LANDSDOWNE AUDITORIUM RENOVATION
330 LANDSDOWNE AVENUE
TORONTO,

FOR

CONSEIL SCOLAIRE VIAMONDE

REQUEST FOR PROPOSAL
22 NOVEMBER 2024

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1 GENERAL

1.1 NORMAL BUSINESS HOURS

.1 The building is occupied and is to be considered “fully operational” from 9am Monday to 4pm Friday.

1.2 PROJECT DELIVERIES

.1 All deliveries are to be communicated to Site Staff for coordination purposes. It is preferred that deliveries are performed outside school drop-off/pick-up hours.

1.3 NOISY, PAINTING, GLUING, SUBSTANCES WITH VOC’S AND / OR STRONG ODOURS AND TARING (SEALANTS, ROOFING, ETC.)

.1 Painting, gluing, working with substances that contain volatile organic compounds (VOC’s) and /or have strong odours and tarring work (sealants, roofing, etc.) are to be performed outside normal business hours.

.2 The Contractor shall minimize any reduction in comfort at the facility.

1.4 PARKING

.1 Owner will make some parking available to Contractor. Location and quantity of parking spaces will be confirmed with Owner.

.2 Determine and make arrangement as required for loading and unloading of equipment and products at times that will not affect public traffic flow and that will be permitted by the City of Toronto. Conform to City by-laws with regard to parking restrictions and other conditions.

1.5 SITE PROTECTION

.1 Dust barriers must be used at all times during dusty work. Poly sheet dust barriers and smoke detectors are to be sealed tight to floor and ceiling and / or to the filter mediums on return air grills etc.

.2 Clean up after all work must be performed immediately and the area(s) are to be left in a clean and safe manner. Failure to clean properly may result in the Contractor being charged for cleaning services obtained by the Building Management and the Building Management may terminate the Contractor’s access.

1.6 ADVANCE NOTIFICATION

.1 Seven (7) business days advance notification is required for any work affecting the building occupants such as the following:

.1 Mold remediation (removal) work / asbestos abatement (removal) work.

.2 Scanning and core drilling.

.3 Notification of start time for painting.

.4 Notification of exterior work.

.5 Notification of any building system shutdown (i.e. power, water, etc.).

.6 Notification of any loss of use area (i.e. washroom shutdown, lunchroom, etc.).

1.7 BREAKER PANELS

.1 Electrical panels must not be touched without first informing and obtaining written permission from Consultant and the Building Management.

.2 Whenever electrical power is shut off the Contractor must “Lock Out” and “Tag Out” any electrical panels or electrical breakers affected.

.3 Panel schedules to be updated each time a change to it is made.

1.8 DOORS

.1 For security purposes the building doors are to be close at all times.

.1 Exit doors must not be propped open for any reason.

.2 All fire doors must be kept closed at all times.

1.9 PROTOCOL FOR SCANNING, CORE DRILLING

.1 Prior to starting the scan work the contractor hired to carry out the work must provide a copy of their health and safety plan to CSV.

.2 The plan must include a copy any of required license(s), a description of the process to be used and any information needed to design safety limits of the work zone. In addition, the plan must include a process to protect the work zone from inadvertent entry, a list of potential hazards that may be encountered by the workers, training and / or instruction that the workers have received to address the hazards and a contingency plan in case of an emergency.

.3 X-Raying is not allowed without prior authorization.

1.10 CORE DRILLING

.1 If dry core drilling will be performed appropriate dust control measure must be identified and used. If wet core drilling will be performed, water control measures must be identified and must be used.

.2 Before commencing the core drilling operation, the Contractor must ensure that it is safe to start drilling. The area must be secured, dust controls are in place, the equipment is set up as intended by the manufacturer, and all safety devices are present and functioning. The location selected to perform the core drilling must be appropriate and will not impact on the structural integrity of the building. The intended path of the coring unit must be free of all embedded power or communication wires, conduits, rebar, pipes and / or structures that could be damaged or disabled.

.3 All sources of asbestos are not to be disturbed. If this is not possible, the appropriate precautions must be taken to prevent the asbestos from becoming airborne which may include the use of either, a type 1, type 2 or type 3 process to comply with the asbestos designated substance regulations O. Reg 838 as am. O. Reg 510/92.

.4 All coring debris must be cleaned up and disposed of and the site returned to its original state after the coring is completed.

.5 If the coring debris contains asbestos, it must be cleaned up following the requirements of the designated substance specifications included in the Contract Documents.

1.11 DESIGNATED SUBSTANCES

.1 Handling and removal of any designated substances shall follow all applicable legislative requirements. Refer to project specific Designated Substances Report in Section 02 82 00 - Asbestos Remediation.

1.12 MAINTANING LIFE SAFETY SYSTEMS IN OCCUPIED FACILITIES

.1 Maintain operational life safety systems and public access to exits in occupied areas during all stages of the Work.

.2 Determine nature and exact locations of existing fire and smoke sensors prior to the commencement of the Work. Avoid direct or indirect jarring while working in adjacent areas and exercise caution to avoid triggering these devices.

.3 Be responsible for costs incurred by Owner on account of false fire alarms activated as a result of the execution of the Work, without adequate precautions.

1.13 PROJECT CONDITIONS, GENERAL

.1 Most of the project will be performed during regular business hours in an operational business setting. Areas will be occupied during normal business hours. At end of each shift, broom clean and leave areas clean and in normal working condition.

.2 All items removed shall be replaced / returned / reinstalled during same shift.

.3 The Contractor shall not be responsible for moving furniture and equipment in areas of Work unless specifically specified in the Scope of Work. The Contractor shall be responsible for repairs or replacements of any damaged furniture.

.4 The Contractor shall cooperate / coordinate with custodian team and CSV project manager, and / or agencies.

1.14 CONTINUITY OF SERVICE

.1 Where equipment and systems are normally required to operate through the course of the Work, notify the CSV at least 2 weeks prior to the necessary interruption of mechanical or electrical service throughout course of Work

.2 Keep duration of interruptions to a minimum not to exceed 4 hours. Interruptions lasting longer than 4hrs will require approval from the Owner.

END OF SECTION

1.1 CASH ALLOWANCES

.1 Refer to the CCDC 2 – 2020Paragraph GC 4.1 Cash Allowances and CCDC 2 – 2020 Supplementary Conditions Paragraph GC 4.1 Cash Allowances for the base details.

.2 Progress payments for Work and Products authorized under allowances will be made in accordance with the payment terms set out in Conditions of the Contract.

.3 Progress payments on accounts of Work authorized under cash allowances shall be included in the Consultant's monthly certificate for payment.

.4 Cash allowances, unless otherwise specified, cover the net cost to the Contractor of services, products, construction machinery and equipment, freight, handling, unloading, storage, installation where indicated, and other authorized expenses incurred in performing the Work. Cash allowances shall not be included by a Subcontractor in the amount for their Sub-contract work.

.5 Supply only allowances shall include:

- .1 Net cost of products.
- .2 Delivery to Site.
- .3 Applicable taxes and duties, excluding HST.

.6 Supply and install allowances shall include:

- .1 Net cost of products.
- .2 Delivery to Site.
- .3 Unloading, storing, handling or products on Site.
- .4 Installation, finishing and commissioning of products.
- .5 Applicable taxes and duties, excluding HST.
- .6 The amount of each cash allowance does not include Contractor’s overhead and profit, and other related costs, which shall be included in the Contract Price and not in the cash allowance.

.7 Inspection and testing allowances shall include:

- .1 Net cost of inspection and testing services.
- .2 Applicable taxes and duties, excluding HST.

.8 Other costs related to work covered by cash allowances are not covered by the allowance but shall be included in the Contract Price.

.9 Where costs under a cash allowance exceed the amount of the allowance, the Contractor will be compensated for any excess incurred and substantiated plus an allowance for overhead and profit as set out in the Contract Documents.

.10 Owner / Consultant, may request Contractor to identify potential Suppliers or Subcontractors, as applicable, and to obtain at least three competitive prices for each cash allowance item.

.11 Submit, before application for final payment, copies of all invoices and statements from suppliers and Subcontractors for work which has been paid from cash allowances.

.12 Owner / Consultant, will determine by whom and for what amount each cash allowance item will be performed. Obtain owner’s prior written approval in the form of a Cash Allowance Disbursement Authorization (CADA) before entering into a subcontract, amending an existing subcontract, or performing own forces work included in a cash allowance. Upon issuance of the CADA, the Contractor’s responsibilities for a cash allowance item shall be the same as for work of the Contract.

.13 The “Cash Allowances” expected, and the amount of each allowance is listed in the Bid package.

END OF SECTION

1 GENERAL

1.1 ALTERNATIVES AND SUBSTITUTIONS

.1 Refer to the Rate Bid Form included in the Bid package - Alternate Prices.

.2 Requests for substitutions will not be accepted prior to the Notification of Award. Where the Specifications include the “or approved alternate” clause, substitutions will be considered by the Consultant provided that:

.1 The materials and / or products specified are not available.

.2 Substitute products to those specified, which are brought to the attention of, and considered by Project Team after the Contract Award as "equivalent" to those specified will result in a credit to the Contract Price.

.3 Substitute products to those specified which are brought to the attention of, and considered by Project Team after the Contract Award as "superior" to those specified will result in a change to the Contract Price.

.4 The proposed substitutions have been investigated and complete data are submitted in accordance with the Specifications. Proposed substitutions to show the material and product names and complete data and specifications and state what difference, if any, will be made to the Contract Price for each substitution, should it be accepted.

.5 Data relating to changes in the Contract Schedule, if any, and relation to other Work have been submitted.

.6 Same warranty is given for the substitution as for the original product specified.

.7 All claims are waived for additional costs related to the substitution which may subsequently arise. Installation of the accepted substitution is coordinated into the Work and that full responsibility is assumed when substitutions affect other work. Make any necessary changes required to complete the Work. Revisions to the drawings for incorporation of the substitutions shall be made by the Consultant and all costs associated with the revisions shall be borne by the Contractor.

.8 Should the proposed substitution be accepted either in part or in whole, the Contractor will assume full responsibility when the substitution affects any other work or work of other Sections (Subcontractors). Drawing changes required as a

.9 result of the substitution will be executed by the Consultant at the Contractor's expense.

.10 Proposed substitutions must satisfy all design conditions and other specified requirements. Properties included but not limited to the following as applicable, will be considered:

.1 Physical dimension requirements must satisfy the space limitations,

.2 Static and dynamic weight limitations,

.3 Structural properties,

.4 Audible noise levels,

.5 Vibration generation,

.6 Interchangeability of parts and / or components,

.7 Accessibility for maintenance,

.8 Possible removal or replacement,

.9 Colours,

.10 Textures,

.11 Compatibility with other materials, products, assemblies and components.

.3 Substitutions to methods or process described in the Specifications or drawings, may be proposed for the consideration of the Consultant.

.4 Ensure that such substitutions are in accordance with the following requirements:

.1 Time spent by the Consultant in evaluating the substitution shall not be the basis for a claim by the Contractor for extensions;

.2 Clearly indicate how the proposed substitutions would be advantageous to the Owner or in the opinion of the Contractor would improve the operation of the installation;

.3 The cost of all changes in the work of Other Contractors, necessitated by the substituted methods or processes, if accepted, is borne by the Contractor;

.4 The substituted methods or processes fit into space allotted for the specified methods or processes. Revisions to the drawings for incorporation of the substitutions shall be made by the Consultant and all costs associated with the revisions shall be borne by the Contractor.

.5 Substitutions will not be considered if:

.1 They are indicated or implied on shop drawings or product data without formal request;

.2 Acceptance will require substantial revision of the Specifications and Drawings.

.3 Contractor fails to order a specified Product or order a Product by a specified manufacturer in adequate time to meet Contractor's construction schedule

.6 Do not substitute products or methods or processes into the Work unless such substitutions have been specifically approved for the Work by the Consultant.

.7 Approved substituted products shall be subject to Consultant's sole discretion. Approved substituted products shall only be installed after receipt of the Consultant's written approval.

.8 The cost of changes in the Work of a Contractor necessitated by the use of proposed material and / or product substitution is to be borne by the Contractor proposing the substitution.

.9 The Contract Price will be adjusted accordingly to any and all credits arising from the substitutions mentioned above.

1.2 SUBMISSION REQUIREMENTS FOR PROPOSED SUBSTITUTIONS

.1 Include with each proposed Substitution the following information:

.1 Identification of the Substitution, including product name and manufacturer's name, address, telephone numbers, and web site.

.2 Reason(s) for proposing the Substitution.

.3 A statement verifying that the Substitution will not affect the Contract Price and Contract Time or, if applicable, the amount and extent of a proposed increase or decrease in Contract Price and Contract Time on account of the Substitution.

.4 A statement verifying that the Substitution will not affect the performance (or warrant) of other parts of the Work.

.5 Manufacturer's Product literature for the Substitution, including material descriptions, compliance with applicable codes and reference standards, performance and test data, compatibility with contiguous materials and systems, and environmental considerations.

.6 Product samples as applicable.

.7 A summarized comparison of the physical properties and performance characteristics of the specified Product and the Substitution, with any significant variations clearly highlighted.

.8 Availability of maintenance services and sources of replacement materials and parts for the Substitution, as applicable, including associated costs and time frames.

.9 If applicable, estimated life cycle cost savings resulting from the Substitution.

.10 Details of other projects and applications where the Substitution has been used.

.11 Identification of any consequential changes in the Work to accommodate the Substitution and any consequential effects on the performance of the Work as a whole. A later claim for an increase to the Contract Price or Contract Time for other changes in the Work attributable to the Substitution will not be considered.

1.3 METHODS OR PROCESSES SUBSTITUTIONS

.1 The Contractor may suggest, for the consideration of the Project Team, substitutions to methods or processes described in the Specifications and / or shown on the Drawings. Any application for such substitutions must indicate how such substitutions are advantageous to the Owner or to the better fulfillment of the Contract. There shall be no obligation on the parties concerned to accept any such suggestions. Requests for alternatives must be made in duplicate and be accompanied by catalogue cuts, specifications and methods of installation.

.2 Time spent by the Consultant in evaluating the substitution shall not be the basis for a claim by the Contractor for extensions to the Contract Time.

.3 The Contractor will be responsible for substitutions to methods or processes concerning such work, and the warranty covering all parts of the Work shall not be affected.

.4 The cost of all changes in the work of other Sections (Subcontractors) necessitated by the use of substituted methods or processes, is to be borne by the Section (Subcontractor) proposing the substitution.

.5 Said methods or processes must fit into the space allotted for the specified methods or processes.

1.4 CREDITS ARISING FROM SUBSTITUTIONS

.1 Any and all credits arising from the substitutions mentioned will be credited to the Contract and the Contract Price will be adjusted accordingly.

1.5 RELATED CHANGES

.1 The Contractor will advise Subcontractors and suppliers and make all necessary changes to the related Work occasioned by Owner’s acceptance of alternatives.

END OF SECTION

1.1 SUMMARY

.1 This Section specifies Contractor's responsibilities for preparation and submission of schedules and other documentation related to tracking construction progress.

.2 The purpose of submitting progress schedules is to:

.1 Inform Owner and Consultant of actual progress versus planned progress, and

.2 Provide assurance that scheduling issues are being proactively identified and addressed in a timely manner, and that planned progress is being maintained as closely as possible.

1.2 CONSTRUCTION PROGRESS SCHEDULE

.1 Format and Content:

.1 Prepare schedule in the form of a Critical Path Method (CPM) Gantt chart using Microsoft Project or equivalent software as agreed.

.2 Provide a work breakdown structure identifying key activities, work packages, and major milestones, including long delivery Products, inspection and testing activities, preparation and review of mock-ups, Owner decisions for cash allowances, shutdown or closure activities, delivery of Owner supplied Products, Owner performed work, demonstration and training activities, and similar items, at a sufficient level of detail to effectively manage construction progress.

.3 Indicate milestone dates for Ready-for-Takeover and Substantial Performance of the Work.

.2 Submission:

.1 Submit initial schedule to *Owner* and *Consultant* within 15 *Working Days* after *Contract* award via email as .pdf file.

.2 Submit updated progress schedule monthly to Owner and Consultant, indicating actual and projected start and finish dates with report date line and progress, critical path, float, and baseline comparison to current progress.

1.3 SUBMITTALS SCHEDULE

.1 Format and Content:

.1 Prepare schedule identifying all required *Shop Drawing*, *Product* data, and sample submissions, including samples required for testing.

.2 Prepare schedule in electronic format.

.3 Provide a separate line for each required submittal, organized by

Specifications section names and numbers, and further broken down by individual *Products* and systems as required.

.4 For each required submittal, show planned earliest date for initial submittal, earliest date for return of reviewed submittal by *Consultant* and latest date for return of reviewed submittal without causing delay.

.5 Allow time in schedule for resubmission of submittals, should resubmission be necessary.

.2 Submission:

.1 Submit initial schedule to Consultant within 15 Working Days after Contract award via email.

.2 Submit updated submittals schedule monthly to Owner and Consultant.

1.4 SCHEDULE MANAGEMENT

.1 A schedule submitted as specified and accepted by Consultant shall become the baseline schedule and shall be used as the baseline for updates.

.2 At each regular progress meeting, review and discuss current construction progress and submittals schedules with Consultant and Owner, including activities that are behind schedule and planned measures to regain schedule slippage in key areas on or near the critical path.

.3 Activities considered behind schedule are those with start or completion dates later than the dates shown on the baseline schedule.

1.5 RECORDING ACTUAL SITE CONDITIONS ON AS-BUILT DRAWINGS

.1 Obtain from *Consultant* an electronic copy of the construction *Drawings* for the purpose of creating as-built drawings. Record information in electronic form, clearly identifying as-built deviations from the originally obtained construction *Drawings*.

.2 Clearly label each drawing as “AS-BUILT DRAWING”. Record information concurrently with construction progress. Do not conceal *Work* until required information is recorded.

.3 Record actual construction including:

.1 Measured depths of elements of foundation in relation to finish first floor datum.

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.3 Measured locations of pipes, ducts, conduits, outlets, fixtures, access panels, and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.

.5 Changes made by Change Orders and Supplemental Instructions

.6 References to Shop Drawings, where Shop Drawings show more detail.

.4 Do not use as-built drawings for construction purposes.

1.6 PROGRESS PHOTOGRAPHS

.1 Arrange for periodic digital photography to document and provide a photographic record of the progress of the *Work*.

.2 Identify each photograph by project name and date taken.

.3 Submission: Submit .jpg format files in standard resolution via project web site monthly.

.4 Do not use progress or any other *Project* photographs for promotional purposes without *Owner*'s written consent.

END OF SECTION

1.1 ADMINISTRATIVE

.1 Submit specified submittals to Consultant for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in the Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time or for Product substitutions or other deviations from the Drawings and Specifications.

.2 Where required by authorities having jurisdiction, provide submittals to such authorities for review and approval.

.3 Do not proceed with Work affected by a submittal until review is complete.

.4 Present Shop Drawings, Product data, and samples in SI metric units. Where items or information is not produced in SI Metric, converted values are acceptable.

.5 Review submittals, provide verified field measurements where applicable, and affix Contractor's review stamp prior to submission to Consultant. Contractor's review stamp represents that necessary requirements have been determined and verified, and that the submittal has been checked and coordinated with requirements of the Work and Contract Documents.

.6 Verify field measurements and that affected adjacent work is coordinated.

.7 Submittals not meeting specified requirements will be returned with comments.

.8 Reproduction of construction Drawings to serve as background for Shop Drawings is not permitted.

.9 Do not propose Substitutions or deviations from Contract Documents via Shop Drawing, Product data and sample submittals. Proposed alternates must follow the procedures outlined in Sectio 01 25 00.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Indicate Products, methods of construction, and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of the Work.

.2 Where Products attach or connect to other Products, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and Installed. Indicate cross-references to Drawings, Specifications and other already reviewed Shop Drawings.

.3 Accompany submittals with a transmittal information including:

- .1 Date.
- .2 *Project* title and number.
- .3 *Contractor*'s name and address.
- .4 Identification of each submittal item and quantity.
- .5 Other pertinent data.

.4 *Shop Drawing* submittals shall include:

- .1 Date and revision dates.
- .2 *Project* title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 *Contractor*'s stamp, date, and signature of *Contractor*'s authorized representative

responsible for *Shop Drawing* review, indicating that each *Shop Drawing* has been reviewed for compliance with *Contract Documents* and, where applicable, that field measurements have been verified.

.5 Details of appropriate portions of the *Work* as applicable:

.1 Fabrication.

.2 Layout, showing dimensions, including identified field dimensions, and clearances.

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

.7 Operating weight.

.8 Wiring diagrams.

.9 Single line and schematic diagrams.

.10 Relationships to other parts of the *Work*.

.6 *Product* data submittals shall include material safety data sheets (MSDS) for all controlled Products.

.7 Submit electronic copy of *Shop Drawings* where specified in the technical *Specifications*

.8 Submit electronic copy of Product data sheets or brochures where specified in the technical *Specifications*.

.9 Where a submittal includes information not applicable to the *Work,* clearly identify applicable information and strike out non-applicable information.

.10 Supplement standard information to include details applicable to *Project*.

.5 Allow 10 *Working Days* for *Consultant*'s review of each submittal and incorporate in submittals schedule specified in Section 01 32 00 – Construction Progress Documentation. Allow additional 5 *Working Days* where sub-*Consultant r*eview is required.

.6 If upon *Consultant*'s review no errors or omissions are discovered, or if only minor corrections are required as indicated, submittal will be returned / approved and fabrication or installation of *Work* may proceed.

.7 If upon *Consultant*'s review significant errors or omissions are discovered, a so noted copy will be returned for correction and resubmission. Do not commence fabrication or installation.

.8 *Consultant*'s notations on submittals are intended to ensure compliance with *Contract Documents* and are not intended to constitute a change in the *Work* requiring change to the *Contract Price* or *Contract Time*. If *Contractor* considers any *Consultant*'s notation to be a change in the *Work*, promptly notify *Consultant* in writing before proceeding with the *Work*.

.9 Resubmit corrected submittals through same procedure indicated above, before any fabrication or installation of the *Work* proceeds. When resubmitting, notify *Consultant* in writing of any revisions other than those requested by *Consultant*.

1.3 SAMPLES

.1 Submit samples for *Consultant*'s review in triplicate where specified in the technical *Specifications*. Label samples as to origin, *Project* name, and intended use.

.2 Deliver samples prepaid to *Consultant*'s business address.

.3 Notify *Consultant* in writing of any deviations in samples from requirements of *Contract Documents*.

.4 Where a required colour, pattern or texture has not been specified, submit full range of available *Products* meeting other specified requirements.

.5 *Consultant* selection from samples is not intended to change the *Contract Price* or *Contract Time*. If a selection would affect the *Contract Price* or *Contract Time*, notify *Consultant* in writing prior to proceeding with the *Work*.

.6 Resubmit samples as required by *Consultant* to comply with *Contract Documents*.

.7 Reviewed and accepted samples will establish the standard against which installed *Work* will be reviewed.

END OF SECTION

1.1 REFERENCE STANDARDS

.1 "Reference standards" means consensus standards, trade association standards, guides, and other publications expressly referenced in Contract Documents.

.2 Where an edition or version date is not specified, referenced standards shall be deemed to be the latest edition or revision issued by the publisher at the time of bid closing. However if a particular edition or revision date of a specified standard is referenced in an applicable code or other regulatory requirement, the regulatory referenced edition or version shall apply.

.3 Reference standards establish minimum requirements. If Contract Documents call for requirements that differ from a referenced standard, the more stringent requirements shall govern.

.4 If compliance with two or more reference standards is specified and the standards establish different or conflicting requirements, comply with the most stringent requirement. Refer uncertainties to Consultant for clarification.

.5 Within the Specifications, reference may be made to the following standards writing, testing, or certification organizations by their acronyms or initialisms:

.1 AA - Aluminum Association

.2 ACI - American Concrete Institute

.3 AISC - American Institute of Steel Construction

.4 ANSI - American National Standards Institute

.5 ASME - American Society of Mechanical Engineers

.6 ASTM - American Society for Testing and Materials

.7 AWMAC - Architectural Woodwork Manufacturers Association of Canada

.8 AWPA - American Wire Producers Association

.9 CaGBC - Canadian Green Building Council

.10 CGSB - Canadian General Standards Board

.11 CISC - Canadian Institute of Steel Construction

.12 CPCI - Canadian Prestressed Concrete Institute

.13 CSA - Canadian Standards Association

.14 CSSBI - Canadian Sheet Steel Building Institute

.15 CWB – Canadian Welding Bureau

.16 ICEA - Insulated Cable Engineers Association

.17 IEEE - Institute of Electrical and Electronics Engineers

.18 IGMAC – Insulating Glass Manufacturers Association of Canada

.19 LEED - Leadership in Energy and Environmental Design

.20 MPP – Master Painters Institute

.21 MSS - Manufacturers Standardization Society of the Valve and Fittings Industry

.22 NAAMM - National Association of Architectural Metal Manufacturers

.23 NEMA - National Electrical Manufacturers Association

.24 NFPA - National Fire Protection Association

.25 NHLA - National Hardwood Lumber Association

.26 NLGA - National Lumber Grades Authority

.27 SSPC – The Society for Protective Coatings

.28 TTMAC - Terrazzo, Tile and Marble Association of Canada

.29 ULC - Underwriters' Laboratories of Canada

1.2 INDEPENDENT INSPECTION AND TESTING AGENCIES

.1 Except as otherwise specified, Owner will retain and pay for independent inspection and testing agencies to inspect, test, or perform other quality control reviews of parts of the Work.

.2 Retain and pay for inspection and testing that is for Contractor's own quality control or is required by regulatory requirements.

.3 Section 01 21 00 – Allowances specifies a cash allowance for independent inspection and testing services to be retained and paid for by Contractor. Cash allowance excludes any inspection and testing that is for Contractor's own quality control or is required by regulatory requirements.

.4 Employment of inspection and testing agencies by Contractor or Owner does not relieve Contractor from responsibility to perform the Work in accordance with Contract Documents.

.5 Allow and arrange for inspection and testing agencies to have access to the Work, including access to off site manufacturing and fabrication plants.

.6 For inspection and testing required by Contract Documents or by authorities having jurisdiction, provide Consultant and inspection and testing agencies with timely notification in advance of required inspection and testing.

.7 Submit test samples required for testing in accordance with submittals schedule specified in Section 01 32 00 – Construction Progress Documentation.

.8 Provide labour, Construction Equipment and temporary facilities to obtain and handle test samples on site.

1.3 INSPECTION AND TESTING AGENCY REPORTS

.1 For inspection and testing required by *Contract Documents* or by regulatory requirements, and performed by *Contractor* retained inspection and testing agencies, submit to *Consultant* copies of reports. Submit within 3 days after completion of inspection and testing.

.2 For inspection and testing performed by *Owner* retained inspection and testing agencies, copies of inspection and testing agency reports will be provided to *Contractor*.

1.4 MOCK-UPS

.1 Prepare mock-ups of *Work* as specified in the technical *Specifications*. If a mock-up location is not indicated in the *Drawings* or *Specifications*, locate where directed by *Consultant*.

.2 Modify mock-up as required until *Consultant* approval is obtained.

.3 Approved mock-ups establish an acceptable standard for the *Work*.

.4 Protect mock-ups from damage until the *Work* they represent is complete.

.5 Unless otherwise specified in the technical *Specifications*, approved mock-ups forming part of the *Work* may remain as part of the *Work*.

.6 Remove mock-ups only when the *Work* they represent is complete or when otherwise directed by *Consultant*.

END OF SECTION

1 GENERAL

1.1 TEMPORARY WORK

.1 Accept responsibility for all temporary structures and comply with applicable rules and regulations. Pay all taxes and all other charges.

.2 The expression "provide" shall be deemed to include the provision, installation and finishing, maintenance, servicing and removal of the work described. All Work damaged by temporary installations shall be repaired and made good at no expense to the Owner.

1.2 TEMPORARY UTILITIES - GENERAL

.1 Provide temporary utilities as specified and as otherwise necessary to perform the Work expeditiously.

.2 Remove temporary utilities after use.

1.3 TEMPORARY WATER SUPPLY

.1 Separate from water required for fire protection with adequate pressure at every floor, except hose extensions which shall be provided by Subcontractors requiring them.

.2 Water supply shall be potable, available from existing service. Be responsible for the careful and reasonable use of any Owner supplied water.

.3 If large quantity of water is required for the Work, a water meter shall be provided to monitor Contractor's water usage. Provide proof to Consultant of no drop in water pressure in water supply for affected tenant (s) (i.e. Contractors using hydrodemolition method to remove concrete in a project or similar instances).

1.4 TEMPORARY HEATING AND VENTILATION

.1 *Contractor* may connect to and use *Owner*'s existing supply of natural gas for temporary use during construction, subject to existing available volume and pressure. Usage at no cost to *Contractor*.

.2 Vent construction heaters in enclosed spaces to the outside or use flameless type of construction heaters.

.3 Provide temporary heat for the *Work* as required to:

.1 Facilitate progress of *Work*.

.2 Protect the *Work* against dampness and cold.

.3 Prevent moisture condensation on surfaces, freezing, or other damage to finishes or stored *Products*.

.4 Maintain specified minimum ambient temperatures and humidity levels for storage, installation and curing of *Products*.

.5 After building is enclosed, maintain interior temperature of minimum 10 degrees C.

.4 Provide temporary ventilation for the *Work* as required to:

.1 Prevent accumulations of fumes, exhaust, vapours, gases and other hazardous, noxious, or volatile substances in enclosed spaces, as required to maintain a safe work environment meeting applicable regulatory requirements.

.2 Ensure that hazardous, noxious, or volatile substances do not migrate to *Owner* occupied spaces.

.3 Ventilate temporary sanitary facilities.

.4 New permanent building heating and ventilation systems may be used during construction, at Contractor's option. If used during construction:

.1 *Owner* will pay utility costs resulting from the use of permanent systems.

.2 Operate systems in a non-wasteful and energy efficient manner. Be responsible for any system damage.

.3 Just prior to *Substantial Performance of the Work*, replace filters, and perform other required maintenance to ensure systems are in as near as new condition as possible. Refer also to Division 15 requirements.

.4 Ensure that systems manufacturers' warranties do not commence until the date of *Substantial Performance of the Work* or, if manufacturers' warranties do commence earlier when systems are put into use, arrange for necessary extension of manufacturers' warranties or provide equivalent coverage under *Contractor*'s warranty.

END OF SECTION

1.1 CONTRUCTION FACILITIES - GENERAL

.1 Provide temporary construction facilities as necessary for performance of the *Work* and in compliance with applicable regulatory requirements.

.2 Maintain temporary construction facilities in good condition for the duration of the *Work*.

.3 Remove temporary construction facilities from *Place of the Wor*k when no longer required.

1.2 CONSTRUCTION PARKING

.1 Limited parking will be permitted at *Place of the Work*, within the assigned limits of construction only, during normal working hours, provided it does not disrupt continuing operation of the facility. Outside of normal working hours, staff parking can be used.

1.3 VEHICULAR ACCESS

.1 Provide and maintain adequate access to Place of the Work.

.2 Existing roads at Place of the Work may be used for access to Place of the Work, provided Contractor assumes responsibility for any damage caused by construction traffic, and prevents or promptly cleans up any mud tracking or material spillage.

1.4 SITE OFFICES

.1 Space within the existing building will not be made available to the Contractor for use as a Site Office.

.2 Contractor shall provide a temperature controlled and ventilated office, with suitable lighting, of sufficient size to accommodate site meetings.

1.5 SANITARY FACILITIES

.1 Provide sanitary facilities for workers.

.2 Do not use permanent washroom facilities during construction.

.3 Keep sanitary facilities clean and fully stocked with the necessary supplies.

1.6 FIRE PROTECTION

.1 Provide and maintain temporary fire protection systems and equipment during construction. Contractor shall provide firewatch as required; costs for firewatch shall be included in base bid price.

END OF SECTION

1.1 BARRIERS AND ENCLOSURES - GENERAL

.1 Provide temporary barriers and enclosures necessary to protect the public and building occupants and to secure *Place of the Wor*k during performance of the *Work*.

.2 Comply with applicable regulatory requirements.

.3 Maintain temporary barriers and enclosures in good condition for the duration of the *Work*.

.4 Remove temporary barriers and enclosures from *Place of the Work* when no longer required.

1.2 FENCING

.1 Erect temporary security and safety site fencing, complete with sediment control fabric, minimum 1.8m high, using self-supporting wire fence sections enclosing applicable portions of site as necessary to maintain safety and security. Maintain site fencing in good repair until removed.

1.3 WEATHER ENCLOSURES

.1 Provide weather tight enclosures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.

.2 Provide weather enclosures to protect floor areas where walls are not finished and to enclose work areas that require temporary heating.

.3 Design weather enclosures to withstand wind pressure and snow loading requirements.

1.4 DUST TIGHT PARTITIONS

.1 Provide dust tight wood stud and plywood and/or steel stud and gypsum board partitions to localize interior building areas from dust and noise generating activities.

.2 Erect, maintain, and relocate partitions as required to facilitate construction operations and *Owner*'s operational requirements.

1.5 FIRE ROUTES

.1 Maintain fire access routes, including overhead clearances, for use by emergency response vehicles.

1.6 PROTECTION OF BUILDING FINISHES

.1 Provide necessary temporary barriers and enclosures to protect [existing and] completed or partially completed finished surfaces from damage during performance of the *Work* until substantial completion.

END OF SECTION

1.1 GENERAL

.1 Provide *Products* that are not damaged or defective, and suitable for purpose intended, subject to specified requirements. If requested by *Consultant*, furnish evidence as to type, source and quality of *Products* provided.

.2 Unless otherwise specified, maintain uniformity of manufacture for like items throughout.

.3 Permanent manufacturer's markings, labels, trademarks, and nameplates on *Products* are not acceptable in prominent locations, except where required by regulatory requirements or for operating instructions, or when located in mechanical or electrical rooms.

1.2 PRODUCT AVAILABILITY AND DELIVERY TIMES

.1 Promptly upon Contract award and periodically during construction, review and confirm *Product* availability and delivery times. Order *Products* in sufficient time to meet the construction progress schedule and the *Contract Time*.

.2 If a specified *Product* is no longer available, promptly notify *Consultant*. *Consultant* will take action as required.

.3 If delivery delays are foreseeable, for any reason, promptly notify *Consultant*.

.1 If a delivery delay is beyond *Contractor*'s control, *Consultant* will provide direction.

.2 If a delivery delay is caused by something that was or is within *Contractor*'s control, *Contractor* shall propose actions to maintain the construction progress schedule for *Consultant*'s review and acceptance.

1.3 STORAGE, HANDLING, AND PROTECTION

.1 Store, handle, and protect *Products* during transportation to *Place of the Work* and before, during, and after installation in a manner to prevent damage, adulteration, deterioration and soiling.

.2 Comply with manufacturer's instructions for storage, handling and protection.

.3 Store packaged or bundled *Products* in original and undamaged condition with manufacturer's seals and labels intact. Do not remove from packaging or bundling until required in *Work*.

.4 Comply with the requirements of the workplace hazardous materials information system (WHMIS) regarding use, handling, storage, and disposal of hazardous materials, including requirements for labeling and the provision of material safety data sheets (MSDS).

.5 Store *Products* subject to damage from weather in weatherproof enclosures.

.6 Store sheet *Products* on flat, solid, supports and keep clear of ground. Slope to shed moisture.

.7 Remove and replace damaged *Products*.

END OF SECTION

1.1 SURVEYOR QUALIFICATIONS

.1 Engage a registered land surveyor, licensed to practice in *Place of the Work*.

1.2 SUBMITTALS

.1 Submit name and address of registered land surveyor performing survey work.

.2 Submit to *Owner* and *Consultant* the survey of the *Work* prepared and issued by a registered land surveyor on completion of the building footings and foundations and on completion of the *Work*.

1.3 SURVEY REFERENCE POINTS

.1 Locate and confirm permanent reference points prior to starting site work. Preserve and protect permanent reference points on site during construction.

.2 Do not change or relocate reference points without prior written notice to *Consultant*.

.3 Report to *Consultant* when a reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations. Require registered land surveyor to replace reference points in accordance with original survey.

1.4 SURVEY REQUIREMENTS

.1 Establish sufficient permanent benchmarks on site, referenced to established benchmarks by survey control points.

.2 Confirm that existing survey reference points are in accordance with *Owner*'s survey and property limits.

.3 Establish initial lines and levels for building layout.

.4 Maintain a complete, accurate log of control and survey work as it progresses. Record locations with horizontal and vertical data in project record documents.

1.5 EXISTING UTILITIES AND STRUCTURES

.1 Before commencing excavation, drilling or other earthwork, establish or confirm location and extent of all existing underground utilities and structures in work area.

.2 Promptly notify *Consultant* if underground utilities, structures, or their locations differ from those indicated in *Contract Documents* or in available project information. *Consultant* will provide appropriate direction.

.3 Record locations of maintained, re-routed and abandoned utility lines.

1.6 VERIFICATION OF EXISTING CONDITIONS

.1 Where work specified in any Section is dependent on the work of another Section or Sections having been properly completed, verify that work is complete and in a condition suitable to receive the subsequent work. Commencement of work of a Section that is dependent on the work of another Section or Sections having been properly completed, means acceptance of the existing conditions.

.2 Verify that ambient conditions are suitable before commencing the work of any Section and will remain suitable for as long as required for proper setting, curing, or drying of *Products* used.

.3 Ensure that substrate surfaces are clean, dimensionally stable, cured and free of contaminants.

.4 Notify *Consultant* in writing of unacceptable conditions.

END OF SECTION

1.1 SUMMARY

.1 Except where otherwise specified in technical *Specifications* or otherwise indicated on *Drawings*, comply with requirements of this Section.

1.2 MANUFACTURER'S INSTRUCTIONS

.1 Install, erect, or apply *Products* in strict accordance with manufacturer's instructions.

.2 Notify *Consultant*, in writing, of conflicts between *Contract Documents* and manufacturer's instructions where, in *Contractor*'s opinion, conformance with *Contract Documents* instead of the manufacturer's instructions may be detrimental to the *Work* or may jeopardize the manufacturer's warranty.

.3 Do not rely on labels or enclosures provided with *Products*. Obtain written instructions directly from manufacturers.

.4 Provide manufacturer's representatives with access to the *Work* at all times. Render assistance and facilities for such access so that manufacturer's representatives may properly perform their responsibilities.

1.3 CONCEALMENT

.1 Conceal pipes, ducts, and wiring in floors, walls and ceilings in finished areas:

.1 after review by *Consultant* and authority having jurisdiction, and

.2 where locations differ from those shown on *Drawings*, after recording actual locations on as-built drawings.

.2 Provide incidental furring or other enclosures as required.

.3 Notify *Consultant* in writing of interferences before installation.

1.4 FASTENINGS - GENERAL

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials.

.2 Prevent electrolytic action and corrosion between dissimilar metals and materials by using suitable non-metallic strips, washers, sleeves, or other permanent separators to avoid direct contact.

.3 Use non-corrosive fasteners and anchors for securing exterior work [and in spaces where high humidity levels are anticipated].

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Do not use fastenings or fastening methods that may cause spalling or cracking of material to which anchorage is made.

1.5 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Bolts shall not project more than one diameter beyond nuts.

1.6 FIRE RATED ASSEMBLIES

.1 When penetrating fire rated walls, ceiling, or floor assemblies, completely seal voids with fire-stopping materials, smoke seals, or both, in full thickness of the construction element as required to maintain the integrity of the fire rated assembly.

1.7 LOCATION OF FIXTURES, OUTLETS AND DEVICES

.1 Consider location of fixtures, outlets, and devices indicated on *Drawings* as approximate.

.2 Locate fixtures, outlets, and devices to provide minimum interference, maximum usable space, and as required to meet safety, access, maintenance, acoustic, and regulatory, including barrier free, requirements.

.3 Promptly notify *Consultant* in writing of conflicting installation requirements for fixtures, outlets, and devices. If requested, indicate proposed locations and obtain approval for actual locations.

1.8 PROTECTION OF COMPLETED WORK AND WORK IN PROGRESS

.1 Adequately protect parts of the *Work* completed and in progress from any kind of damage.

.2 Promptly remove, replace, clean, or repair, as directed by *Consultant,* work damaged as a result of inadequate protection.

.3 Do not load or permit to be loaded any part of the *Work* with a weight or force that will endanger the safety or integrity of the *Work*.

1.9 REMEDIAL WORK

.1 Notify *Consultant* of, and perform remedial work required to, repair or replace defective or unacceptable work. Ensure that properly qualified workers perform remedial work. Coordinate adjacent affected work as required.

END OF SECTION

1.1 REQUEST FOR CUTTING, PATCHING AND REMEDIAL WORK

.1 Submit written request in advance of cutting, coring, or alteration which affects or is likely to affect:

.1 Structural integrity of any element of the Work.

.2 Integrity of weather-exposed or moisture-resistant elements.

.3 Efficiency, maintenance, or safety of any operational element.

.4 Visual qualities of sight-exposed elements.

.5 Work of *Owner* or other contractors.

.6 Warranty of *Products* affected.

.2 Include in request:

.1 Identification of *Project*.

.2 Location and description of affected work, including drawings or sketches as required.

.3 Statement on necessity for cutting or alteration.

.4 Description of proposed work, and *Products* to be used.

.5 Alternatives to cutting and patching.

.6 Effect on work of *Owner* or other contractors.

.7 Written permission of affected other contractors.

.8 Date and time work will be executed.

1.2 PRODUCTS

.1 Unless otherwise specified, when replacing existing or previously installed Products in the course of cutting and patching work, use replacement Products of the same character and quality as those being replaced.

.2 If an existing or previously installed Product must be replaced with a different Product, submit request for substitution in accordance with Section 01 25 00 - Substitution Procedures.

1.3 PREPARATION

.1 Inspect existing conditions in accordance with Section 01 71 00 - Examination and Preparation.

.2 Provide supports to ensure structural integrity of surroundings; provide devices and methods to protect other portions of the *Work* from damage.

.3 Provide protection from elements for areas that may be exposed by uncovering work.

1.4 EXISTING UTILITIES

.1 When breaking into or connecting to existing services' utilities, execute the Work at times directed by local governing authorities, with a minimum of disturbance to the Work, pedestrian and vehicular traffic, and ongoing Owner operations.

.2 Maintain excavations free of water.

.3 Keep duration of interruptions to a minimum.

.4 Carry out interruptions after regular working hours of occupants, preferably on weekends, unless Owner's prior written approval is obtained.

.5 Protect and maintain existing active services. Record location of services, including depth, on as-built drawings.

.6 Construct or erect barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures as required to protect pedestrian and vehicular traffic.

1.5 CUTTING, PATCHING, AND REMEDIAL WORK

.1 Coordinate and perform the *Work* to ensure that cutting and patching work is kept to a minimum.

.2 Perform cutting, fitting, patching, and remedial work [including excavation and fill, to make the affected parts of the *Work* come together properly and complete the *Work*.

.3 Provide openings in non-structural elements of the *Work* for penetrations of mechanical and electrical work.

.4 Perform cutting by methods to avoid damage to other work

.5 Provide proper surfaces to receive patching, remedial work, and finishing.

.6 Perform cutting, patching, and remedial work using competent and qualified specialists familiar with the *Products* affected, in a manner that neither damages nor endangers the *Work*.

.7 Do not use pneumatic or impact tools without *Consultant*'s prior approval.

.8 Ensure that cutting, patching, and remedial work does not jeopardize manufacturers' warranties.

.9 Refinish surfaces to match adjacent finishes. For continuous surfaces refinish to nearest intersection. For an assembly, refinish entire unit.

.10 Fit work to pipes, sleeves, ducts, conduit, and other penetrations through surfaces with suitable allowance for deflection, expansion, contraction, acoustic isolation, and firestopping.

.11 Maintain fire ratings of fire rated assemblies where cutting, patching, or remedial work is performed. Completely seal voids or penetrations of assembly with firestopping material to full depth or with suitably rated devices.

END OF SECTION

1.1 REGULATORY REQUIREMENTS

.1 Comply with applicable regulatory requirements when disposing of waste materials.

.2 Obtain permits from authorities having jurisdiction and pay disposal fees where required for disposal of waste materials and recyclables.

1.2 GENERAL CLEANING REQUIREMENTS

.1 Provide adequate ventilation during use of volatile or noxious substances. Do not rely on building ventilation systems for this purpose.

.2 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.3 Prevent cross-contamination during the cleaning process.

.4 Notify the *Consultant* of the need for cleaning caused by *Owner* or other contractors.

1.3 PROGRESSIVE CLEANING AND WASTE MANAGEMENT

.1 Maintain the *Work* in a tidy and safe condition, free from accumulation of waste materials and construction debris.

.2 Provide appropriate, clearly marked, containers for collection of waste materials and recyclables. Location of containers to be agreed with Owner.

.3 Remove waste materials and recyclables from work areas, separate, and deposit in designated containers at end of each *Working Day*. Collect packaging materials for recycling or reuse.

.4 Remove waste materials and recyclables from *Place of the Work* at regular intervals.

.5 Clean interior building areas prior to start of finish work and maintain free of dust and other contaminants during finishing operations.

.6 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly finished surfaces nor contaminate building systems.

1.4 FINAL CLEANING

.1 Before final cleaning, arrange a meeting at *Place of the Work* to determine the acceptable standard of cleaning. Ensure that *Owner*, *Contractor* and cleaning company are in attendance.

.2 Remove from *Place of the Work* surplus *Products*, waste materials, recyclables, *Temporary Work*, and *Construction Equipment* not required to perform any remaining work.

.3 Remove dust from lighting reflectors, lenses, lamps, bulbs, and other lighting surfaces.

.4 Vacuum clean and dust exposed wall, floor, and ceiling surfaces, behind grilles, louvres and screens, above suspended ceiling tiles.

.5 Clean mechanical, electrical, and other equipment. Replace filters for mechanical

equipment if equipment is used during construction.

.6 Remove waste material and debris from crawlspaces and other accessible concealed spaces.

.7 Remove stains, spots, marks, and dirt from exterior facades.

.8 Clean exterior and interior window glass and frames.

.9 Clean and sweep roofs, clear roof drains and downspouts.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of waste materials and recyclables at appropriate municipal landfills and recycling facilities in accordance with applicable regulatory requirements.

.2 Do not burn or bury waste materials at Place of the Work.

.3 Do not dispose of volatile and other liquid waste such as mineral spirits, oil, paints and other coating materials, paint thinners, cleaners, and similar materials together with dry waste materials or on the ground, in waterways, or in storm or sanitary sewers. Collect such waste materials in appropriate covered containers, promptly remove from Place of the Work, and dispose of at recycling facilities or as otherwise permitted by applicable regulatory requirements.

.4 Cover or wet down dry waste materials to prevent blowing dust and debris.

END OF SECTION

1.1 READY-FOR-TAKEOVER

.1 The prerequisites to attaining Ready-for-Takeover of the Work are described in the General Conditions of the Contract.

1.2 INSPECTION AND REVIEW BEFORE READY-FOR-TAKEOVER

.1 Contractor's Inspection: Before applying for the Consultant's review to establish Ready-for-Takeover of the Work:

.1 Ensure that the specified prerequisites to Ready-for-Takeover of the Work are completed.

.2 Conduct an inspection of the Work to identify defective, deficient, or incomplete work.

.3 Prepare a comprehensive and detailed list of items to be completed or corrected.

.4 Provide an anticipated schedule and costs for items to be completed or corrected.

.2 Consultant's Review: Upon receipt of the Contractor's application for review, together with the Contractor's list of items to be completed or corrected, the Consultant will review the Work. The Consultant will advise the Contractor whether or not the Work is Ready-for-Takeover and will provide the Contractor with a list of items, if any, to be added to the Contractor's list of items to be completed or corrected. Provide the Consultant with a copy of the Contractor's revised list.

.3 Maintain the list of items to be completed or corrected and promptly correct or complete defective, deficient and incomplete work. The Contractor's inspection and Consultant's review procedures specified above shall be repeated until the Work is Ready-for-Takeover and no items remain on the Contractor's list of items to be completed or corrected.

.4 When the Consultant determines that the Work is Ready-for-Takeover, the Consultant will notify the Contractor and the Owner in writing to that effect.

1.3 PREREQUISITES TO FINAL PAYMENT

.1 After Ready-for-Takeover of the Work and before submitting an application for final payment in accordance with the General Conditions of Contract:

.1 Correct or complete all remaining defective, deficient, and incomplete work.

.2 Remove from the Place of the Work all remaining surplus Products, Construction Equipment, and Temporary Work.

.3 Perform final cleaning and waste removal necessitated by the Contractor's work performed after Ready-for-Takeover, as specified in Section 01 74 00 – Cleaning and Waste Management.

1.4 PARTIAL USER OCCUPANCY

.1 If partial Owner occupancy of a part of the Work is required before the date of

Ready-for-Takeover of the entire Work of the Contract, the provisions of this Section shall apply, to the extent applicable, to that part of the Work that the Owner intends to occupy.

1.5 SUBSTANTIAL PERFORMANCE OF THE WORK

.1 The prerequisites to, and the procedures for, attaining substantial performance of the Work, or similar such milestone as provided for in the lien legislation applicable to the Place of the Work, shall be:

.1 independent of those for attaining Ready-for-Takeover of the Work, and

.2 in accordance with the lien legislation applicable to the Place of the Work.

END OF SECTION

1.1 OPERATION AND MAINTENANCE MANUAL

.1 Prepare a comprehensive operation and maintenance manual, in the language of the Contract, using personnel qualified and experienced for this task.

.2 Submit an initial draft of the operation and maintenance manual for *Consultant*'s review. If required by *Consultant*'s review comments, revise manual contents and resubmit for *Consultant*'s review. If required, repeat this process until *Consultant* accepts the draft manual in writing.

.3 Submit final version to *Owner* in electronic format and 2 sets of hard copies (3 ring binder with letter sized pages, tabbed by division).

1.2 OPERATION AND MAINTENANCE MANUAL FORMAT

.1 Organize data in the form of an instructional manual.

.2 Binders: vinyl, hard covered, three D-rings, loose leaf, 216 x 279 mm, with spine and face pockets.

.3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

.4 Cover: Identify each binder with typed or printed title “Operation and Maintenance Manual”, name of Project or facility, and subject matter of contents.

.5 Arrange content [by systems,] [process flow,] under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate Product or system, with typed description of Product and major component parts of equipment.

.7 Text: Manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.9 Provide electronic copy of manual in PDF format.

.10 Provide electronic copy of Shop Drawings in manual as CAD files in.dwg format on electronic media acceptable to Owner.

1.3 OPERATION AND MAINTENANCE MANUAL – GENERAL CONTENT

.1 Table of contents for each volume.

.2 Introductory information including:

.1 Date of manual submission.

.2 Complete contact information for *Consultant*, subconsultants, other consultants, and *Contractor*, with names of responsible parties.

.3 Schedule of *Products* and systems indexed to content of volume.

.3 For each *Product* or system, include complete contact information for *Subcontractors*, *Suppliers* and manufacturers, including local sources for

supplies and replacement parts.

.4 *Product* Data: mark each sheet to clearly identify specific products, options, and component parts, and data applicable to installation. Delete or strike out inapplicable information. Supplement with additional information as required.

.5 Reviewed *Shop Drawings*.

.6 Permits, certificates, letters of assurance and other relevant documents issued by or required by authorities having jurisdiction.

.7 Warranties.

.8 Operating and maintenance procedures, incorporating manufacturer's operating and maintenance instructions, in a logical sequence.

.9 Training materials as specified in Section 01 79 00 - Demonstration and Training.

1.4 OPERATION AND MAINTENANCE MANUAL - EQUIPMENT AND SYSTEMS CONTENT

.1 Each Item of Equipment and Each System: include description of unit or system and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel Board Circuit Directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor's coordination drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.14 Include testing and balancing reports.

.15 Include additional content as specified in technical Specifications sections.

1.5 OPERATION AND MAINTENANCE MANUAL - PRODUCTS AND FINISHES CONTENT

.1 Include *Product* data, with catalogue number, options selected, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured *Products*.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Include an outline of requirements for routine and special inspections and for regular maintenance to ensure that on-going performance of the building envelope will meet the initial building envelope criteria.

.4 Include additional content as specified in technical *Specifications* sections.

1.6 OPERATION AND MAINTENANCE MANUAL - WARRANTIES CONTENT

.1 Separate each warranty with index tab sheets keyed to Table of Contents listing.

.2 List each warrantor with complete contact information.

.3 Verify that documents are in proper form and contain full information. Ensure that warranties are for the correct duration and are in *Owner*'s name.

1.7 CONTRACTOR'S AS-BUILT DRAWINGS

.1 Submit final as-built drawings in the form specified in Section 01 32 00 – Construction Progress Documentation to Consultant.

1.8 PROJECT RECORD DRAWINGS

.1 Transfer all information marked up on the as-built drawings during the progress of the *Work* to a master set of record drawing files provided by *Consultant*, in CAD format.

.2 Mark revised drawings as "RECORD DRAWINGS".

.3 Submit completed record drawings in electronic CAD and PDF form to *Owner*.

1.9 SPARE PARTS, MAINTENANCE MATERIALS, AND SPECIAL TOOLS

.1 Supply spare parts, maintenance materials, and special tools in quantities specified in technical *Specifications* sections.

.2 Ensure spare parts and maintenance materials are new, not damaged nor defective, and of same quality, manufacturer, and batch or production run as installed *Products*.

.3 Provide tags for special tools identifying their function and associated *Product*.

.4 Deliver to and store items at location directed by *Owner* at *Place of the Work*. Store in original packaging with manufacturer's labels intact and in a manner to prevent damage or deterioration.

.5 Catalogue all items and submit to *Consultant* an inventory listing organized by *Specifications* section. Include *Consultant* reviewed inventory listing in operation and maintenance manual.

END OF SECTION

1.1 SUMMARY

.1 Demonstrate and provide training to *Owner*'s personnel on operation and maintenance of equipment and systems prior to scheduled date of *Ready-for-Takeover of the Work*.

.2 *Owner* will provide list of personnel to receive training and will coordinate their attendance at agreed upon times.

.3 Coordinate and schedule demonstration and training provided by *Subcontractors* and *Suppliers*.

1.2 SUBMITTALS

.1 Submit proposed dates, times, durations, and locations for demonstration and training of each item of equipment and each system for which demonstration and training is required. Record the training and submit final version to *Owner* in electronic format. Allow sufficient time for training and demonstration for each item of equipment or system, or time as may be specified in technical *Specifications*.

.2 *Consultant* and *Owner* will review submittal and advise *Contractor* of any necessary revisions.

.3 Submit report(s) within 5 *Working Days* after completion of demonstration and training:

.1 identifying time and date of each demonstration and training session,

.2 summarizing the demonstration and training performed, and

.3 including a list of attendees.

1.3 PREREQUISITES TO DEMONSTRATION AND TRAINING

.1 Testing, adjusting, and balancing has been performed in accordance with *Contract Documents*.

.2 Equipment and systems are fully operational.

.3 Copy of completed operation and maintenance manual is available for use in demonstration and training.

.4 Conditions for demonstration and training comply with requirements specified in technical *Specifications*.

1.4 DEMONSTRATION AND TRAINING

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment and system.

.2 Review operation and maintenance manual in detail to explain all aspects of operation and maintenance.

.3 Prepare and insert additional information in operation and maintenance manual if required.

END OF SECTION

1 General

1.1 SUMMARY

.1 Review drawings, site conditions, and other specification sections to ascertain the extent and nature of work of this section.

.2 The Work of this Section includes, but is not limited to the following:

.1 Demolish and removal of the following where indicated on the Drawings:

.1 Concrete slabs;

.2 Masonry;

.3 Structural steel;

.4 Drywall/steel stud partitions/assemblies

.5 Doors, windows, frames and associated hardware;

.2 Disconnect/cap existing service in areas of demolition.

.3 Trace, demolish and remove decommissioned mechanical and electrical services found during demolition. Remove decommissioned services to the area of demolition to the source, leaving no buried services in walls and floors, unless otherwise approved by written notice from the Owner.

.4 Dispose of demolished materials except where required to be salvaged or reused.

.5 Refer to demolition notes indicated on all disciplines Drawings.

.3 Drawings contain details that suggest directions for solving some of the major demolition and removal requirements for this project; Contractor is required to develop these details further by submitting a demolition plan prepared by a professional engineer employed by the Contractor.

1.2 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI):

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

.2 Canadian Standards Association (CSA):

.1 CSA S350- M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

.3 National Fire Protection Association (NFPA):

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

.4 Provincial Legislation:

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

1.3 DEFINITIONS

.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.

.2 Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.

.3 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

.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.

1.4 EXAMINATION

.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.

.2 Where appropriate prepare a photographic or video record of existing conditions, particularly of existing work scheduled to remain.

.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.

1.5 SUBMITTALS

.1 Provide required information in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Prepare schedule in conjunction with overall project schedule, and outline proposed methods in writing. Obtain approval before commencing demolition work, and indicate the following:

.1 Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity

.2 Interruption of utility services

.3 Coordination for shutoff, capping, and continuation of utility services

1.6 QUALITY ASSURANCE

.1 Conform to requirements of all authorities having jurisdiction.

.2 Comply with applicable requirements of CSA S350-M "Code of Practice for Safety in Demolition of Structures".

.3 Work of this Contract shall be executed by an approved company having a minimum of five (5) years continuous experience and able to deploy adequate equipment and skilled personnel to complete work expediently in an efficient and orderly manner.

.4 Perform cutting and coring, where applicable, by a firm specializing in this type of work, able to produce evidence of successful completion of similar work over a period of at least five (5) years immediately prior to date of contract.

.5 Apply for, secure, arrange and pay for all permits, notices and inspections necessary for proper execution and completion of work in this Section.

.6 Professional Engineer Qualifications: Procure the services of a professional engineer who is experienced in providing relevant engineering services to perform the following:

.1 Review portions of the Work requiring structural performance, prepare plan of action, engineer temporary shoring and bracing, and Provide site administration and inspection for work of this Section.

1.7 PROTECTION

.1 Prevent movement or settlement of adjacent work. Provide and place bracing or shoring and be responsible for safety and support of such work. Be liable for any such movement or settlement, and any damage or injury caused.

.2 Cease operations and notify Consultant if safety of any adjacent work or structure appears to be endangered. Take all precautions to support the structure. Do not resume operations until reviewed with the Consultant.

.3 Prevailing weather conditions and weather forecasts shall be considered. Demolition work shall not proceed when weather conditions constitute a hazard to the workers and site.

.4 Prevent damage of surrounding vegetation by construction. Install tree protection barriers to trees that are scheduled to remain.

.5 Prevent debris from blocking surface drainage inlets and mechanical and electrical systems which remain in operation.

.6 Temporarily suspended work that is without continuous supervision shall be closed to prevent entrance of unauthorized persons.

1.8 REMAINING AND ADJACENT STRUCTURES

.1 Do not interfere with, encumber, endanger or create nuisance, from any cause due to demolition work, to public property or any adjacent attached and/or detached structures in possession of Owner or others, which are to remain, whether occupied or unoccupied during this work.

.2 Make good damage to such structures resulting from work under this Section at no cost to Owner. Make good adjacent building surfaces damaged by work of this Section.

1.9 PROTECTION OF SERVICES AND STRUCTURES

.1 Take necessary precautions to guard against movement, settlement or collapse of existing adjacent utility services, public property and/or structures, whether to remain or not. If these or other unforeseen conditions develop, take immediate emergency measures, report to Consultant, confirm in writing, and await instructions before proceeding with any further related demolition work.

.2 Prior to saw cutting or core drilling of existing concrete slabs, use ground penetrating radar (GPR) to detect utilities and structural reinforcing. Concrete X-Rays can be used when access to both sides of concrete slab is accessible for placement of required x-ray film.

1.10 EXISTING SERVICES

.1 Prior to start of demolition disconnect all electrical service lines in the areas to be demolished. Post warning signs on all electrical lines and equipment which must remain energized to serve other areas during period of demolition. Disconnect electrical service lines in demolition areas to the requirements of local authority having jurisdiction.

.2 In each case, notify the affected utility company in advance and obtain approval where required before commencing with the work on main services.

.3 Arrange with utility companies for locating of such services and for disconnection of existing services owned by utility companies and which will be disconnected by said utility companies, provided such services do not interfere with adjacent tenancy operators.

.4 Remove sewer and water lines where required within existing building as deemed necessary, and cap to prevent leakage, in accordance with authorities having jurisdiction.

.5 Existing services are to be maintained where required for normal tenant operation during regular hours of operation and/or as deemed necessary by Owner.

1.11 DECOMMISSIONED SERVICES

.1 Remove fully decommissioned electrical and mechanical service lines, plumbing, ducting, fixtures and all fasteners and supports for decommissioned items.

.1 Remove sewer and water lines where required within existing building as deemed necessary, and cap to prevent leakage, in accordance with authorities having jurisdiction.

.2 Patch and repair surfaces affected by this selective demolition to match existing adjacent surfaces, as approved by the Consultant.

1.12 EXISTING WARRANTIES

.1 Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

2 Products

2.1 DEBRIS, SALVAGED MATERIAL AND EQUIPMENT DISPOSAL

.1 All materials and or equipment salvaged from demolition work becomes property of demolition Contractor unless designated otherwise.

.2 At no cost to Owner repair or replace material and/or equipment scheduled to remain which is damaged by demolition work. Do not sell any salvaged material or equipment directly from project site.

.3 Remove waste debris continually and entirely from project site during demolition work. Do not load vehicles transporting such debris beyond their safe capacity or in a manner which might cause spillage on public or private property. If spillage does occur, clean up immediately to prevent traffic hazards or nuisance.

2.2 PROTECTION

.1 Temporary Protection:

.1 Erect temporary hoarding protection, to enclose openings in exterior walls, and/or provide security to partially occupied interior spaces, as indicated in Division 01.

.2 Erect temporary dust screens to prevent dust and debris to enter areas of the building which are not scheduled for demolition. Remove temporary dust screens when no longer required.

2.3 REPAIR MATERIALS

.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 Floor Patching and Levelling Compounds: Cement based, trowelable, self-levelling compounds compatible with specified floor finishes; as indicated in Sections 03 35 00 Concrete Finishing, 09 30 00 Tile and 09 65 00 Resilient Flooring.

.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.

.1 Refer to drawings for schedule/extent of patching required.

.4 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 29 00 – Gypsum Board.

.5 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.

2.4 EXISTING MATERIALS

.1 Items to be retained for re-use in new construction include, but are not limited to the following:

.1 Confirm with Consultant any materials that appear to be in re-usable condition prior to disposal.

.2 Confirm with Consultant any materials scheduled for re-use that are not in re-usable condition prior to installation.

3 Execution

3.1 GENERAL

.1 Exercise caution in dismantling, disconnecting of work adjacent to existing work designated to remain.

.2 Carry out demolition in a manner to cause as little inconvenience to the adjacent properties as possible.

.3 Carry out demolition in an orderly and careful manner.

.4 Demolition by explosives is not permitted.

.5 Selling or burning of materials on site is not permitted.

.6 Sprinkle exterior debris with water to prevent dust. Do not cause flooding, contaminated run-off or icing. Do not allow waste material, rubbish, and windblown debris to reach and contaminate adjacent properties.

.7 Lower waste materials in a controlled manner; do not drop or throw materials from heights.

.8 At end of each day's work, leave in safe condition so that no part is in danger of toppling or falling.

3.2 PREPARATION

.1 Although possible (with additional precautions), openings through existing concrete columns and beams are generally not permitted; the structural engineer must be contacted for such proposed openings for specific additional requirements.

.2 For all openings to be located through existing structural components, the following requirements for coring or sawcutting openings through existing reinforced concrete floor slabs, roof slab and shear walls for mechanical and electrical services must be followed:

.1 Prior to installation of openings, a testing agency is to be engaged to accurately scan the areas of the proposed openings to locate existing reinforcing steel, electrical conduit and cast-in mechanical services (i.e. pipes). Electromagnetic scanning or ground-penetrating radar are acceptable methods of scanning for these purposes. Note that x-ray technology will not be permitted.

.2 During/after conducting the scanning procedures, the testing agency is to clearly and accurately mark the surfaces of the concrete elements identifying individual existing reinforcing bars and electrical/mechanical services.

3.3 SAFETY AND SECURITY

.1 Maintain security of the building at all times during demolition work.

.2 Provide and maintain fire prevention equipment and alarms accessible during demolition.

3.4 ACCESS ROUTES

.1 Restrict operations to designated access routes.

.2 Do not obstruct roads, parking lots, sidewalks, hydrants and the like.

3.5 SELECTIVE DEMOLITION

.1 Provide necessary shoring and supports to assure safety of structure prior to cutting and coring.

.2 Where practical, sawcut and remove material as required.

.3 Where sawcutting is not appropriate, use suitable hand tools.

.4 Demolish, cut-out and remove from site all other work noted on drawings or required to permit new construction.

.5 Do not allow water to accumulate or flow beyond work area. Provide receptacles and mop-up as work proceeds.

.6 Fill all openings in concrete block walls with concrete masonry units, coursing to match existing, prepare ready to receive new finishes to match existing.

.1 Provide bond beams in new openings cut into existing concrete masonry unit walls.

.2 Provide finished end masonry units to patch and repair for new jamb sections in existing concrete masonry unit walls.

.7 Fill all openings in gypsum board walls with gypsum board and steel framing to match existing, skim coat to make wall smooth and even.

.8 Demolish existing flooring and wall finishes, and adhesive remnants as follows:

.1 Floor and wall substrate shall be smooth, free from ridges and depressions, and adhesive remnants that could telegraph through new flooring and wall finishes.

.9 Demolish completely all ceiling panels and grid as indicated.

.10 Patch and repair all walls, floor and ceilings damaged during demolition with material matching adjacent walls, prepare ready for new finishes.

.1 Prepare existing surfaces schedule to receive new finish by grinding, filling, over-coating, stripping, washing, etching, shot blasting or other chemical or mechanical means, as required to ensure satisfactory installation of new finish.

3.6 PATCHING AND REPAIRING

.1 Floors and Walls:

.1 Where walls or partitions that are demolished extend from one finished area into another, patch and repair floor and wall surfaces in the new space.

.2 Provide a level and smooth surface having uniform finish colour, texture, and appearance.

.3 Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform colour and appearance.

.4 Patch with durable seams that are as invisible as possible.

.5 Provide materials and comply with installation requirements specified in other Sections of these Specifications.

.6 Patch any existing areas adjoining / adjacent to new construction in good workmanship, filling and finishing gaps between finishes to allow new work to blend seamlessly with existing work.

.7 Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.

ASBESTOS ABATEMENT SPECIFICATIONS
École secondaire Toronto Ouest

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At Rear:

Drawing No. 30240643-1 - Locations of Work Areas – Ground Floor Plan

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 ASBESTOS ABATEMENT OUTLINE OF WORK

.1 The intent of the work is to remove, and dispose select accessible asbestos-containing materials, to the extent practicable, prior to and during renovation work and to assist in making attachments to asbestos-containing materials.

.2 Replacement of the 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, Electrical, Audio Visual, and Structural drawings and project specifications for additional details and locations.

.5 All electrical and life systems isolations and disconnects will be performed by the General Contractor's sub trades prior to commencement of remedial work.

.6 Removal of doors and associated hardware in door frames slated for demolition by the Abatement Contractor, will be performed by the General Contractor's sub trades prior to commencement of remedial work**.**

.7 Removal of light fixtures and associated fluorescent light tubes in suspended ceiling systems slated for demolition by the Abatement Contractor, will be performed by the General Contractor's sub trades prior to commencement of remedial work**.**

.8 Work in Work Areas 1 will be performed as a lump sum cost. Work in Work Area 2 will be performed on a time and materials basis using unit rates based on unit rates provided by the Abatement Contractor.

.9 Each HEPA filtered negative pressure unit shall be integrity tested at the work site prior to commencement of asbestos removal operations.

.10 Provide all supervision, labour, equipment, tools, materials, waste management, haulage and disposal, and other services, as required, for undertaking and completing all of the work, as detailed below.

.11 **Work Area 1 (Lump Sum) – Rooms 150 (Partial) and 151 (Partial)**

.1 Prepare the area as indicated above and on the attached floor plan for a Type 2 Enclosure asbestos removal operation.

.2 Refer to Architectural Drawings A1.0 and A1.1 for additional details.

.1 Room numbers on asbestos abatement specification drawings may not correspond with room numbers on architectural drawings. Please coordinate and cross reference between different drawings.

.3 Supply and install scaffolding, in accordance with all applicable regulations, in order to provide sufficient and safe access to the work areas.

.4 Establish a measurable negative pressure differential in the enclosure work area 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 into adjacent Rooms 150 or 151.

.5 Remove and dispose as clean demolition waste, entire T-bar ceiling assembly. Prior to leaving the work area, all concrete block and associated asbestos-containing paint debris that may have been generated by the actions of removing the T-bar wall moldings, must be disposed as asbestos-waste. Wall moldings may be disposed as clean demolition waste provided, they are thoroughly cleaned of all dust and debris.

.6 Remove and dispose as asbestos, all asbestos-containing caulking applied to two (2) door frames slated for removal. The General Contractor will clearly identify door frames slated for removal.

.7 In locations where select sections of concrete block walls are being removed by the General Contractors sub trades, remove and dispose as asbestos waste, asbestos-containing caulking in corners where concrete block walls attach to adjacent walls. The General Contractor will clearly identify all areas where concrete block walls are being removed. For costing purposes allow for the removal of a total of sixteen (16) linear metres of caulking.

.8 Remove and dispose as asbestos waste all vinyl baseboards and associated asbestos-containing mastic attached to concrete block walls with asbestos-containing block filler primer paint in Room 151. Using chemical paint strippers, mastic removers, power tools (power grinders) attached to dust collecting devices equipped with HEPA filters, and/or all three, remove and dispose as asbestos waste, all remnant baseboard mastic and paint applied to concrete block walls in areas where baseboards were removed. Paint is to be completely removed from concrete block.

.9 Using chemical paint strippers, power tools (power grinders) attached to dust collecting devices equipped with HEPA filters, and/or both, remove and dispose as asbestos waste, select areas of asbestos-containing paint applied to concrete block walls where existing door openings are being enlarged, block wall openings are being made and/or enlarged and existing block wall openings are being infilled. Paint is to be completely removed from concrete block.

.1 Coordinate with the General Contractor to remove adequate amounts of paint from concrete block to allow the General Contractor’s sub trades to remove concrete block, install lintels and infill block wall openings without the use of special procedures. The General Contractor will clearly identify all areas for paint removals. For costing purposes, allow for the removal of approximately twenty (20) square metres of paint from concrete block.

.12 **Work Area 2 – (Time and Materials) Areas To be Determined**

.1 Prepare locations pre-determined by the General Contractor for Type 1 and Type 2 Non-Enclosure asbestos removal operations.

.2 During the rebuild phase, perform localized removal of asbestos-containing paint from concrete block, remove materials attached to concrete block walls with asbestos-containing paint and assist General Contractor's sub trades in attaching items to concrete block walls with asbestos-containing paint.

.3 Scaffolding and/or lift equipment required to provide sufficient and safe access to the work areas, will be provided by the General Contractor.

.4 Using Type 1 asbestos abatement procedures, using hand tools and/or chemical paint removers, remove and dispose as asbestos waste, localized areas of asbestos-containing paint from concrete block walls.

.5 Using Type 1 asbestos abatement procedures, remove items attached to concrete block walls with asbestos-containing paint.

.6 Using Type 2 Non-Enclosure asbestos abatement procedures, using power tools attached to dust collecting devices equipped with HEPA filters, remove and dispose as asbestos waste, localized areas of asbestos-containing paint from concrete block walls.

.7 Using Type 2 Non-Enclosure asbestos abatement procedures, using power tools attached to dust collecting devices equipped with HEPA filters, drill into concrete block walls with asbestos-containing paint and mechanically fasten items to concrete block. The General Contractor will supply fasteners and items to be attached.

.13 Block filler primer paint on concrete block walls contains 0.93% to 1.8% chrysotile asbestos. Baseboard mastic contains 0.95% chrysotile asbestos. Caulking contains 0.65% chrysotile asbestos.

.14 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 a lockable metal door system which must be kept always locked. Disposal bins must be removed immediately on completion of work.

.15 Schedule

.1	Mobilization	To be Coordinated with the General Contractor
.2	Complete Work and Demobilization	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 Arcadis Canada Inc. Consultant shall determine the manner for proceeding. The Asbestos Contractor shall not be entitled to any additional payment.

.2 The General Contractor is responsible for all electrical connects and disconnects. All work must be performed by a licensed electrician in compliance to all regulatory requirements and codes.

.3 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.

.4 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 Arcadis Canada Inc. Consultant shall be advised in writing at least four days in advance of the proposed working hours.

.5 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.

.6 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.

.7 All work in work areas that are confined spaces shall comply with all requirements respecting confined spaces specified in O. Reg. 632/05, as amended 346/15, November 26, 2015.

.8 **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.

.9 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.

.10 The Arcadis Canada Inc. 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.

.11 The Arcadis Canada Inc. 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 Arcadis Canada Inc. Consultant.

.12 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, Arcadis Canada Inc. 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 Arcadis Canada Inc. 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.

.13 Any employee shall be replaced, at the written request of the Arcadis Canada Inc. Consultant, if working, or causing others to work, in violation of O.Reg. 278/05.

.14 The Asbestos Contractor's insurance coverage limits, per occurrence, shall equal or exceed the following and shall name the Owner, the Architect, the General Contractor 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.

.15 The supervisor must have proven experience and proficiency in the type of Work being undertaken under this Contract.

.16 The supervisor shall be replaced, at the written request of the Arcadis Canada Inc. Consultant, if found to be incompetent or inattentive to the needs of the project.

.17 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 Arcadis Canada Inc. 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. 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 Canada Inc., 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:*

.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:

.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, as amended 62/18, March 2, 2018 – made under the *Occupational Health and Safety Act, R.S.O. 1990, c. E. 19, as amended.*

.2 Ontario Ministry of the Environment *Regulation 347* under the Environmental Protection Act, 19 as amended by O. Reg. 509/21, June 30, 2021.

.2 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.)

.3 Government of Ontario *Occupational Health and Safety Act, -R.S.O. 1990, c. E. 19, as amended, and Regulations for Construction Projects* O. Reg. 213/91, as amended.

.4 Office of the Fire Commissioner of Canada.

.5 Ontario Electrical Safety Code.

.6 Government of Ontario, Building Code O. Reg. 332/12, as amended 137/19, May 2, 2019.

.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 Arcadis Canada Inc. Consultant 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 firefighting procedures;

.3 the control of fire hazards in and around the building;

.4 maintenance of firefighting facilities; and

.5 special requirements as may be identified by the building owner.

.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 *Safety Data Sheets:*

.1 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.

.5 *Insurance:*

.1 Provide a Certificate signed by the insurance agency naming the Owner, the Architect, the General Contractor 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 Results of negative pressure unit integrity tests.

.2 Proposed Work Area emergency exit procedures.

.3 Proposed locations of decontamination facilities and negative pressure units and exhaust routing.

.4 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.

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 Block filler primer paint on concrete block walls contains 0.93% to 1.8% chrysotile asbestos. Baseboard mastic contains 0.95% chrysotile asbestos. Caulking contains 0.65% chrysotile asbestos.

.2 Existing conditions are documented in a report prepared by Arcadis Canada Inc. for the Conseil scolaire Viamonde titled "*Pre-Renovation Designated Substances and Hazardous Materials Survey, École secondaire Toronto Ouest, 330 Lansdowne Avenue, Toronto, Ontario"* dated October 15, 2024, which is included with the proposal documents.

.3 Masonry applications may contain silica. Paint applications contain lead and may contain 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;

.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;

.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

.1 If any work area, or part thereof, is a confined space, the contractor shall comply with all requirements respecting confined spaces specified in O. Reg. 632/05, as amended 346/15, November 26, 2015, including but not limited to:

.1 preparation of a co-ordination document;

.2 development of a written program;

.3 assessment of hazards;

.4 development and implementation of an adequate written plan;

.5 provision of adequate worker training; and

.6 issuance of entry permits.

.2 The contractor shall perform adequate air tests while a worker is in a confined space to ensure that acceptable atmospheric levels are maintained in the confined space, including during any inspections and during final clearance air monitoring performed by Arcadis Canada Inc.

.3 The contractor shall provide an attendant for communications and rescue response whenever a worker is to enter a confined space, including during inspections and final clearance air monitoring by Arcadis Canada Inc.

.4 The contractor shall provide Arcadis Canada Inc. with calibration records for air testing equipment and copies of all records of atmospheric monitoring of confined space.

.5 The co-ordination document (see Section 1.13.1.1) shall refer to the contractor's responsibilities for air testing, communications and rescue response specified in Sections 1.13.2 and 1.13.3, above.

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.

.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 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 Arcadis Canada Inc. 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 Arcadis Canada Inc. Consultant prior to installation of the Panel on site.

3.0 PART 3 – EXECUTION

3.1 MAJOR ASBESTOS WORK (TYPE 3 OPERATIONS)

Not Applicable.

3.2 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.

.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 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.

.10 Do not use compressed air.

.11 Do not eat, drink, smoke or chew in the work area.

.12 Vacuum surfaces of insulated material in the work area using a HEPA vacuum.

.2 Asbestos Removal and Cleanup

.1 Only non-powered hand-tools, or power tools **FITTED WITH A DUST COLLECTION DEVICE AND HEPA FILTER** are permitted to be used.

.2 Do not eat, drink, chew or smoke within the work area.

.3 *Mastic and paints and coatings:* Apply amended water to the surface of the material using an airless sprayer. Using chemical paint removers, hand tools or power tools fitted with HEPA filtered dust collection devices, remove asbestos-containing paint. Ensure that all asbestos-containing paint is completely removed from substrate materials.

.4 Remove the saturated asbestos material in small sections. Do not allow saturated asbestos to dry out. As it is being removed, pack the material into a waste receptor (polyethylene bag).

.1 Spray the asbestos material repeatedly during the work process to maintain saturation and to minimize asbestos fibre dispersion.

.2 Mist the air periodically with water.

.3 Excess water is to be treated as asbestos waste and is to be placed into a waste receptor (polyethylene bag). Refer to Waste Handling for cleaning and removal of bagged asbestos waste.

.5 After completion of asbestos removal, all surfaces from which asbestos has been removed shall be brushed and wet-sponged to remove all visible material and residues. During this Work the surfaces shall be kept wet.

.6 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.

3.3 TYPE 2 NON-ENCLOSURE METHOD

.1 Preparation

.1 Control the spread of dust from the work being performed by use of drop sheets, keeping doors closed, providing signage, etc. Ensure that appropriate equipment and materials are at hand.

.2 Restrict access to the work area using rope barriers, barricades, and other appropriate measures.

.3 Disable ventilation systems servicing the work area.

.4 Provide and wear a non-powered air purifying respirator with high efficiency cartridges approved for use with asbestos and disposable coveralls including hood, elasticized cuffs and zipper over work clothes.

.2 Asbestos Removal and Cleanup

.1 Only non-powered hand-tools, or power tools **FITTED WITH A DUST COLLECTION DEVICE AND HEPA FILTER** are permitted to be used.

.2 Do not eat, drink, chew or smoke within the work area.

.3 *Mastic and Paints and coatings:* Apply amended water to the surface of the material using an airless sprayer. Using chemical paint removers, hand tools or power tools fitted with HEPA filtered dust collection devices, remove asbestos-containing paint and/or using power tools drill into asbestos-containing paint as required to make attachments. Ensure that all asbestos-containing paint is completely removed from substrate materials.

.4 Do not allow waste to accumulate.

.5 Clean dust and debris at regular intervals and at the end of each shift with a damp cloth or HEPA vacuum.

.6 Ensure that there is no visible airborne dust in the work area during the removal and cleanup operation.

.7 All duct tape, polyethylene sheets, disposable clothing and other consumables used for, and during the removal of asbestos shall be contained and disposed as asbestos waste.

.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 Dispose of protective clothing as asbestos waste.

.10 Wash hands and face prior to taking breaks and at completion of the work before leaving the work area. Damp-wipe the respirator after use and store in an appropriate place.

.11 Make arrangements for disposal of all asbestos-containing waste material.

3.4 TYPE 1 OPERATION

.1 Preparation

.1 Control the spread of dust from the work being performed by use of drop sheets, keeping doors closed, providing signage, etc. Ensure that appropriate equipment and materials are at hand.

.2 Restrict access to the work area using rope barriers, barricades, and other appropriate measures.

.3 Disable ventilation systems servicing the work area.

.4 Provide and wear a non-powered air purifying respirator with high efficiency cartridges approved for use with asbestos and disposable coveralls including hood, elasticized cuffs and zipper over work clothes.

.2 Asbestos Removal and Cleanup

.1 Do not use any power tools. All work is to be completed by non-powered hand tools only.

.2 Do not eat, drink, chew or smoke within the work area.

.3 *Caulking, mastic, paints and coatings*: Apply amended water as required to reduce dust. Remove material by hand and place immediately into waste receptor. Do not throw asbestos waste. Double bag when removing debris from work area.

.4 Do not allow waste to accumulate.

.5 Clean dust and debris at regular intervals and at the end of each shift with a damp cloth or HEPA vacuum.

.6 Ensure that there is no visible airborne dust in the work area during the removal and cleanup operation.

.7 All duct tape, polyethylene sheets, disposable clothing and other consumables used for, and during the removal of asbestos shall be contained and disposed as asbestos waste.

.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 Dispose of protective clothing (where applicable) as asbestos waste.

.10 Wash hands and face prior to taking breaks and at completion of the work before leaving the work area. Damp-wipe the respirator (where appliable) after use and store in an appropriate place.

.11 Make arrangements for disposal of all asbestos-containing waste material.

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 All waste is to be removed from the site and disposed. Disposal containers are not to be left on the property unattended unless fully enclosed and locked. Bins must be removed immediately on completion of work.

.3 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

.4 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.

.5 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.

.6 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.

.7 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.

.8 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).

.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,

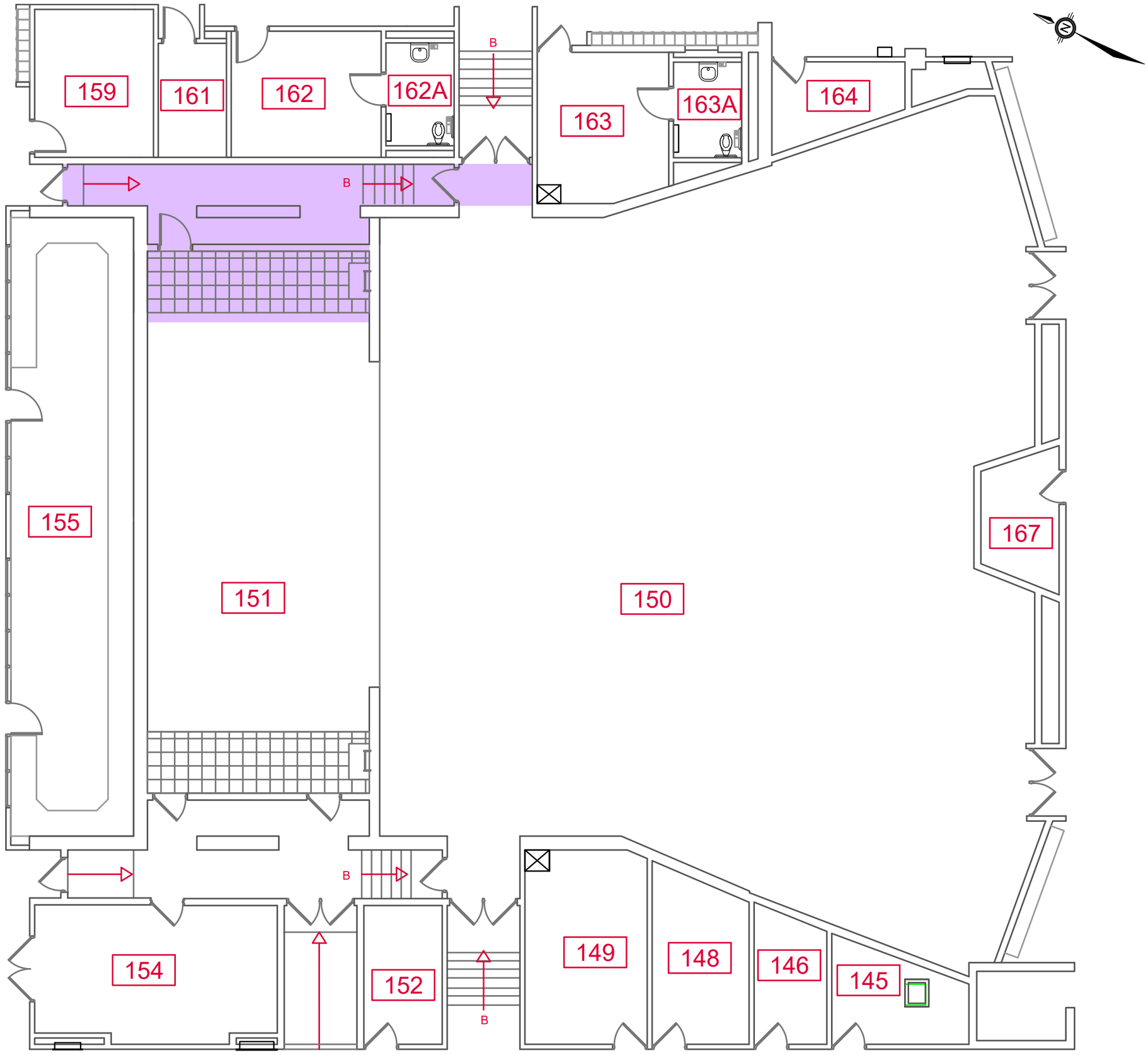
.2 all activities deemed necessary by the Inspector including area isolation, personnel relocation, additional visual inspections and air monitoring to confirm that the area has been adequately cleaned,

.3 disruption of plant production, office routine, and delays.

.2 *Final Clearance Test:*

Not Applicable.

END OF SECTION



LEGEND

150 FUNCTIONAL SPACE

WORK AREA 1

NOTES:

1.

REVISIONS:

No.	Date:	By:	Revisions

REFERENCE:

1.

ARCADIS

Conseil scolaire Viamonde

ASBESTOS ABATEMENT SPECIFICATIONS

LOCATIONS OF WORK AREAS

ÉCOLE SECONDAIRE TORONTO OUEST
330 LANSDOWNE AVENUE, TORONTO, ONTARIO

GROUND FLOOR

Drawn By: BR	Approved By: J.D	Project No: 30240643
Date: OCTOBER 2024	Scale: N.T.S	Drawing No: 30240643-1

.8 Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

.2 Exterior Walls:

.1 Where existing doors and/or windows are schedule to be removed during demolition, patch and repair exterior walls using similar wall construction techniques as adjacent wall construction. Provide exterior and interior substrate and finish materials, matching existing adjacent materials, to provide an even-plane surface of uniform appearance suitable for application of air barrier membrane AB-01 and/or finishes as scheduled.

.3 Parging:

.1 Patch and repair existing parging damaged or spalling, at areas identified in the Document, using single-component, sand/cement blend designed for coating or parging vertical surfaces. Build up in multiple layers in locations where depth of required repair cannot be filled in a single layer.

3.7 EQUIPMENT

.1 The Testing Agency shall provide and operate all necessary equipment for conducting accurate scans of existing reinforced concrete components for which openings are required.

.2 Equipment and methodology to be capable of scanning concrete elements to a maximum of 400 mm thickness.

3.8 EXCESSIVE DEMOLITION

.1 Where excessive demolition occurs, be responsible for cost of replacing such work.

.2 Consultant shall determine extent of such 'over-demolition' and method of rectification.

3.9 COMPLETION

.1 Leave project site as directed, reasonably clean and presentable, free from above grade debris, any salvaged material and/or equipment except those designated to remain.

.2 Maintain access to exits clean and free of obstruction during removal of debris.

END OF SECTION

Conseil scolaire Viamonde

Pre-Renovation Designated Substances and Hazardous Materials Survey

École secondaire Toronto Ouest
330 Lansdowne Avenue, Toronto Ontario

October 15, 2024

Pre-Renovation Designated Substances and Hazardous Materials Survey

École secondaire Toronto Ouest
330 Lansdowne Avenue, Toronto, Ontario

October 15, 2024

Prepared By:
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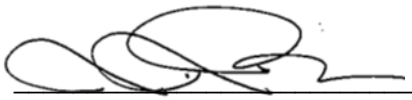

Jean Daigle
Senior Technical Specialist

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Appendices

1 Introduction

Arcadis Canada Inc. (Arcadis) was by Conseil scolaire Viamonde (CSV) to conduct a pre-renovation designated substances and hazardous materials survey in designated areas of École secondaire Toronto Ouest located at 330 Lansdowne Avenue in Toronto, 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 three-storey masonry structure including with a partial basement and tunnel system that was reported to have been constructed in 1970.

It is our understanding that a sound and lighting upgrade project is scheduled for the auditorium and stage (Rooms 150, 151, 250 and 327). The survey was limited to inspecting and testing materials in the auditorium and stage areas referred to in this report as the "*designated study areas",* that may be affected by the renovation project based on information provided by architect.

The designated study areas 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; and
- preparation of a report outlining the findings of the investigation.

Mr. Dwayne Kellyman of Arcadis visited the site on September 23, 2024, to conduct the designated substances and hazardous materials survey at École secondaire Toronto Ouest.

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).

(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 (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 B-1 in Appendix B, 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 B, Table B-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 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.

[1] *Lead-Containing Paints and Coatings: Preventing Exposure in the Construction Industry.* WorkSafe BC, 2011.

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 B, Table B-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 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 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 prepared by Arcadis for CSV titled "*Updated Survey of Asbestos-Containing Materials, École secondaire Toronto Ouest, École secondaire catholique Saint-Frére-André, 330 Lansdown Avenue, Toronto, Ontario"* dated October 4, 2019. Information and/or bulk sample analysis results obtained from these reports were utilized by Arcadis during the course of our investigation and in the preparation of this report.

Table 3.1 includes bulk sample results that are outside of the designated study areas, which are provided for references purposes only. Locations of accessible asbestos-containing materials and roof plans are shown on the floor plan provided in Appendix A.

Table 3-1 Summary of Results of Analyses of Bulk Samples for Asbestos Content

École secondaire Toronto Ouest

Sample Nº	Location	Description	Asbestos Content
V-1A	Room 145 south wall (125)	Vermiculite block-fill insulation inside concrete block wall cavities	**Tremolite**(1)
116-FT-1A	Room 116 (156)	12' vinyl floor tile – beige with beige directional fleck	**0.57% Chrysotile** (1)(3)
116-M-2A	Room 116 (156)	Mastic on floor tile Sample FT-1 – black colour	None Detected (TEM) (1)
223-M-2B	Room 223 (228)	Mastic on floor tile Sample FT-1 – black colour	None Detected (1)
240-M-2C	Room 240 (212)	Mastic on floor tile Sample FT-1 – black colour	None Detected (1)
117-CB-3A	Room 117 (158)	Vinyl cove baseboard – black colour	None Detected (TEM) (1)(3)
124-CB-3B	Room124 (101A)	Vinyl cove baseboard – black colour	None Detected (1)
223-CB-3C	Room 223 (228)	Vinyl cove baseboard – black colour	None Detected (1)
117-M-4A	Room 117 (158)	Mastic on vinyl cove baseboard Sample M-4 – brown colour	**0.95% Chrysotile** (1)
100-M-5A	Room 101 (150)	Carpet mastic – brown colour	None Detected (TEM) (1)
100-M-5B	Room 101(150)	Carpet mastic – brown colour	None Detected (1)
236-M-5C	Room 236(209)	Carpet mastic – brown colour	None Detected (1)
125B-M-7A	Room 125B (103)	Mastic on floor tile Sample FT-6 – black colour	None Detected (TEM) (1)
130-M-7B	Room 130A (106)	Mastic on floor tile Sample FT-6 – black colour	None Detected (1)
130-M-7C	Room 130A (106)	Mastic on floor tile Sample FT-6 – black colour	None Detected (1)
125L-M-9A	Room 135 (114A)	Mastic on floor tile Sample FT-8 – black colour	None Detected (TEM) (1)
154C-M-9B	Room 154C (141A)	Mastic on floor tile Sample FT-8 – black colour	None Detected (1)
154C-M-9C	Room 222 (226)	Mastic on floor tile Sample FT-8 – black colour	None Detected (1)(3)
136-M-11A	Room 136 (115)	Mastic on floor tile Sample FT-10	None Detected (TEM) (1)
136-M-11B	Room 136 (115)	Mastic on floor tile Sample FT-10	None Detected (1)
222-M-11C	Room 222 (226)	Mastic on floor tile Sample FT-17	None Detected (1)

Sample Nº	Location	Description	Asbestos Content
136-CB-12A	Room 136 (115)	Vinyl cove baseboard – flexible black colour – (new)	None Detected (TEM) (1)(3)
236-CB-12B	Room 236 (209)	Vinyl cove baseboard – flexible black colour – (new)	None Detected (1)(3)
C2D-CB-12C	Room C2D (C201)	Vinyl cove baseboard – flexible black colour – (new)	None Detected (1)
Stair 4-R-15	Stair 4 (D2)	Rubber stair tread – black colour	None Detected (TEM) (1)
Stair 4-M-16A	Stair 4 (D2)	Mastic on rubber stair tread – brown colour	None Detected (TEM) (1)
Stair 2-M-16B	Stair 2 (B2)	Mastic on rubber stair tread – brown colour	None Detected (1)
Stair 1-M-16C	Stair 1 (A2)	Mastic on rubber stair tread – brown colour	None Detected (1)
231-M-20A	Room 231 (202)	Mastic on floor tile Sample FT-19 – black colour	None Detected (TEM) (1)
C2A-M-20B	Room C2A (C205)	Mastic on floor tile Sample FT-19 – black colour	None Detected (1)
C3B-M-20C	Room C3B (C301)	Mastic on floor tile Sample FT-19 – black colour	None Detected (1)
B7-M-22A	Room B7 (003)	Mastic on floor tile Sample FT-21 – black colour	None Detected (TEM) (1)
B7-M-22B	Room B7 (003)	Mastic on floor tile Sample FT-21 – black colour	None Detected (1)
B7-M-22C	Room B7 (003)	Mastic on floor tile Sample FT-21 – black colour	None Detected (1)
116-TH-2A	Room 116 (156)	Caulking on door frame – white colour	**0.65% Chrysotile** (1)
109A-TH-5A	Room 109 (144)	Caulking on window frame – black colour	None Detected (TEM) (1)
123-TH-5B	Room 123 (101)	Caulking on window frame – black colour	None Detected (1)
C2B-TH-5C	Room C2B (C204)	Caulking on window frame – black colour	None Detected (1)
125A-TH-9A	Room 126 (107)	Fibrous duct seal on ducting – green colour	None Detected (TEM) (1)
125A-TH-9B	Room 126 (107)	Fibrous duct seal on ducting – green colour	None Detected (1)
136-TH-9C	Room 136 (115)	Fibrous duct seal on ducting – green colour	None Detected (1)
107A-TH-11A	Room 107A (169)	Putty on wall penetrations inside walk-in freezer	None Detected (TEM) (1)
107A-TH-11B	Room 107A (169)	Putty on wall penetrations inside walk-in freezer	None Detected (1)
154D-TH-11C	Room 154D (141B)	Putty on wall penetrations inside walk-in freezer	None Detected (1)
157-TH-12	Room 157 (131)	Cement pipe	**30% Chrysotile** (1) **15% Crocidolite**
145-TH-13A	Room 145 (122)	Caulking on metal panels adjacent to exit door – dark grey colour	**5% Chrysotile** (1)
213-TH-15	Room 213 (218)	Packing material inside metal pipe sleeves in floor	**50% Chrysotile** (1)
C2B-TH-18A	Room C2B (C204)	Caulking around ducting where it penetrates cement block walls – brown-green colour	**0.91% Chrysotile** (1)
313A-TH-20A	Room 313A (312A)	Thermal insulation on pipe fittings – grey cementitious	None Detected (1)
B5-TH-20B	Room B5 (001)	Thermal insulation on pipe fittings – grey cementitious	None Detected (1)
B5-TH-20C	Room B5 (001)	Thermal insulation on pipe fittings – grey cementitious	None Detected (1)

Sample Nº	Location	Description	Asbestos Content
313-TH-21A	Room 313 (312)	Thermal insulation inside door in Boiler #2 – white fibrous	None Detected (1)
313-TH-21C	Room 313 (312)	Thermal insulation inside door in Boiler #2 – white fibrous	None Detected (1)
313-TH-21A	Room 313 (312)	Thermal insulation inside door in Boiler #2 – white fibrous	None Detected (1)
335-TH-23	Room 335 (307)	Mastic behind chalk board – brown colour	**3% Chrysotile** (1)
B5-TH-25A	Room B5 (001)	Packing material in control joint in concrete wall – fibrous	None Detected (1)
B5-TH-25B	Room B5 (001)	Packing material in control joint in concrete wall – fibrous	None Detected (1)
B5-TH-25C	Room B5 (001)	Packing material in control joint in concrete wall – fibrous	None Detected (1)
B5-TH-26A	Room B5 (001)	Caulking in control joint in concrete wall – white colour	None Detected (TEM) (1)
B5-TH-26B	Room B5 (001)	Caulking in control joint in concrete wall – white colour	None Detected (1)
B5-TH-26C	Room B5 (001)	Caulking in control joint in concrete wall – white colour	None Detected (1)
145-PT-1	Room 145 (125)	Thick paint on south wall – multi-layered white	<0.25% Chrysotile (1) (TEM)
145-PT-1B	Room 145 (125)	Thick paint on concrete block on south wall – multi-layered white colour	**0.65% Chrysotile** (1) (2)
125V-FP-10A	Room 137G (112)	Fireproofing patch – hard cementitious white colour	None Detected (TEM) (1)
125V-FP-10B	Room 137G (112)	Fireproofing patch – hard cementitious white colour	None Detected (1)
226-FP-10C	Room 226 (231)	Fireproofing patch – hard cementitious white colour	None Detected (1)
B2-FP-12A	Room B2 (006)	Fireproofing patch – dense fibrous white colour	None Detected (1)
237-FP-12B	Room 237 (208)	Fireproofing patch – dense fibrous white colour	None Detected (1)
313A-FP-12C	Room 313A (312A)	Fireproofing patch – dense fibrous white colour	None Detected (1)
B3-FP-13A	Room B3 (007)	Fireproofing on underside of beams – dense fibrous white colour	None Detected (TEM) (1)
B3-FP-13B	Room B3 (007)	Fireproofing on underside of beams – dense fibrous white colour	None Detected (1)
B3-FP-13C	Room B3 (007)	Fireproofing on underside of beams – dense fibrous white colour	None Detected (1)
116-FP-14	Room 116 (156)	Fireproofing on deck and beams – white-yellow colour	None Detected (1)
125A-FP-15	Room 125A (103)	Fireproofing on metal lath – grey colour	None Detected (1)
323-FP-16	Room 323 (322)	Fireproofing on beams between metal deck flutes – grey colour	None Detected (1)
100-TC-1	Room 100 (150)	Texture coat on plaster ceiling	**40% Chrysotile** (1)

Sample Nº	Location	Description	Asbestos Content
138A-TP-3A	Room 138A (118D)	Textured plaster on ceiling – homogenized sample topcoat and scratch coat	**2.3% Chrysotile** (1)(3)
100J-PL-4A	Room 100J (250)	Smooth plaster on ceiling	None Detected (TEM) (1)
100K-PL-4B	Room 100K (250)	Smooth plaster on ceiling	None Detected (1)
316-PL-4C	Room 316 (318)	Smooth plaster on wall	None Detected (1)
116-DW-1A	Room 116 (156)	Drywall joint compound on wall	**2.1% Chrysotile** (1)(3)
154-DW-1C	Room 154 (138)	Drywall joint compound on east ceiling	**0.71% Chrysotile** (1)
214-DW-1E	Room 214 (219)	Drywall joint compound on conduit enclosure above ceiling	**1.1% Chrysotile** (1)
COR3-DW-1H	Corridor C3 (C307)	Drywall joint compound on wall above windows	**0.74% Chrysotile** (1)
B147-DW-1I	Room B147 (124)	Drywall joint compound on bulkhead	**1.1% Chrysotile** (1)(3)
145-DW-1J	Room 145B (120)	Drywall joint compound on ceiling	**0.93% Chrysotile** (1)(3)
WR3-FL-1A	Room 322 (323)	Cementitious floor – yellow colour	None Detected (TEM) (1)
WR4-FL-1B	Room 331B (340)	Cementitious floor – yellow colour	None Detected (1)
WR5-FL-1C	Room 222 (226)	Cementitious floor – yellow colour	None Detected (1)
FS-FL-1D	Room 154L (141)	Cementitious floor – yellow colour	None Detected (1)
FS-FL-1E	Room 154L (141)	Cementitious floor – yellow colour	None Detected (1)
KIT-FL-2A	Room 154A (141)	Cementitious floor – red colour	None Detected (1)
KIT-FL-2B	Room 154A (141)	Cementitious floor – red colour	None Detected (1)
FS-FL-2C	Room 154L (141)	Cementitious floor – red colour	None Detected (1)
ST1-PL-2	Exit 1 (100)	Plaster on ceiling – scratch coat under asbestos-containing textured plaster topcoat	None Detected (1)
ST1-TC-3	Exit 1 (100)	Textured plaster – topcoat	**2.9% Chrysotile** (1)(3)
154-P-1	Room 153 (133)	Paint on drywall bulkhead – white colour	None Detected (1)
C1-P-2	Corridor C1A (C109)	Paint on concrete block wall – white colour	None Detected (1)
145-P-3	Room 145 (122)	Thick paint on concrete block on north wall – multi layered white colour	None Detected (1)
229	Room 229 (248)	Paint on concrete block wall – purple colour	**1.5% Chrysotile** (1)
C3-P-7	Corridor C3E (C311)	Paint on concrete block wall – white colour	**1.8% Chrysotile** (1)
154-P-1A	Room 154 (138)	Paint on metal door frame – orange colour	None Detected (1)
101-P-1B	Room 101 (150)	Paint on metal door – orange colour	None Detected (1)
105-P-1C	Room 105 (167)	Paint on metal door frame – white colour	None Detected (1)
Roof C-P-1D	Roof C	Paint on metal ducting – orange colour	None Detected (1)
C1A-P-1E	C1A (C108)	Paint on exterior receiving door – brown colour	None Detected (1)
C1C-P-2A	C1C (C104)	Paint on radiator cabinet – brown colour	None Detected (1)
C2C-P-2B	C2C (C203)	Paint on radiator cabinet – brown colour	0.26% Chrysotile (1)(2)
C3D-P-2C	C3C (C303)	Paint on radiator cabinet – brown colour	0.44% Chrysotile (1)(2)
C3C-P-3A	C3C (C303)	Paint on drywall wall – white colour	0.76% Chrysotile (1)(4)
Stair 4-P-4A	Stair 4 (D1)	Paint on concrete ceiling – white colour	None Detected (1)

Sample Nº	Location	Description	Asbestos Content
Stair 5-P-4B	Stair 5 (F1)	Paint on concrete ceiling – white colour	None Detected (1)
P2-P-5A	Room P2	Paint on concrete wall – green colour	None Detected (1)
P2-P-5B	Room P2	Paint on concrete wall – green colour	None Detected (1)
P2-P-5C	Room P2	Paint on concrete wall – green colour	None Detected (1)
Stair 6 (4th)-P-6	Stair 6 Fourth Floor (G4)	Paint on concrete block walls – beige colour	**0.94% Chrysotile** (1)
P5-P-7	Room P5	Paint on concrete block walls – white colour	None Detected (1)
323B-P-8	Room 323B (402)	Paint on exterior concrete block walls – pink colour	**6% Chrysotile** (1)
A-M-2A	Roof A	Mastic on roof flashing – black colour	None Detected (TEM) (1)
J-M-2B	Roof J	Mastic on asphalt shingles – black colour	None Detected (1)
H-M-2C	Roof H	Mastic on roof flashing – black colour	None Detected (1)
J-RS-10A	Roof J	Asphalt roof shingle – brown colour	None Detected (TEM) (1)
J-RS-10B	Roof J	Asphalt roof shingle – brown colour	None Detected (1)
J-RS-10C	Roof J	Asphalt roof shingle – brown colour	None Detected
K-RF-11A	Roof K	Roof felts	None Detected (TEM)
K-RF-11B	Roof K	Roof felts	None Detected (1)
K-RF-11C	Roof K	Roof felts	None Detected (1)
EXT-CLK-27A	Exterior North	Caulking in control joint in brick wall – black colour	None Detected (TEM) (1)
EXT-CLK-27B	Exterior West	Caulking in control joint in brick wall – black colour	None Detected (1)
EXT-CLK-27C	Exterior East	Caulking in control joint in brick wall – black colour	None Detected (1)
EXT-CLK-28A	Roof C West	Caulking on exterior door frame – black colour	None Detected (TEM) (1)
EXT-CLK-28B	Room 116 (158)	Caulking on exterior window frame – black colour	None Detected (1)
EXT-CLK-28C	Roof C East	Caulking on exterior door frame – black colour	None Detected (1)
EXT-CLK-29A	Room 116 (158)	Caulking on exterior window between glass and frame – grey colour	**4.4% Chrysotile**
EXT-CLK-30A	Room 154 (138)	Caulking on exterior door frame – brown colour	None Detected (TEM) (1)
EXT-CLK-30B	Room 148 (127)	Caulking on exterior metal wall panels – brown colour	None Detected (1)
EXT-CLK-30C	Room 148 (127)	Caulking on exterior door frame – brown colour	None Detected (1)
EXT-CLK-30D	Exit 4 (S11)	Caulking on exterior door frame – brown colour	None Detected (1)
EXT-CLK-30E	Room 131 (106)	Caulking on exterior door frame – brown colour	None Detected (1)
62580-FP-1	Corridor C3D (C306)	Fireproofing overspray – typical to Sample # 101 (grey) as outlined in the Golder report	None Detected (1)
701171-FP-2	Corridor 3CE (C311)	Fireproofing overspray – typical to Sample # 101 (grey) and Sample # 107 (tan) as outlined in the Golder report	None Detected (1)

Sample Nº	Location	Description	Asbestos Content
62548-FP-3	Room 313 (312)	Fireproofing on exposed beams – hand packed – white coloured – not identified in the Golder report	None Detected (1)
62536-FP-4	Room 331 (340)	Fireproofing – typical to Sample #101 (grey) as outlined in the Golder report	None Detected (1)
62536-FP-5	Room 331 (340)	Fireproofing – typical to Sample #107 (tan) as outlined in the Golder report	None Detected (1)
101167-FP-6	Corridor C2B (C204)	Fireproofing – typical to Sample # 206 (light brown to grey) as outlined in the Golder report	None Detected (1)
62490-FP-8	Room 240 (212)	Fireproofing – typical to sample #4 (black and white) as outlined in the Golder report	None Detected (1)
62486-TH-1	Stair 2 – 2nd Floor (B2)	Paint on concrete ceiling deck – identified as texture coat material in the Golder report	None Detected (1)
101165-TH-2	Corridor C2B (C204)	Duct seal on ducting – red coloured – not identified on the Golder report.	**1.1% Chrysotile** (1)
101-1	62562 Room 330 (302)	Spray on Fireproofing - grey	No Asbestos Detected (1)
101-2	62562 Room 330 (302)	Spray-on Fireproofing - grey	No Asbestos Detected (1)
101-3	106622 Room 330B (401)	Spray-on Fireproofing - grey	No Asbestos Detected (1)
101-4	106621 Room 323B (402)	Spray-on Fireproofing - grey	No Asbestos Detected (1)
101-5	106621 Room 323 (322)	Spray-on Fireproofing - grey	No Asbestos Detected (1)
102-1	106622 Room 330B (402)	Parging	**60% Chrysotile** (1)
103-1	62534 Corridor C3C (C305)	Ceiling Tile 2’ x 4’ – short fissures parallel to length and pin holes	No Asbestos Detected (1)
103-2	62534 Corridor C3C (C305)	Ceiling Tile 2’ x 4’ – short fissures parallel to length and pin holes	No Asbestos Detected (1)
103-3	62534 Corridor C3C (C305)	Ceiling Tile 2’ x 4’ – short fissures parallel to length and pin holes	No Asbestos Detected (1)
103-4	62567 Room 309 (334)	Ceiling Tile 2’ x 4’ – short fissures parallel to length and pin holes	No Asbestos Detected (1)
103-5	62534 (Corridor C3C) (C305)	Ceiling Tile 2’ x 4’ – short fissures parallel to length and pin holes	No Asbestos Detected (1)
104-1	62534 Corridor C3C (C305)	Spray-on Fireproofing – brown	No Asbestos Detected (1)
104-2	62534 Corridor C3C (C305)	Spray-on Fireproofing – brown	No Asbestos Detected (1)
104-2	62534 Corridor C3C (C305)	Spray-on Fireproofing – brown	No Asbestos Detected (1)
107-1	10117 Corridor C3E (C311)	Spray-on Fireproofing – tan	No Asbestos Detected (1)

Sample Nº	Location	Description	Asbestos Content
107-2	101172 Corridor C3E (C311)	Spray-on Fireproofing – tan	No Asbestos Detected (1)
107-3	101172 Corridor C3E (C311)	Spray-on Fireproofing – tan	No Asbestos Detected (1)
107-4	101172 Corridor C3E (C311)	Spray-on Fireproofing – tan	No Asbestos Detected (1)
107-5	101172 Corridor C3E (C311)	Spray-on Fireproofing – tan	No Asbestos Detected (1)
114-1	338a Room 337C (312C)	Spray-on Fireproofing – white	No Asbestos Detected (1)
114-2	338a Room 337C (312C)	Spray-on Fireproofing – white	No Asbestos Detected (1)
114-3	338a Room 337C (312C)	Spray-on Fireproofing – white	No Asbestos Detected (1)
117-1	62551 Corridor C3A(C312)	Thick black paper covering on duct	No Asbestos Detected (1)
117-2	62551 Corridor C3A (C312)	Thick black paper covering on duct	No Asbestos Detected (1)
117-3	62551 Corridor C3A (C312)	Thick black paper covering on duct	No Asbestos Detected (1)
206-1	260B Corridor C2C (C203)	Spray-on Fireproofing – light brown to grey	No Asbestos Detected (1)
206-2	260B Corridor C2C (C203)	Spray-on Fireproofing – light brown to grey	No Asbestos Detected (1)
206-3	260B Corridor C2C (C203)	Spray-on Fireproofing – light brown to grey	No Asbestos Detected (1)
21-1	62401 Room 154 (138)	Spray-on Fireproofing – black and white	No Asbestos Detected (1)
21-2	62401 Room 154 (138)	Spray-on Fireproofing – black and white	No Asbestos Detected (1)
21-3	62401 Room 154 (138)	Spray-on Fireproofing – black and white	No Asbestos Detected (1)
21-4	62401 Room 154 (138)	Spray-on Fireproofing – black and white	No Asbestos Detected (1)
21-5	62401 Room 154 (138)	Spray-on Fireproofing – black and white	No Asbestos Detected (1)
26-1	62325 Room 123 (101)	Asbestos Cement (*Transite*) Panels	**20% Chrysotile** (1)
402-1	76855 Room B2 (006)	Tan Fireproofing on Beam	No Asbestos Detected (1)
402-2	76855 Room B2 (006)	Tan Fireproofing on Beam	No Asbestos Detected (1)
402-3	76855 Room B2 (006)	Tan Fireproofing on Beam	No Asbestos Detected (1)

NOTES:

Room numbers in the “Location” column in parenthesis correspond to room numbers identified on the floor plans provided in Appendix A in this report.

Room numbers in the “Location” column not in in parenthesis correspond to room numbers presented in the laboratory reports provided in Appendix B.

(1) Bulk sample results taken from a report prepared by Arcadis for CSV and CSDCCS Updated Survey of Asbestos-Containing Materials, École secondaire Toronto Ouest, École secondaire catholique Saint-Frére-André, 330 Lansdown Avenue, Toronto, Ontario” dated October 4, 2019.
(2) Asbestos-containing material” is defined as material that contains 0.5% or more asbestos by dry weight.
(3) Asbestos-containing materials removed from area sampled.
(4) Laboratory was able to determine asbestos content in paint was due to a cross contamination of asbestos-containing drywall joint compound in the paint sample. Paint does not contain asbestos.

< = Less than.

Chrysotile = Chrysotile asbestos
Crocidolite = Crocidolite asbestos
Tremolite = Tremolite 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 review of existing bulk sample analysis results, the following asbestos-containing materials were found to be present in the designated study areas:

- Spray-applied texture coat plaster finishes on ceilings in Rooms 150, 250 and 327;
- Paint on concrete block walls throughout the designated study areas.
- Remnant baseboard mastic on concrete block walls behind new vinyl baseboards (installed in 2012) in Room 151;
- Duct seal (red coloured) on ducting inside ceiling cavity in Room 150;
- Caulking (white coloured) applied to vertical control joints in concrete block walls and on corners where concrete block walls meet throughout the designated study areas; and
- Caulking (white coloured) applied to metal door frames throughout the designated study areas.

Asbestos-containing block-filler paint applied to concrete block walls was generally applied to bare concrete block as a primer coat to limit absorption of the final paint finishes into the concrete block. Exposed paint finishes on concrete block walls should not contain asbestos.

Glass fibre insulation is readily visually distinguishable (typically yellow in colour) from asbestos-containing insulation materials and was, therefore, not tested for asbestos content.

Mastics, paint, caulking and duct seal 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 B-1 in Appendix

B). 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.

Spray-applied texture coat is a friable material. Removal of less than 1 m^2 of friable asbestos-containing materials is classified as a Type 2 enclosure operation as specified in O.Reg. 278/05. Removal of more than 1 m^2 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, which include components of electrical equipment (e.g. electric wiring insulation, non-metallic sheathed cable, electrical panel partitions, arc chutes, high-grade electrical paper, etc.), threaded pipe sealants, mortar, concrete, asphaltic pavement. 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

Arcadis reviewed a report prepared by DCS (now Arcadis) for the CSV titled *"Designated Substances and Hazardous Materials Survey, Auditorium Sound and Lighting Upgrade Project, École Secondaire Toronto Ouest"* dated June 20, 2013. Information and paint sample analysis results taken from this report was utilized by Arcadis during the course of our investigation and in the preparation of this report.

Table 3.2. Summary of Results of Analyses of Bulk Samples for Lead

Sample No.	Sample Location	Sample Description	Lead Content (mg/kg)
116-P-1	Room 116	Multi-layered paint on concrete block walls – beige and grey colour	**770 mg/kg** (1)
117-P-2	Room 117	Paint on metal door – orange colour	**1,900 mg/kg** (1)
119-P-3	Room 119	Paint on drywall wall – beige and grey colour	**1,100 mg/kg** (1)
100-P-4	Room 101	Paint on metal railing – brown colour	**4,200 mg/kg** (1)
111-P-5	Room 111	Paint on concrete floor – grey colour	**610 mg/kg** (1)
125H-P-6	Room 125H	Paint on metal door frame – beige colour	**1,200 mg/kg** (1)
C1A-P-7	Corridor C1A	Paint on concrete block wall – white colour	**1,700 mg/kg** (1)
213-P-8	Room 213	Paint on concrete floor – grey colour	**570 mg/kg** (1)
P2-P-9	Room P2	Paint on concrete wall – blue-green colour	**1,600 mg/kg** (1)

Sample No.	Sample Location	Sample Description	Lead Content (mg/kg)
145-P-10	Room 145	Multi-layered paint on concrete block wall – white colour	**660 mg/kg** (1)

NOTE:

(1) Sample results taken from a report prepared by DCS (now Arcadis) for the CSV titled *"Designated Substances and Hazardous Materials Survey, Auditorium Sound and Lighting Upgrade Project, École Secondaire Toronto Ouest" dated June 20, 2013*.

< = less than.

mg/kg = milligrams lead per kilogram paint.

1 mg/kg = 1 part per million (ppm).

Lead was detected in all paint samples.

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 B, Table B-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 observed 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, plaster, concrete block, concrete and mortar.

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 B, Table B-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

During the course of the site investigation, equipment that may have refrigerants that are ODS was not observed in the designated study areas.

If any ODS-containing equipment is to be removed, then they must be handled in the following manner:

- any equipment designated for disposal as scrap must be drained of its contents by a licensed technician and equipped with a label indicating that the equipment no longer contains any refrigerant. The specific requirements for information on the label, as specified in the regulation, must be adhered to;
- equipment designated for relocation to another facility owned by the Conseil scolaire Viamonde must be drained and labelled, as above; and
- any equipment that is drained to facilitate relocation to another facility owned by Conseil scolaire Viamonde must be tested for leaks prior to re-filling. The equipment must be re-filled within six months of the leak test.

3.10 Mould

The investigation for mould included a visual inspection of readily-accessible surfaces throughout the designated study areas to determine if any mould was evident. The inspection of mould did not include intrusive inspections of wall cavities. Readily evident suspect mould was not observed in the designated study areas during the course of the site investigation. 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 Limitations and Service Constraints

The opinions, conclusions and recommendations presented in this report are limited to the information obtained during the performance of the specific scope of service identified in the report. To the extent that Arcadis relied upon any information prepared by other parties not under direct contract to Arcadis, no representation as to the accuracy or completeness of such information is made. This report is an instrument of professional service and the services described in the report were performed in accordance with generally accepted standards and level of skill and care ordinarily exercised by members of the profession working under similar conditions including comparable budgetary and schedule constraints. No warranty, guarantee or certification express or implied, is intended or given with respect to Arcadis' services, opinions, conclusions or recommendations.

Arcadis' observations, the results of any testing and Arcadis' opinions, conclusions and recommendations apply solely to conditions existing at the specific times when and specific locations where Arcadis' investigative work was performed. Arcadis affirms that data gathered and presented in this report was collected in an appropriate manner in accordance with generally accepted methods and practices. Arcadis cannot be responsible for decisions made by our client solely on the basis of economic factors. Observation and testing activities such as those conducted by Arcadis are inherently limited and do not represent a conclusive or complete characterization. Arcadis analyzed only the substances, conditions and locations described in the report at the time indicated. Conditions in other parts of the project site, building or area may vary from conditions at the specific locations where observations were made and where testing was performed by Arcadis. Additionally, other building material hazards which were not identified by Arcadis, may also be present un-accessed areas and in walls, ceilings, cavities, and floors.

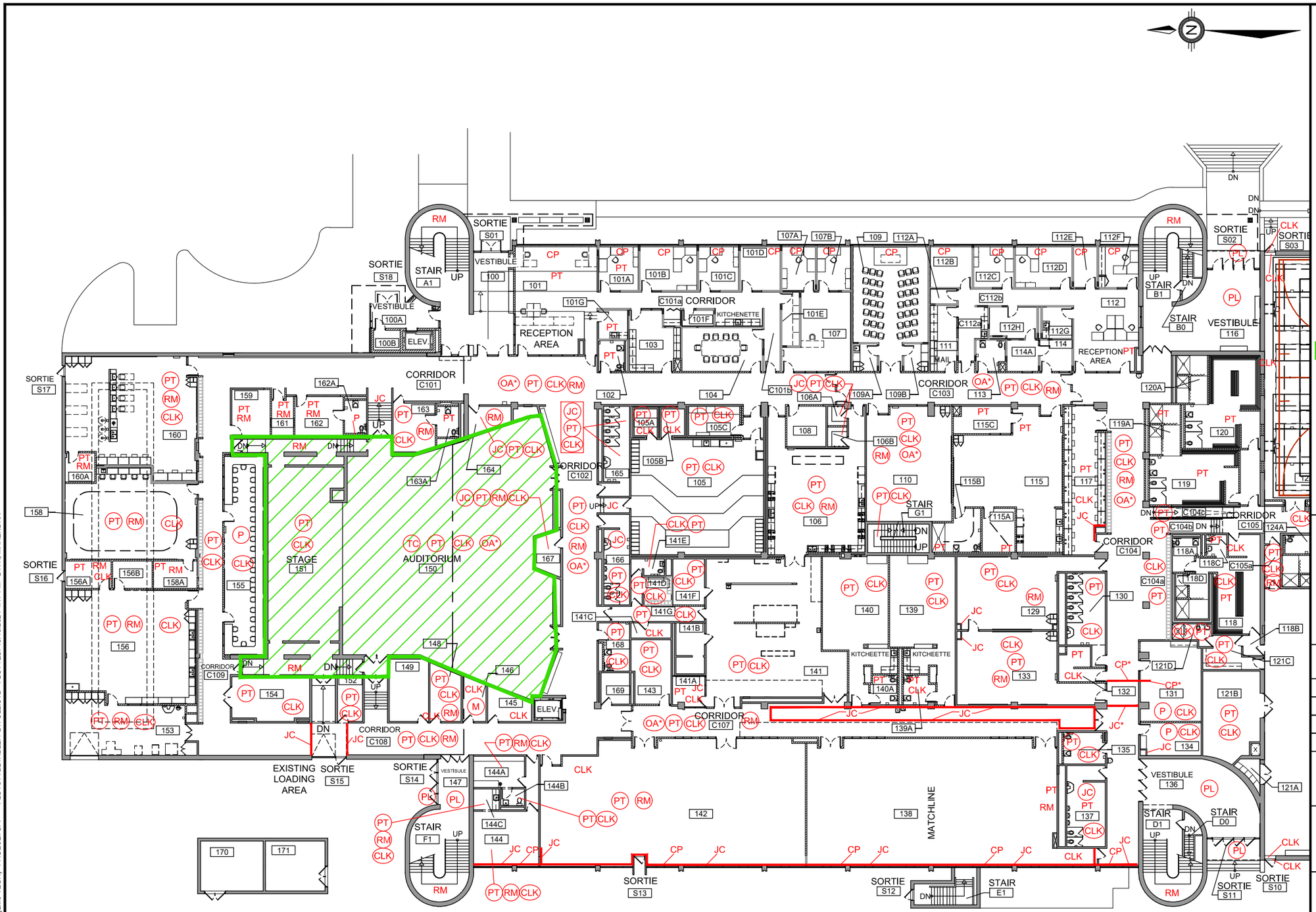
This report is expressly for the sole and exclusive use of the Client for whom this report was originally prepared and for the particular purpose outlined in the report. Reuse of this report or any portion thereof for other than its intended purpose, or if modified, or if used by third parties, shall be at the user's sole risk. This report must be presented in its entirety.

The survey did not include for identification of asbestos in process materials, equipment (including electrical equipment and wiring), furniture (e.g., chairs, tabletops, chalkboards, etc.), nor material outside of the building (e.g., asphaltic pavement).

This report is not intended to be used as a scope of work or technical specification for remediation of designated substances or hazardous materials.

Appendix A

Floor Plans



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LEGEND

103	FUNCTIONAL SPACE
○	THROUGHOUT FUNCTIONAL SPACE
*	ABOVE CEILING ASSEMBLY
TC	ASBESTOS TEXTURE COAT
JC	ASBESTOS DRYWALL JOINT COMPOUND
PL	ASBESTOS PLASTER
V	ASBESTOS VERMICULITE BLOCK-FILL INSULATION
PT	ASBESTOS PAINT
M	ASBESTOS MASTIC ON VINYL BASEBOARD
RM	REMNANT ASBESTOS BASEBOARD MASTIC
CLK	ASBESTOS CAULKING
CP	ASBESTOS CEMENT PRODUCT
OA	OTHER ASBESTOS MATERIAL
▨	STUDY AREA

NOTES:

1.

REVISIONS:

No.	Date:	By:	Revisions

REFERENCE:

1.

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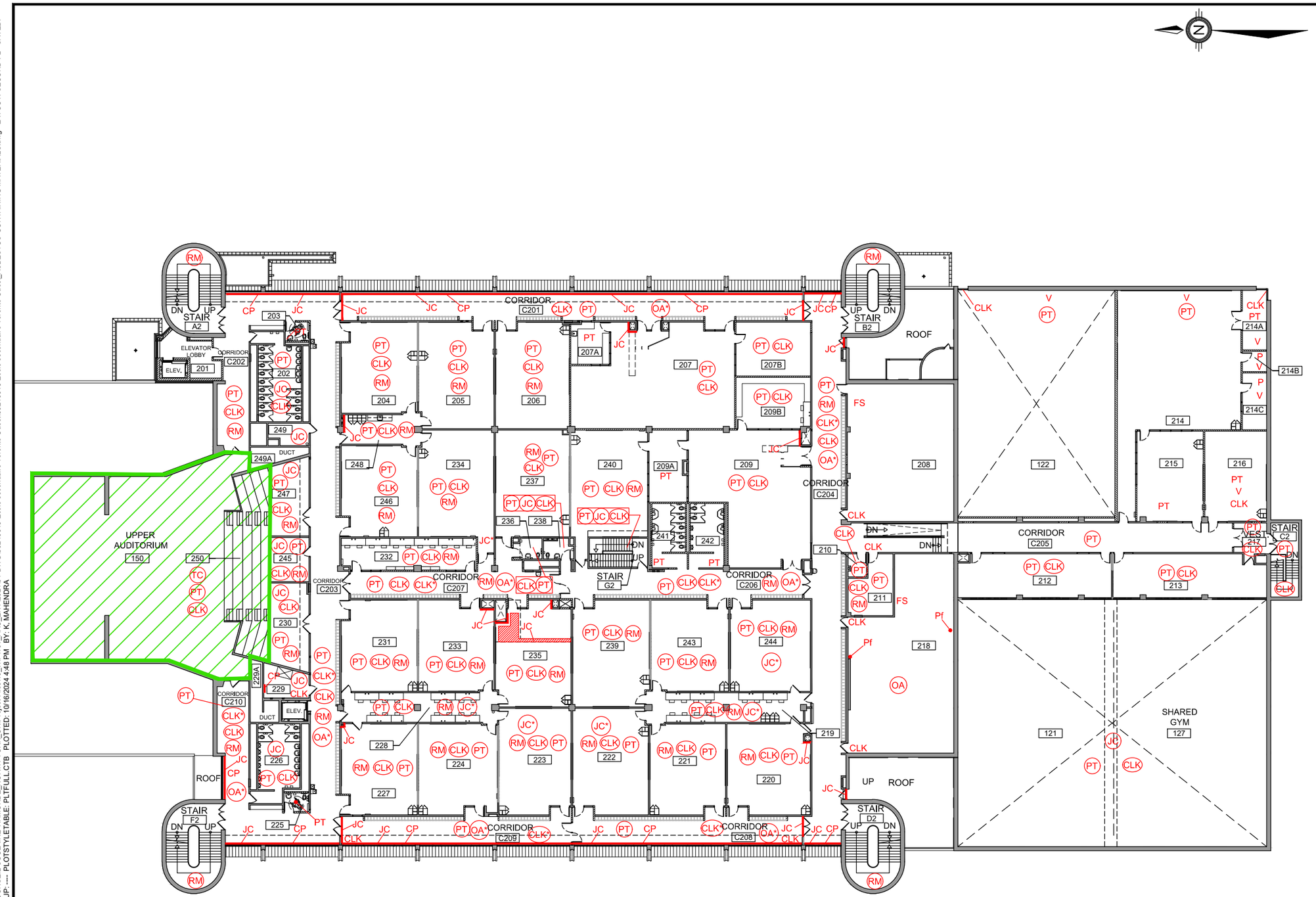
LOCATIONS OF ASBESTOS-CONTAINING MATERIALS AND STUDY AREAS

ÉCOLE SECONDAIRE TORONTO OUEST
330 LANSDOWNE AVENUE, TORONTO, ONTARIO

GROUND FLOOR PLAN (North Portion)

Drawn By: MKR	Approved By: J.D	Project No: 30240643	
Date: OCTOBER 2024	Scale: N.T.S	Drawing No: 30240643-1	



LEGEND

208	FUNCTIONAL SPACE
○	THROUGHOUT FUNCTIONAL SPACE
*	ABOVE CEILING ASSEMBLY
TC	ASBESTOS TEXTURE COAT
JC	ASBESTOS DRYWALL JOINT COMPOUND
Pf	ASBESTOS ON PIPE FITTINGS
V	ASBESTOS VERMICULITE BLOCK-FILL INSULATION
FS	ASBESTOS FIRESTOP MATERIAL
PT	ASBESTOS PAINT
RM	REMNANT ASBESTOS BASEBOARD MASTIC
CLK	ASBESTOS CAULKING
CP	ASBESTOS CEMENT PRODUCT
OA	OTHER ASBESTOS MATERIAL
▨	STUDY AREA

NOTES:

1.

REVISIONS:

No.	Date:	By:	Revisions

REFERENCE:

1.

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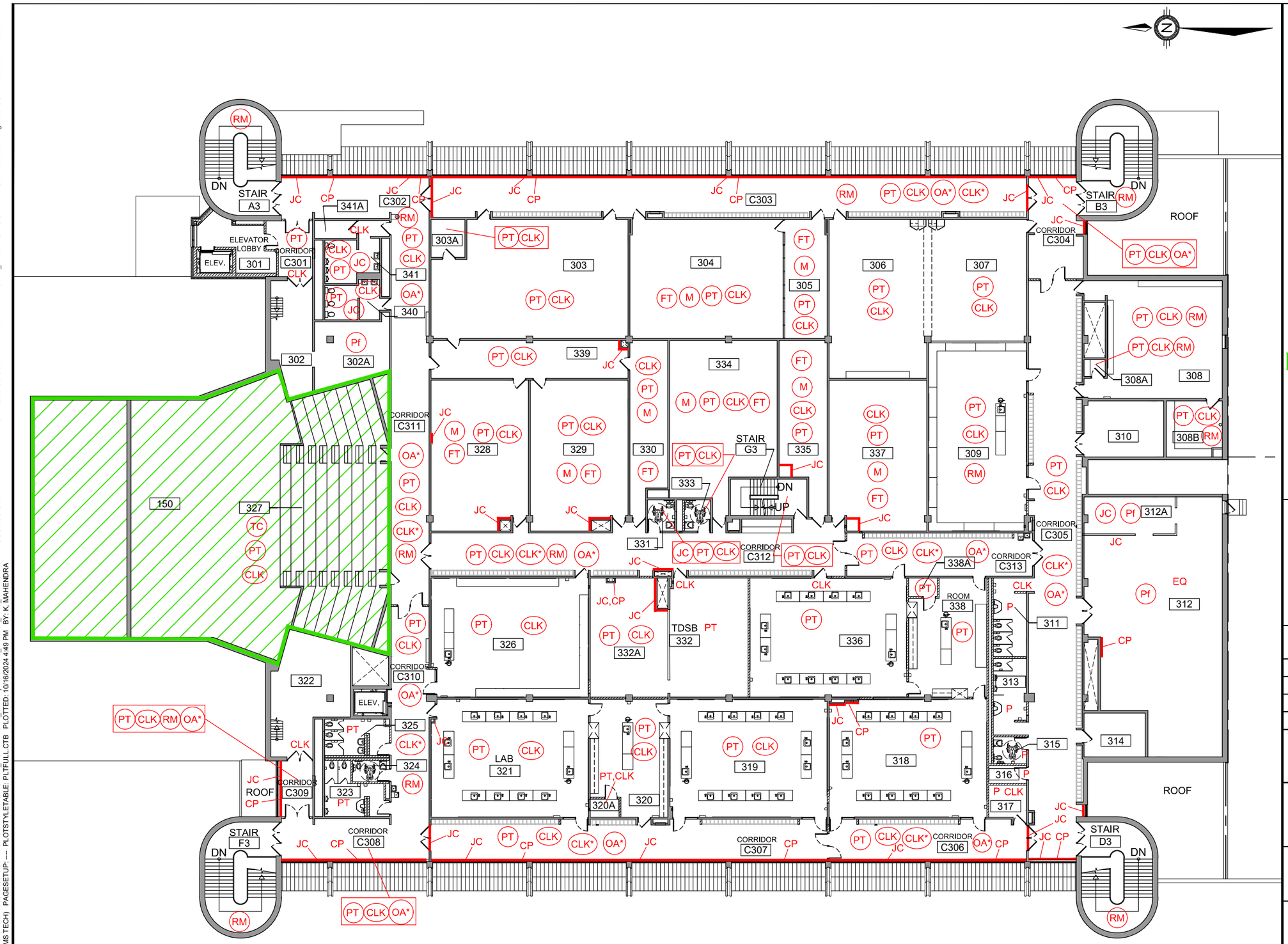
Conseil scolaire Viamonde

LOCATIONS OF ASBESTOS-CONTAINING MATERIALS AND STUDY AREAS

ÉCOLE SECONDAIRE TORONTO OUEST
330 LANSDOWNE AVENUE, TORONTO, ONTARIO

SECOND FLOOR PLAN

Drawn By: MKR	Approved By: D.K	Project No: 30240643	
Date: OCTOBER 2024	Scale: N.T.S	Drawing No: 30240643-2	



LEGEND

122	FUNCTIONAL SPACE
◯	THROUGHOUT FUNCTIONAL SPACE
*	ABOVE CEILING ASSEMBLY
TC	ASBESTOS TEXTURE COAT
JC	ASBESTOS DRYWALL JOINT COMPOUND
PL	ASBESTOS VINYL FLOOR TILE
V	ASBESTOS ON PIPE FITTINGS
PT	ASBESTOS PAINT
M	ASBESTOS MASTIC ON VINYL BASEBOARD AND/OR TACK BOARDS AND CHALK BOARDS
RM	REMNANT ASBESTOS BASEBOARD MASTIC
CLK	ASBESTOS CAULKING
CP	ASBESTOS CEMENT PRODUCT
EQ	ASBESTOS ON MECHANICAL EQUIPMENT
OA	OTHER ASBESTOS MATERIAL
▨	STUDY AREA

NOTES:

1.

REVISIONS:

No.	Date:	By:	Revisions

REFERENCE:

1.

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LOCATIONS OF ASBESTOS-CONTAINING MATERIALS AND STUDY AREAS

ÉCOLE SECONDAIRE TORONTO OUEST
330 LANSDOWNE AVENUE, TORONTO, ONTARIO

THIRD FLOOR PLAN

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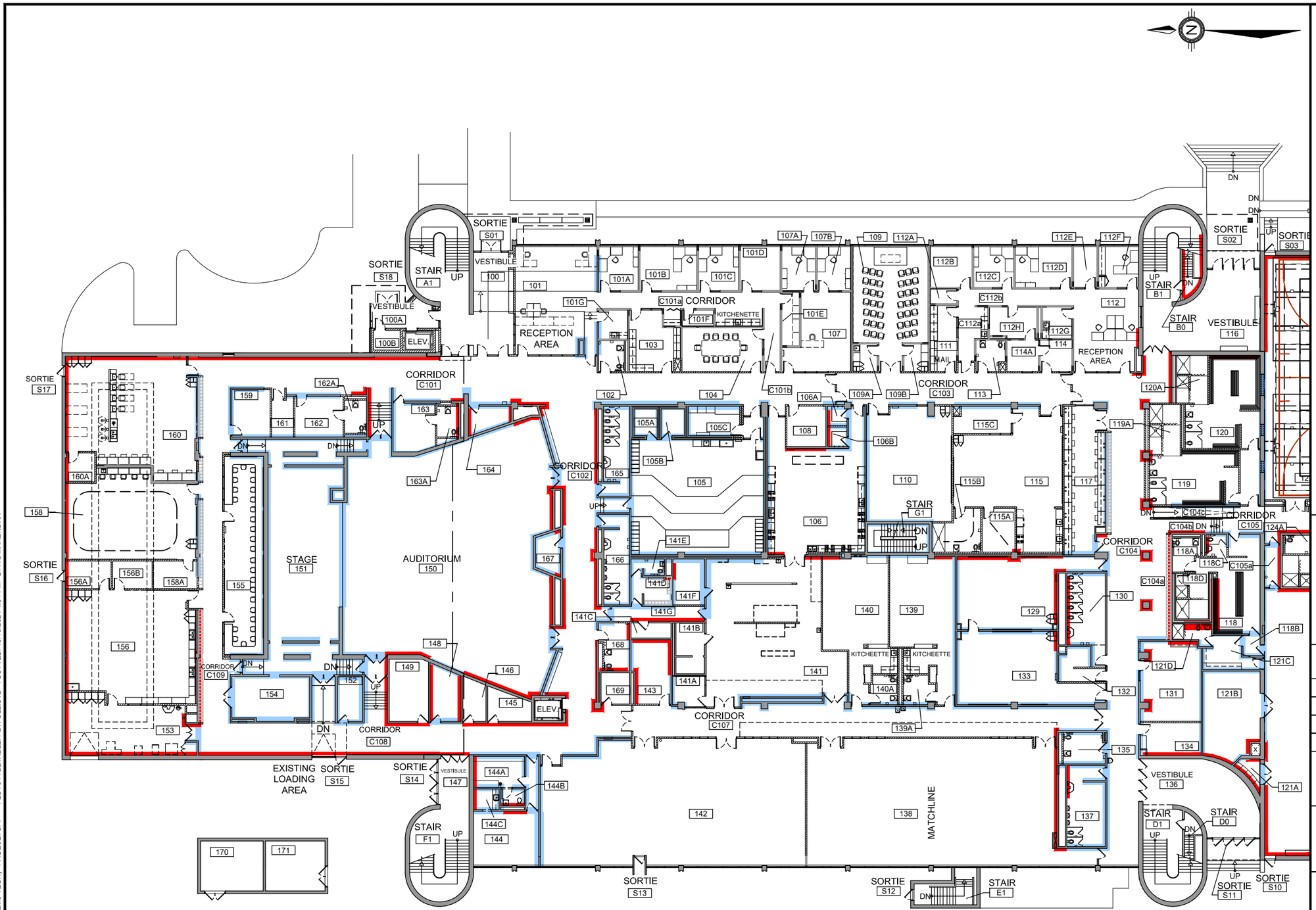

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LEGEND

103 FUNCTIONAL SPACE

ASBESTOS PAINT ON BOTH SIDES OF CONCRETE BLOCK WALL

ASBESTOS PAINT ON ONE SIDE OF CONCRETE BLOCK WALL

NOTES:

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REVISIONS:

No.	Date:	By:	Revisions

REFERENCE:

1.

ARCADIS

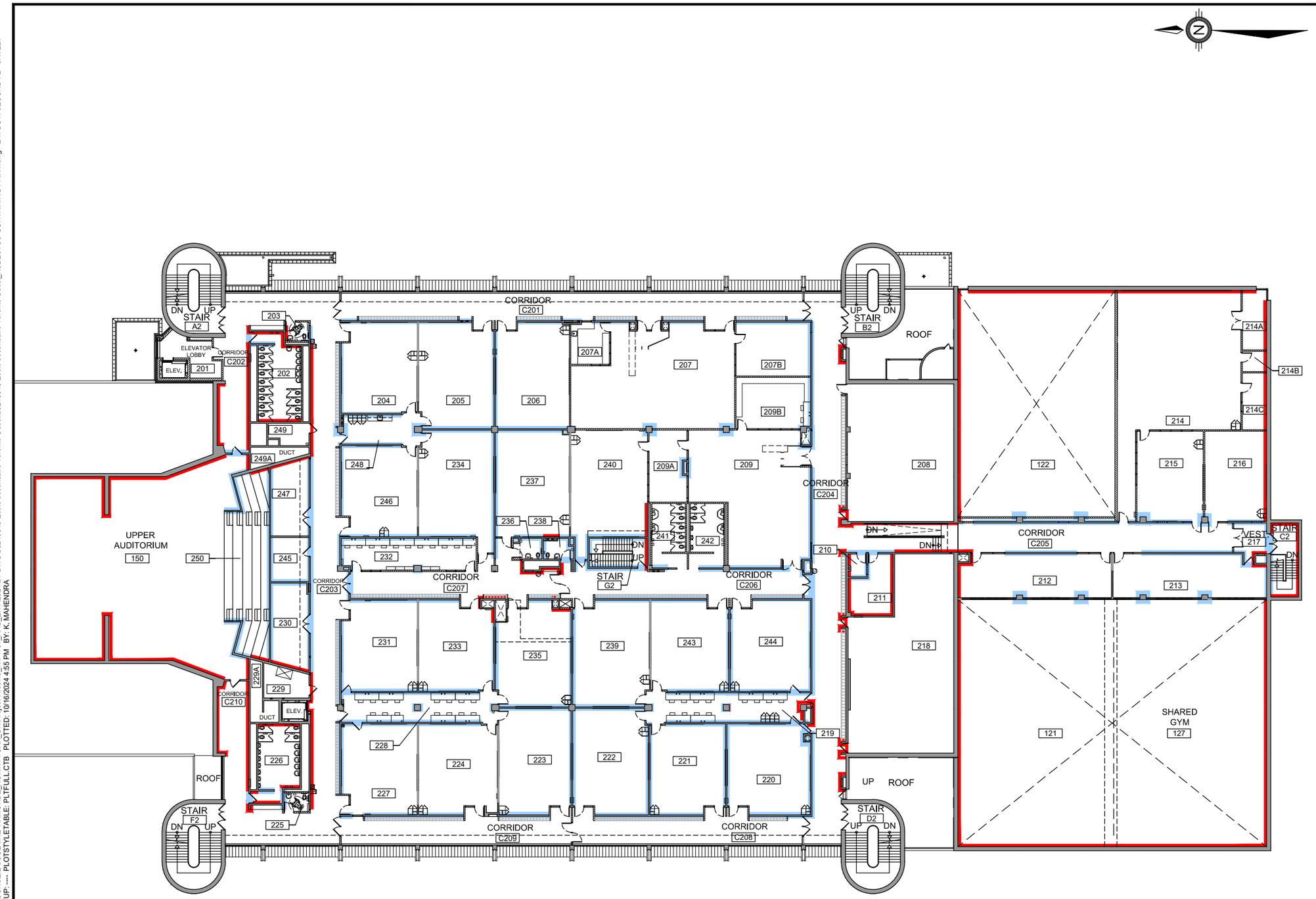
Conseil scolaire Viamonde

LOCATIONS OF ASBESTOS-CONTAINING PAINT

ÉCOLE SECONDAIRE TORONTO OUEST
330 LANSDOWNE AVENUE, TORONTO, ONTARIO

GROUND FLOOR PLAN (North Portion)

Drawn By: MKR	Approved By: J.D	Project No: 30240643	
Date: OCTOBER 2024	Scale: N.T.S	Drawing No: 30240643-4	



LEGEND

208 FUNCTIONAL SPACE

ASBESTOS PAINT ON BOTH SIDES OF CONCRETE BLOCK WALL

ASBESTOS PAINT ON ONE SIDE OF CONCRETE BLOCK WALL

NOTES:

1.

REVISIONS:

No.	Date:	By:	Revisions

REFERENCE:

1.

ARCADIS

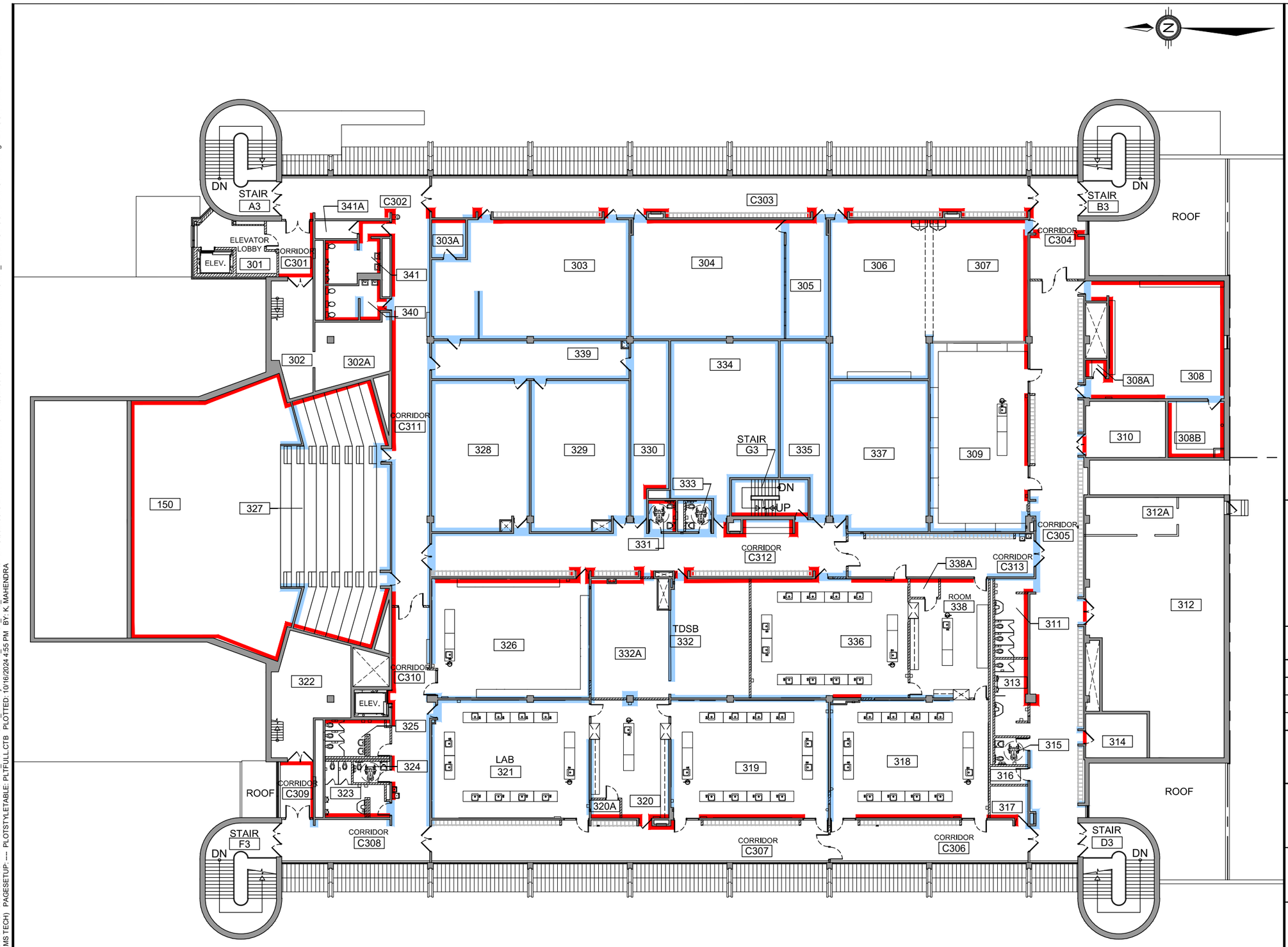
Conseil scolaire Viamonde

LOCATIONS OF ASBESTOS-CONTAINING PAINT

ÉCOLE SECONDAIRE TORONTO OUEST
330 LANSDOWNE AVENUE, TORONTO, ONTARIO

SECOND FLOOR PLAN

Drawn By: MKR	Approved By: D.K	Project No: 30240643	
Date: OCTOBER 2024	Scale: N.T.S	Drawing No: 30240643-5	



LEGEND

122 FUNCTIONAL SPACE

ASBESTOS PAINT ON BOTH SIDES OF CONCRETE BLOCK WALL

ASBESTOS PAINT ON ONE SIDE OF CONCRETE BLOCK WALL

NOTES:

1.

REVISIONS:

No.	Date:	By:	Revisions

REFERENCE:

1.

ARCADIS

Conseil scolaire Viamonde

LOCATIONS OF ASBESTOS-CONTAINING PAINT

ÉCOLE SECONDAIRE TORONTO OUEST
330 LANSDOWNE AVENUE, TORONTO, ONTARIO

THIRD FLOOR PLAN

Drawn By: MKR	Approved By: D.K	Project No: 30240643
Date: OCTOBER 2024	Scale: N.T.S	Drawing No: 30240643-6

Appendix B

Summary of Asbestos, Lead and Silica Work Classifications

TABLE B-1
SUMMARY OF CLASSIFICATION OF TYPE 1, 2 AND 3 OPERATIONS (Ont. Reg. 278/05)

TYPE 1 OPERATIONS

- removing less than 7.5 m^2 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 m^2 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 m^2 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 B-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 B-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, babbit 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 B-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 B-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 B-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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1 General

1.1 SUMMARY

.1 Work of this Section includes the supply and installation of the following concrete floor treatments, as well as testing and measurement for floor flatness and levelness.

.1 Liquid-Applied Penetrating Sealer;

.2 Cementitious Levelling Treatments;

.3 Cementitious Topping, Patching and Flash Patching Materials.

1.2 DEFINITIONS

.1 Floor Classifications: Classification of concrete floor slabs based on their intended use, methods of finishing and finish materials applied to flooring as denoted by the F-rating below, and as follows:

.1 Single Course Floor: Floors placed in a single course with final finishing applied to properly levelled concrete.

.2 Finish or Finishes: Materials applied to finished concrete surface, i.e.: stained or coloured concrete, carpet, or resilient flooring.

.3 Finishing: Methods, tools and equipment employed to achieve levelness or surface flatness for shored slabs and slabs-on-grade, and durability indicated and as follows:

.1 F3-Finishing: Floors having a straightedge value of ±1.6mm over 3048mm (1/6” over 10’); similar to CSA A23.1 Class C Slab Finishing.

1.3 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM):

.1 ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compound for Curing Concrete.

.2 ASTM C979/C979M-10, Standard Specification for Pigments for Integrally Colored Concrete.

.2 American Concrete Institute (ACI):

.1 ACI 117-2010, Specifications for Tolerances for Concrete Construction and Materials and Commentary

.2 ACI 302.1R-15, Guide for Floor and Slab Construction

.3 Canadian Standards Association (CSA):

.1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.4 International Concrete Repair Institute (ICRI):

.1 ICRI 310.2R-2013, Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays and Concrete Repair

1.4 ADMINISTRATION REQUIREMENTS

.1 Coordination:

.1 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.

.2 Pre-Construction Meetings:

.1 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings, attended by the Contractor, 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.

.2 Prepare an outline agenda for meeting in accordance with Division 01.

1.5 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit manufacturer’s product data for each materials specified including recommended application rates and methods of installation.

.3 Informational Submittals: Provide the following submittals during the course of the work:

.1 Site Quality Control Submittals: Submit results for straightedge measurements to demonstrate compliance with specified tolerances. Record the following information on a drawing indicating floor slab layout, column locations and slab penetrations:

.1 Indicate variance from specified straightedge measurements as a + or - value.

.2 Failed tests in excess of 50% of the straightedge will require the Subcontractor to flash patch floor to achieve specified tolerance; example of tolerance failure.

.3 Slabs-On-Grade: Measurement of 1.6mm (1/16”) or greater than ±6mm (1/4”) measurement will be considered as a failed test and will require flash patching.

.4 Suspended Slabs: Measurement of 3mm (1/8”) or greater than ±6mm (¼”) measurement (80% tolerance allowance) will be considered as a failed test and will require flash patching.

1.6 PROJECT CLOSEOUT SUBMISSIONS

.1 Operation and Maintenance Data:

.1 Submit detailed cleaning and maintenance instructions for concrete densifier products, and instruct Owner in proper care and maintenance of specified floor finishes, including a complete list of floor care products that will be required for ongoing maintenance, in accordance with Division 01.

1.7 QUALITY ASSURANCE

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

.2 Ensure proper use of proprietary materials in strict accordance with the material manufacturer's directions.

1.8 SITE CONDITIONS

.1 Environmental Requirements:

.1 Ensure that adequate temporary heating is provided as required for cold weather work.

.2 Provide adequate moisture, sun shades and wind barriers to prevent too rapid drying of concrete during hot weather.

.2 Protection:

.1 Ensure that finished concrete floor areas are protected from abrasion from foot or wheeled traffic, and from damage caused by spillage of oil or other harmful materials.

2 Products

2.1 MATERIALS

.1 Liquid-Applied Penetrating Sealer (SCON):

.1 Clear water based silane micro emulsion penetrating concrete sealer, formulated to prevent water and chloride intrusion into concrete surfaces.

.1 Basis of Design Materials:

.1 Planiseal WR 40 by Mapei Inc.

.2 Cipadm S-40 by CPD Construction Products

.3 Sikagard SN40 by Sika Canada Inc.

.4 Hydrozo Silane 40 VOC by BASF.

.5 or approved equivalent.

.2 Patching and Flash Patching Materials:

.1 Cementitious based, polymer modified, fine aggregate, single component, rapid curing, early strength floor patching compounds having high adhesion, for application in thicknesses to a minimum of 1/8” to 1”.

.2 Basis of Design Materials:

.1 SikaQuick 1000 by Sika Canada Ltd.

.2 Planitop 18ES by MAPEI Canada Inc.

.3 Meadow-Crete H by W.R. Meadows of Canada

.4 or approved equivalent.

.3 Joint Sealant: Refer to Section 07 92 00.

3 Execution

3.1 EXAMINATION

.1 Before commencing work, ensure that surfaces are acceptable to receive and maintain concrete finishing, and that specified installation will be achieved.

3.2 FINISHING FLOORS AND SLABS

.1 Finish floors and slabs in accordance with CSA A23.1 and ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces; do not wet concrete surfaces.

3.3 INSTALLATION

.1 Installation - Liquid-Applied Penetrating Sealer:

.1 Vertical Surfaces:

.1 Apply using a brush, roller or low pressure spray, working from top to bottom by maintaining a 305mm (12”) parallel curtain (run down).

.2 When applying the material on a vertical surface, avoid accumulation and run-off of the material. In the event of material accumulation or run-

off lines being formed, redistribute the material on the surface or remove by sponging.

.3 Apply flood coat in two (2) passes, “wet on wet” with the second pass at right angles to the first. Material coverage should not be greater than 2.5 m2/L total (100 ft2/US gal.), unless otherwise recommended by the Manufacturer.

.2 Horizontal Surfaces:

.1 Apply using a roller or low pressure spray, ensuring that product penetrates the substrate and does not “pond” or “puddle” on the surface.

.2 If ponding occurs, redistribute or remove the excess material on the surface before material starts to dry and form a film that will prevent penetration of excess material.

.3 Material coverage should not be greater than 4.4 m2/L (180 ft2/US gal.), unless otherwise recommended by the Manufacturer.

.4 Apply flood coat in two (2) passes, “wet on wet” with the second pass at right angles to the first.

.5 Complete and correct coverage of surfaces is crucial to the success of such sealers

.3 Control Joints:

.1 Install bond breaker of silica sand, polyethylene film strip or foam filler in bottom of joints.

.2 Cementitious Topping, Patching and Flash Patching Materials:

.1 Leak Prevention:

.1 Fill cracks and voids in subfloor where leakage of slurry could occur using suitable quick setting patch material or caulk, as recommended by underlayment manufacturer.

.2 Prime substrate according to manufacturer’s recommendations.

.3 Installation shall not begin until building is enclosed and ventilated.

.4 Mix levelling treatments and cementitious topping, patching and flash patching materials in accordance with Manufacturer’s written instructions.

.5 Pour levelling treatments and cementitious topping, patching and flash patching materials to recommended thickness and immediately spread and screen to desired surface finish and level.

.3 Control Joints – Interior Surfaces:

.1 Follow existing control joints in concrete levelling and topping finishes to prevent cracking. When concrete levelling and topping finishes are firm enough not to be torn or damaged by cutting, cut 5mm (3/16") wide control joints into surface of concrete with abrasive blade power saw.

.2 Once levelling and topping finishes are cured, fill control joints with joint sealant.

.1 Completely clean side joint surfaces of dirt, oil, grease, and similar contaminants, and mask floor surfaces at joints while installing joint sealant.

.2 Prime side joint surfaces with compatible primer if surfaces are not completely dry.

3.4 PATCHING AND REFINISHING

.1 Before completion of project, patch and refinish defective surfaces to match surrounding areas with no discernible variation in appearance.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and install all miscellaneous metal work indicated on drawings and not included in the work of other Sections in addition to items listed in this Section.

.2 Section includes the supply and installation of decorative steel railings and elements, as detailed on the Drawings for use in the following locations:

.1 Handrails at ramp/stairs;

.2 Various fabrications as detailed

1.2 RELATED REQUIREMENTS

.1 Read carefully all other Sections and review drawings to determine extent of metal work supplied and installed, or installed by others.

.2 Be responsible for co-ordinating this section with all related sections.

1.3 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM):

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

.2 ASTM A325-10, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

.3 ASTM A653/A653M-11, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.4 ASTM C939-10, Standard Test Method for Flow of Grout for Preplaced Aggregate Concrete (Flow Cone Method)

.5 ASTM A1011/A1011M-12b, 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

.6 ASTM C1107/C1107M-11, Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink)

.2 Canadian Standards Association (CSA):

.1 CSA G40.20-04/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel

.2 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing or Irregularly Shaped Articles

.3 CSA-S16-09, Design of Steel Structures

.4 CSA-S136-07, North American Specification for the Design of Cold Formed Steel Structural Members

.5 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel

.6 CSA W55.3-08, Certification of Companies for Resistance Welding of Steel and Aluminum

.7 CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding)

.3 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating

.2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type

.3 CGSB 31-GP-105Ma, Zinc Phosphate Conversion Coatings for Paint Base

.4 The Society for Protective Coatings (SSPC):

.1 SSPC1 Solvent Cleaning - 2004

.2 SSPC2 Hand Tool Cleaning - 2004

.3 SSPC-3 Power Tool Cleaning - 2004

.4 SSPC-6 Commercial Blast Cleaning - 2007

1.4 QUALITY ASSURANCE

.1 All Codes and Standards referred to in this Specification shall be current editions including all latest revisions and addenda.

.2 Conform to requirements of CSA-S16, Design of Steel Structures and CAN/CSA-S136, Cold Formed Steel Structural Members.

.3 Architectural metals work shall be of the highest architectural quality, free of scratches, pitting, roughness, marring, discolouration, staining and other imperfections.

.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.

.5 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.

.6 Where required by authorities having jurisdiction, have work of this Section designed by a professional engineer licensed to design structures and registered in the Province of the Work.

1.5 SUBMITTALS

.1 Provide submittals in accordance with Division 01, bearing stamp or seal and signature of the Professional Engineer responsible for the design of the work of this Section.

.2 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.

.3 Samples:

.1 Provide samples of duplex powder coat finish over hot dip galvanizing, on 100 x 100mm sheet steel (in triplicate).

1.6 STORAGE, DELIVERY, HANDLING AND PROTECTION

.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.

.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.

.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.

.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.

2 Products

2.1 PERFORMANCE REQUIREMENTS

.1 Delegated Design: Engage a qualified professional engineer, to design railings, including attachment to building construction.

.2 Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

.1 Handrails and Top Rails of Guards:

.1 Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.

.2 Concentrated load of 200 lbf (0.89 kN) applied in any direction.

.3 Uniform and concentrated loads need not be assumed to act concurrently.

.2 Infill of Guards:

.1 Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).

.3 Infill load and other loads need not be assumed to act concurrently.

2.2 MATERIALS

.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 Hollow Structural Sections (HSS): New stock; to conform to CAN/CSA-G40.21, Grade 350W (50W), Class C, stress relieved.

.3 Sheet Steel (Structural Quality): Conforms to ASTM A1011/A1011M.

.4 Sheet Steel (Commercial Quality): Conforms to ASTM A653/A653M, stretcher levelled or temper rolled.

.5 All Stainless Steel for interior use to be type 304, brushed satin finish, analysis 18-8.

.6 Galvanized Sheet Steel (Commercial Quality): Galvanized coating G90 (Z275) in accordance with ASTM A653/A653M, minimized spangle, stretch levelled or temper rolled. Specially treat by phosphate conversion process conforming to CGSB 31-GP-105Ma ready to receive prime paint finish.

.7 Steel Pipe: Hot-dip galvanized, zinc coated, welded and seamless type steel pipe conforming to ASTM A53/A53M.

.8 Aluminum Plate and Sheet: ASTM B209M, Alloy 6061-T6.

.9 Aluminum Extrusions: ASTM B221M, Alloy 6063-T6.

.10 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., or approved equivalent.

.11 Galvanizing: All uncoated steel specified to be galvanized shall be galvanized after fabrication by the hot dip process according to CAN/CSA-G164, with minimum coating of 2 oz./sq.ft. Galvanize after all welding is complete. Welding of galvanized material will not be permitted. Specially treat by phosphate conversion process conforming to CGSB 31-GP-105Ma ready to receive prime paint finish.

.12 Primer Paint: CISC/CPMA 2-75.

.13 Bolts, Nuts, Washers: Conforms to ASTM A325.

.14 Welding Materials: Conforms to CSA W59.

.15 Metal Filler: Polyester based type.

.16 Painting:

.1 Shop Applied Structural Steel Primer: Steel Spec Universal Primer (B50RV6227 Red), by Sherwin Williams Company of Canada Ltd., or approved equivalent. Apply a minimum of 2 mils dft./coat. Grey coloured primer is acceptable.

.2 Zinc Rich Paint For Touch-up of Galvanized Metals: Ready mixed, zinc-rich primer conforming to CAN/CGSB-1.181, Sealtight Galvafroid Zinc-Rich Coating by W.R. Meadows of Canada Limited or Zinc Clad No. 5 Organic Zinc Rich Primer by Sherwin Williams Company of Canada Ltd., or approved equivalent.

.3 Touch-up Primer (On Site): Procryl Universal Acrylic Primer by Sherwin Williams Company of Canada Ltd, or approved equivalent. Touch-up primer shall be no less than 3 mil dft.

.4 Refer to Section 09 90 00, and coordinate with the above.

.17 Isolation Coating: Acid and alkali resistant bituminous paint.

.18 Building Paper: Conforms to CAN/CGSB-51.32.

.19 Butyl Tape: Extruded, high grade, macro-polyisobutylene tape of size, width and shore hardness to suit conditions.

2.3 FABRICATION

.1 Fit and assemble work in shop where possible. Execute work according to details and reviewed shop drawings.

.2 Take measurements at the building for work which is to fit or be connected to steel or concrete before commencing fabrication.

.3 Where shop fabrication is not possible, make trial assembly in shop.

.4 Do all welding in accordance with requirements of CSA W59, CSA W55.3 and CSA W47.1 including all supplements. Weld stainless steel electric arc process. Grind welds smooth and flush with surface of parent metal, where exposed to view and where specifically indicated on drawings. Welds shall be continuous seam welds unless specified otherwise. Maintain sharp arises.

.5 Fit joints and intersecting members accurately in true planes, square, plumb, straight with tight joints and intersections.

.6 Provide adequate reinforcing, fastenings, anchors, accessories required for fabrication and erection of work of this Section. Such items occurring on or in an exterior wall or slab shall be hot-dip galvanized. Make thread dimensions such that nuts and bolts will fit without rethreading or chasing threads.

.7 Fabricate, drill and tap members to accommodate attachments, anchorage and work of other Sections where located and directed by them.

.8 Exposed steel surfaces shall be smooth and free from imperfections such as warping, buckling, weld marks, burrs, rust and scale.

.9 Gauges and sizes of metal shall be adequate for various conditions.

.10 Make exposed metal fastenings and accessories of same material, texture, colour and finish as base metal on which they occur unless otherwise shown or specified. Keep exposed fastenings to an absolute minimum evenly spaced and neatly laid out. Make fastenings of permanent type unless otherwise indicated.

2.4 HOT DIP GALVANIZING

.1 Hot dip galvanize, after fabrication, steel metal fabrication items. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with brush or spray-applied anti-corrosion coating containing 92-95% zinc, in accordance with manufacturer's printed directions.

.1 Members exposed to elements when in final location.

.2 Members embedded on exterior side of exterior walls.

.3 Members imbedded in concrete.

.4 Members specified in this Section or indicated on Drawings.

.2 Hot-dip galvanize members in accordance with CAN/CSA G164 and requirements of the following ASTM standards, with minimum coating weights or thicknesses as follows, unless otherwise indicated that high performance organic finish is required:

.1 Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips: ASTM A123/A123M; average weight of zinc coating of actual surface

.1 4.8 mm (3/16”) and less member thickness: 600 g/sq.m.

.2 6 mm (1/4”) and heavier members: 640 g/sq.m.

.2 Iron and Steel Hardware: ASTM A153/A153M; minimum weight of zinc coating, in gram per square meter of surface, in accordance with Table 1 for the various classes of materials used in the Work.

.3 Components scheduled for powder coat finish after galvanizing shall be prepared according to ASTM D7803, including:

.1 Grind and fill as required to remove all bumps, runs and drips.

.2 Remove organic material with mild alkaline, acidic or solvent solution.

.3 Rinse and remove cleaning solution; thoroughly dry.

.4 Profile all surfaces using either sweep blasting, grinding or zinc phosphate solution.

.5 Bake at minimum 30C above temperature used to cure powder coat finish.

2.5 SHOP APPLIED COATINGS AND PROTECTION

.1 Preparation

.1 As per SSPC2 Hand Tool Clean and SSPC1 Solvent Clean, clean welds by wire brushing and wash down with clean water, to remove the chemical residues left by the electrodes, prior to painting.

.2 Prepare steel as per SSPC-3 Power Tool Cleaning for Interior or SSPC-6 Commercial Blast Cleaning for exterior members. Remove rust, mill scale, oil, dirt, and other foreign matter before commencing shop painting.

.2 Priming

.1 Apply shop coat of primer to all surfaces except areas requiring field welding. Apply by brush, working paint well into surfaces, interstices and cavities. Primer to be zinc rich for exterior applications.

.2 Primer is to be free of runs, sags, or other collections of primer due to dipping of members into primer.

.3 Prime field welded areas after erection and touch up shop coat where damaged and barred by erection and handling.

3 Execution

3.1 GENERAL

.1 Verify at site that the Work to receive the work of this Section is free of irregularities detrimental to the installation and performance of the work and that it is located correctly and at proper levels before delivery and installation.

.2 Erection: To meet specified requirements of CAN/CSA-S16.

.3 Bearing Plates and Anchors: Standard.

.4 Anchors: Anchors to structural concrete shall be approved inserts set into concrete or approved self-drilling expansion insets drilled and placed afterwards.

3.2 INSTALLATION

.1 Assemble and erect work plumb, true, square, straight, level and accurate to sizes detailed, to reviewed shop drawings, free from distortion and defects detrimental to appearance and performance.

.2 Isolate metals where necessary to prevent corrosion due to contact between dissimilar metals and between metals and masonry, concrete or plaster. Use bituminous paint or butyl tape.

.3 Supply adequate instructions, templates, and if necessary, supervise installation of the fastenings or accessories requiring to be built-in by other Sections of the Work.

3.3 SCHEDULES

.1 Where items are required to be built into masonry, concrete or other work, supply such items to respective Sections with all anchors and accessories for building in.

.2 Itemized List: Supply and install metal work listed below unless specifically designated to be supplied only. Each item shall be as shown on drawings and as detailed on reviewed shop drawings.

.3 Miscellaneous Steel Framing, Channels, Angles, Plates and Brackets: As required and indicated on drawings.

.4 Steel L-Angle support complete with mounting plates at either end for support at light shelf at windows W1 & W3.

.5 Handrails:

.1 Handrail (H1) at stage ramp:

.1 38mm diameter steel handrail on 10mm diameter stand offs complete with mounting plate at masonry wall attachment locations.

.2 Height of stand-offs varies as per drawings/details.

.3 Finish: site painted as per Section 09 90 00.

.2 Handrail (H2) at stage ramp:

.1 38mm diameter steel handrail, complete with flat bar vertical balusters

.2 Intermediate baluster to be welded to site installed mounting plate cast into concrete.

.3 Finish: site painted as per Section 09 90 00.

.3 Handrail (H3) at balcony stairs

.1 38mm diameter steel handrail, complete with flat bar vertical balusters and intermediate flat bar mid rail

.2 Intermediate baluster to be welded to site installed mounting plate cast into concrete.

.3 Finish: site painted as per Section 09 90 00.

.4 Handrail (H4) at balcony:

.1 Existing 25mm square steel handrail, complete with 25mm square vertical baluster to remain.

.2 L-angle welded to existing 25mm square vertical baluster below top and bottom rails. Height of L-angles per drawings/details.

.3 12mm clear polycarbonate guard panel to be site installed on L-angles with mechanical fasteners per drawings/details.

.4 Finish: site painted as per Section 09 90 00.

.6 Loose Lintels:

.1 Provide and install loose lintels if not by structural steel.

.2 Finish: Hot-dip galvanized after fabrication.

.7 Masonry Lateral Supports:

.1 Install deflection space and lateral support for non-load-bearing masonry walls and partitions in accordance with specified requirements of CAN/ULC-S304-M, where not provided on Structural Drawings.

.2 At walls with concealed tops:

.1 3" x 2" x 1/4" angles 8" long on both sides of walls. Anchor to structure above wall.

.3 At walls with tops exposed to view:

.1 3" x 2" x 1/4" angles, continuous on both sides of wall. Anchor to structure above wall.

.4 Finish: Prime paint.

.8 Other Miscellaneous Metal Components:

.1 As required and indicated on drawings.

.2 Finish: Prime paint for interior components, ready for finishing by Section 09 90 00 and hot-dip galvanized after fabrication for exterior components.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and install materials in accordance with published 'Through-Penetration Firestop Systems' in UL's Fire Resistance Directory or the publication of another approved independent laboratory.

1.2 REFERENCE STANDARDS

.1 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S115-05, Standard Method of Fire Tests and Firestop Systems

.2 American Society for Testing and Materials (ASTM):

.1 ASTM E814-11a, Standard Test Method for Fire Tests of Penetration Firestop Systems

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Shop Drawings:

.1 Provide details indicating all reinforcing, anchorages, fastening and proposed method of installation for the various conditions within the project.

.3 Samples:

.1 Submit samples of each type of firestop and smokeseal material and accessory.

1.4 QUALITY ASSURANCE

.1 Applicator shall be licensed by the manufacturer of fireproofing materials.

.2 Conform to flame and temperature ratings established by CAN/ULC-S115-05 and ASTM E814-11a.

.3 Submit manufacturer's certification that materials meet or exceed specified requirements.

.4 Maintain flame and temperature ratings equal to surrounding materials.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Deliver materials in original, unopened packages bearing name of manufacturer and product identification.

.2 Store materials off ground, under cover, and away from damp surfaces.

1.6 SITE CONDITIONS

.1 Do not apply materials when temperature of substrate material is below 4 deg C and surrounding air temperature is below 4 deg C, for 24 hours prior to application.

2 Products

2.1 MATERIALS

.1 Bears UL, ULC or Warnock Hersey label and confirmation of compliance with ASTM E814-11a or CAN/ULC-S115.

.2 Provide fire stopping and smoke sealing systems in accordance with CAN/ULC-S115-M and shall also conform to special requirements in part 3.5 of the Building Code.

.3 Fire-resistant rating of fire stopping material assemblies must meet or exceed the fire-resistance rating of the floor or wall section being penetrated.

.4 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control shall be elastomeric seal type. Do not use a cementitious, or rigid seal at such locations.

.5 Primers shall be to manufacturer's recommendation for specific material, substrate, and end use.

.6 Damming and backup materials, supports and anchoring devices shall be to manufacturer's recommendations, and in strict accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.7 Sealants for vertical joints, shall be non-sagging type.

3 Execution

3.1 PROTECTION

.1 Mask adjacent work of other Sections as necessary to avoid spillage onto adjoining surfaces. Remove stains on adjacent surfaces as required.

3.2 PREPARATION

.1 Examine sizes and conditions to establish correct thickness and installation of backup materials. Ensure surfaces are dry and frost free.

.2 Clean bonding surfaces of deleterious substances including dust, paint, rust, oil, grease and other foreign matter which may otherwise impair effective bonding.

.3 Do not apply firestops and smokeseals to 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 Prepare surfaces in accordance with manufacturer's instructions.

.5 Priming and Sealing: Prime surfaces in accordance with manufacturer's instructions.

3.3 APPLICATION

.1 Mix materials in accordance with manufacturers' written instructions.

.2 Apply in strict accordance with ULC certification and manufacturer's recommendations to provide a temperature and flame rated seal equal as a minimum to the rating of the wall or floor surrounding.

.3 Seal all holes or voids made by penetrations to ensure an air and water resistant seal.

.4 Seal all joints to ensure an air and water resistant seal, capable to withstand compression due to thermal, wind or seismic joint movement.

.5 Consult with Mechanical Engineer and project manager prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.

.6 Apply to mechanical and electrical service through-penetrations, to formed, sleeved, or cored openings in smoke and fire rated masonry, or gypsum wallboard stud walls and structural floors and ceilings.

.1 Coordinate with plumbing, HVAC and electrical contractors to ensure proper firestopping application, providing smokeseal around penetrations through fire rated assemblies. Ensure that end joints between lengths of firestopping material have been properly sealed.

.7 Apply to head of smoke and fire rated gypsum wallboard stud wall abutting underside of structure (concrete or steel deck).

.8 Apply to control joints in rated stud walls.

.9 Apply to penetrations for passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire rated vertical barriers (walls and partitions), horizontal beams (floor/ceiling assemblies) and vertical service shaft walls and partitions.

.10 Apply to safing slots gaps between edge of floor slabs and curtain walls.

.11 Apply to openings between structurally separate sections of walls and floors.

.12 Apply to gaps between tops of walls and ceiling or roof assemblies.

.13 Apply to expansion joints in fire rated walls and floors.

.14 Apply to openings and penetrations in fire rated partitions or walls containing fire doors.

.15 Apply to openings around structural members which penetrate fire rated floors or walls.

.16 Apply firestop and smokeseal materials in accordance with manufacturer's directions, with sufficient pressure to properly fill and seal openings.

.17 Tool or trowel exposed surfaces.

.18 Remove excess compounds promptly as work of this Section progresses and upon completion of work of this Section.

3.4 CURING

.1 Cure materials in accordance with manufacturer's instructions.

.2 Do not cover up materials until proper curing has taken place.

3.5 IDENTIFICATION

.1 Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, prepreinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

.1 The words: "Warning: Through-Penetration Firestop System - Do Not Disturb"

.2 Contractor's name, address and telephone number.

.3 Designation of applicable testing and inspection agency.

.4 Date of installation.

.5 Manufacturer's name for firestop materials.

3.6 CLEAN UP AND REPAIRS

.1 Clean adjacent surfaces immediately and leave work neat and clean.

.2 Remove excess materials using recommended procedures, as work progresses.

.3 Remove dams after initial set of firestops and smokeseals as required.

.4 Correct staining and discolouring of adjacent surfaces as directed by Consultant.

.5 Remove all debris and excess materials entirely from the site and leave the work in a neat and tidy condition.

.6 Perform one simulated smoke test for each penetration type once per day. Simulate smoke at a rate of four seconds/100 cubic feet (2.8 cubic metres) and maintain the fog density until inspection is complete.

.7 After inspection is complete, repair all defective firestopping and smokeseals and test again. Continue this procedure until all firestopping and smokeseals passes test.

END OF SECTION

1 General

1.1 SUMMARY

.1 Read other Sections of the Specification for extent of sealant specified in those Sections. Do all other sealing indicated, specified or required.

.2 Provide all items, articles, materials, operations or methods listed, mentioned or scheduled on drawings and/or herein, including all labour, materials, equipment and incidentals necessary and required for the completion of the sealant.

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM):

.1 ASTM C509-06(2011), Standard Specifications for Elastomeric Cellular Performed Gasket and Sealing Material

.2 ASTM C920-11, Standard Specification for Elastomeric Joint Sealants

.3 ASTM C-1382-11, Standard Test Method for Determining Tensile Adhesion Properties of Sealants when Used in Exterior Insulation and Finish Systems (EIFS) Joints

.4 ASTM D2240-05(2010), Standard Test Method for Rubber Property - Durometer Hardness

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-19.13-M87, Sealing Compound, One-Component, Elastomeric, Chemical Curing

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Manufacturer's Data: Submit manufacturer's literature describing each material to be used in the work of this Section. Literature shall contain a statement that the material complies with the specified standard.

.2 Samples: Submit for approval and colour selection sample of each type of compound, recommended primers and joint filler or fillers proposed to be used.

.3 Mock-Up:

.1 If requested by the Consultant, construct mock-ups where directed to show location, size, shape, colour and depth of joints complete with back-up material, primer and sealant. Mock-up may be part of finished work.

.2 Allow 24-hours for inspection of work before proceeding with work.

.4 Safety Data Sheets: Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on Site for reference by workers.

1.4 QUALITY ASSURANCE

.1 Adhere to Manufacturer's recommendations for mixing or preparation of materials listed in this Section.

.2 Pot life or installation times shall not be exceeded.

.3 Integral materials which compose a joint detail shall be compatible.

.4 Component parts, where possible, shall have the same manufacturer.

.5 A representative of sealant material manufacturer shall visit the site during application to ensure that all Work is carried out according to the manufacturer's printed instructions.

1.5 SITE CONDITIONS

.1 Apply sealants only to completely dry surfaces, and at air, substrate and material temperatures above minimum established by manufacturer's written specifications.

1.6 DELIVERY, STORAGE HANDLING AND PROTECTION

.1 Deliver all materials to the jobsite in their original, unopened containers, with all labels intact.

.2 Receive and store materials as recommended by materials manufacturer.

.3 Maintain containers and labels in undamaged condition.

1.7 WARRANTY

.1 Provide a written warranty endorsed and issued in the name of the Owner stating that all sealant work of this Section is warranted against leakage, cracking, crumbling, melting, running, deterioration, shrinkage, loss of cohesion, loss of adhesion, staining of adjoining or adjacent work or surfaces, or failure to provide intended seal for a period of five (5) years from the Date of Substantial Performance of the Work, and that any defects will be made good including, related materials and installation at no additional cost to the Owner.

2 Products

2.1 MATERIALS

.1 Joint Cleaner:

.1 Non-corrosive solvents as recommended by sealant manufacturer for applicable substrate material(s).

.2 Primer:

.1 Non-staining type as recommended by sealant manufacturer, for use on substrate conditions outlined, and compatible with specified sealant being applied.

.3 Joint Back-Up – Backer Rod:

.1 Round, closed cell, reticulated foam, 50% compression, compatible with sealant and primer, non-adhering to sealant.

.4 Bond Breaker:

.1 Pressure sensitive plastic tape, not bondable to sealant as recommended by sealant manufacturer.

.5 Sealant Type "A" – Joints around Interior Door Frames, Windows and Under Exterior Thresholds:

.1 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

.4 Or approved equivalent.

OR

.2 One component, low modulus, moisture curing, polyurethane joint sealant, conforming to ASTM C920-11, Type S, Grade NS, Class 25.

.1 Dymonic FC by Tremco Ltd., division of RPM Company.

.2 Sikaflex 1A by Sika Canada Inc.

.3 Sonolastic NP1 by BASF.

.4 Pourthane NS by W.R MEADOWS

.5 Or approved equivalent.

.6 Sealant Type "B" – Exterior Wall Joints; Control Joints; Expansion Joints:

.1 One-part, ultra low modulus, non-staining neutral curing 100% silicone joint sealant, conforming to ASTM C920-11, Type S, Grade NS, Class 50.

.1 DC 790 by Dow Corning.

.2 Spectrem 1 by Tremco

.3 SCS2700 SilPruf LM by GE

.4 SikaSil WS-290 by Sika

.5 Or approved equivalent.

.7 Sealant Type "C" – Floor Control Joints:

.1 Multi-component, chemical curing, self-levelling, polyurethane joint sealant, conforming to ASTM C920-11, Type M, Grade P, Class 25.

.1 THC-900 by Tremco (Canada) Ltd., division of RPM Company.

.2 Sonolastic SL2 by Sonneborn Building Products, division of BASF Building Systems.

.3 Sikaflex 2c SL by Sika Canada Inc.

.4 Or approved equivalent.

.8 Sealant Type "E" – Mould and Mildew Resistant:

.1 Mould and mildew resistant, Shore A Hardness 15-25, conforming to ASTM C920-11, Type S, Grade NS, Class25, use NT, G, and A:

.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

.6 Or approved equivalent.

.9 Sealant Type "F" – Glazing Joints:

.1 Silicone Sealant: Butt glazing, one part, moisture curing, shore A hardness 15-25, conforming to CAN/CGSB-19.13-M, Classification C-1-40-B-N and C-1-25-B-N and ASTM C920-11, Type S, Grade NS, Class 25, use NT, G, A, O; Colour: clear (translucent):

.1 DC 795 by Dow Corning

.2 SCS2000 by GE.

.3 Multiseal by Chemtron.

.4 Spectrum 2 by Tremco

.5 SikaSil WS-295 by Sika

.6 Or approved equivalent.

.10 Sealant Type "H" – Saw Cut Sealant:

.1 Multi-component, self-levelling, conforming to ASTM D2240-05(2010):

.1 Tremco Control Joint Sealant

.2 BASF Masterfill 300

.3 Sika Loadflex

.4 Rezi-Weld Flex by W.R MEADOWS

.5 Or approved equivalent.

.11 Sealant Type “I” – HVAC Sealant:

.1 One-part, RTV, acetoxy-cure silicone sealant for heating, ventilation, air conditioning and refrigeration applications:

.1 Dow Corning HVAC Silicone Sealant

.2 Or approved equivalent.

.12 Sealant Type “J” – Electrical Sealant:

.1 One-part, white, non-flowing moisture cure adhesive for electrical applications:

.1 Dow Corning 738 Electrical Sealant

.2 Or approved equivalent.

.13 Sealant Type “K” - Interior Acoustical Sealant:

.1 Non-skinning, non-hardening, single component synthetic rubber sealant, conforming to CAN/CGSB-19.21-M:

.1 Tremco Acoustic Sealant

.2 Chemtron Metaseal

.3 Or approved equivalent.

.14 Preformed Compression Seal:

.1 Compartmental open cell neoprene extrusion type conforming to ASTM C509-06(2011), complete with liquid lubricant adhesive recommended by manufacturer.

3 Execution

3.1 INSPECTION

.1 Verify at site that joints and surfaces conditions provided will not adversely affect execution, performance or quality of completed work.

.2 Ensure masonry and concrete have cured 28 days minimum.

.3 Ascertain that sealers and coatings applied to substrates are compatible with sealant used and that full bond of the sealant and substrate is attained. Request samples of the sealed or coated substrate from their fabricators for testing of compatibility and adhesion, if necessary.

.4 Verify that specified recommended environmental conditions are present before commending work.

.5 Defective work resulting from application to unsatisfactory joint conditions will be considered the responsibility of those performing the work of this section.

.6 Do not start work of this Section until conditions are satisfactory.

3.2 PREPARATION

.1 Clean joint surfaces using joint cleaner as necessary, to remove dust, paint, loose mortar, and other foreign matter and dry joint surfaces.

.2 Remove dust, silt, scale and coatings from ferrous metals by wire brush, grinding or sandblasting.

.3 Remove oil, grease and other coatings from non-ferrous metals with approved cleaning solvent.

.4 Ensure surfaces are free of frost, rust, lacquers, laitance, release agents, moisture or other matter which might adversely affect adhesion of sealant.

.5 Examine joint sizes and correct as required to allow for anticipated movement and to achieve proper width/depth ratio per manufacturer's written recommendations for specified sealant.

.6 Support joint filler on horizontal traffic surfaces against vertical movement which might result from traffic loads or foot traffic.

.7 Prepare surfaces as recommended by sealant manufacturer.

.8 Fully remove existing sealant scheduled to be removed and replaced with new sealant, in areas indicated on the Drawings.

.1 Follow manufacturers procedures for removal of existing sealant and test areas for adhesion of new sealant. Provide the Consultant with field report identifying results of adhesion testing.

.9 Install joint backing material or apply bond breaker tape to achieve correct joint depth and prevent three-sided adhesion.

.10 To protect adjacent surfaces, mask adjacent surfaces with tape prior to priming and/or sealing.

.11 Prime sides of joints using two cloth method in accordance with manufacturer's directions immediately prior to sealing.

.12 Before any sealing is commended, a test of the material shall be made for indications of staining, poor adhesion or other undesirable effects.

.13 Seal joints in surfaces to be painted before painting. Where surfaces to be sealed are prime painted in shop before sealing, check to make sure prime paint is compatible with primer and sealant. If incompatible inform Consultant, consult the manufacturer, and change primer and sealant to approved compatible types.

.14 Check form release agent used on concrete for compatibility with primer and sealant. If incompatible inform Consultant and change primer and sealant to approved compatible types or clean concrete to Consultant's approval.

3.3 APPLICATION

.1 Apply sealant in accordance with manufacturer's directions, using a gun with proper nozzle size, ensuring to fill voids and joints completely, to leave a weathertight, airtight installation. Superficial pointing with skin bead is not acceptable.

.2 Neatly tool surface to a slight concave profile. Surface of sealant shall be smooth, free from ridges, wrinkles, sags, air pockets and embedded impurities.

.3 Clean adjacent surfaces immediately and leave Work neat and clean. Remove excess sealant and droppings, using recommended cleaners as Work progresses. Remove masking tape after tooling of joints.

3.4 CLEANING AND PROTECTION

.1 Remove all waste materials from site. Sealant shall be cleaned of all foreign material as recommended by the sealant manufacturer. Leave work in a condition satisfactory to the Consultant.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and install door hardware listed in the Hardware Schedule, establishes the quality standards, finishes, manufacturers and functions, and meets all current barrier free design standards required by authorities having jurisdiction.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Submission of Substitutions: Materials other than the named products for the Project may be acceptable to the Consultant, subject to Specification 01 25 00.

.2 Pre-installation Conference: Arrange a preconstruction meeting in accordance with Division 01 to discuss the following:

.1 Keying Conference: Conduct keying conference between the Owner, the Contractor and manufacturer to review and finalize requirements, at the Project site and incorporate decisions into final keying schedule after reviewing door hardware keying system.

.2 Electrified Hardware Conference: Conduct pre-installation conference at Project site and review methods and procedures related to electrified door hardware.

.3 Coordination: Obtain and distribute templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Coordinate with shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware.

1.3 SUBMITTALS

.1 Provide required information in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit product data indicating installation details, material descriptions, dimensions of individual components and profiles, and finishes.

.2 Shop Drawings: Submit shop drawings indicating details of electrified door hardware including, but not limited to, the following:

.1 Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer installed and site installed wiring.

.3 Samples:

.1 Submit samples of complete line of hardware and finishes, if and when requested, to accompany any proposal for substitution. Fully label each sample as to manufacture, type, size and location for use proposed.

.4 Hardware Schedule: Submit door hardware schedule prepared by Architectural Hardware Consultant (AHC), detailing fabrication and assembly of door hardware, including make, model, material, function, size, finish, and other pertinent information.

.3 Do not order hardware from manufacturers until samples have been approved. Hardware and finishes supplied shall be identical with approved samples.

1.4 PROJECT CLOSEOUT SUBMISSION

.1 Operation and Maintenance Data: Provide operations and maintenance information in accordance with Division 01.

.2 Spare Parts and Tools: Submit unique parts and tools for maintaining hardware system in accordance with Division 01.

1.5 DELIVERY, HANDLING AND PROTECTION

.1 Pack hardware in suitable wrappings and containers to protect from injury during shipping and storage. Enclose accessories, fastening devices and other loose items with each item. Mark packages for easy identification as indicated on approved delivery schedule. Hand over hardware to designated installer.

1.6 WARRANTY

.1 Warrant door closers to remain free from defects in materials and workmanship in accordance with the General Conditions, but for a period of five (5) years, and locks and locksets for two (2) years. Agree to promptly make good defects which become apparent within warranty periods without cost to Owner.

2 Products

2.1 GENERAL

.1 Supply to the job site all items of finishing hardware as indicated in the Hardware Scheduled appended to this Section. All items to be supplied with complete and adequate fixing and anchoring devices necessary for satisfactory installation into or upon the various surfaces to which it is to be affixed.

.2 Cooperate with all trades using hardware supplied under this Section.

.3 Render a complete service to the metal fabrication contractor wherein full cooperation is assured them of the supply of hardware information, and templates as requested.

.4 Supply for installation by others where specified, as scheduled or indicated on the drawings.

.5 Provide six, (6) copies of the hardware specification for field construction and office use.

.6 All hardware shall be of the best quality and design, construction and finish, free from all defects.

.7 All blank strikes shall be ASA with no lip.

.8 Lock strikes shall be ASA with lip.

.9 All deadlock strikes shall be ASA with no lip.

.10 Where door pulls are scheduled on one side of door and a push plate on the other side, the contractor shall be responsible for fixing, so that the pull shall be secured through the door from the reverse side and the push plate installed to cover the thru bolts which will be countersunk flush with door.

.11 All door closers shall be non sized and where possible non handed. They shall be sized and adjusted by the installer to suit the site conditions.

.12 Panic sets are to be of style specified and completely plated.

.13 Before installing any hardware, carefully check all architectural drawings of Work requiring hardware, verify door swings, door and frame material and operating conditions. Ensure hardware will fit Work.

.14 Provide ULC approved hardware to ULC labelled doors.

.15 Check shop drawings and frame and door lists affecting hardware type and installation. Certify to correctness or advise Consultant in writing of required revisions.

.16 Templates:

.1 Check hardware schedule, drawings and specifications. Furnish promptly to applicable trades any patterns, templates, template information and manufacturer's literature required for proper preparation for and application of hardware, in ample time to facilitate progress of Work.

.2 Exposed screws for installing hardware shall have Phillips or Robertson heads.

.3 All door closers shall have back-checking features and shall be of proper size to operate door efficiently.

.4 Use no wall stops on drywall.

.5 Rim Panic Device strikes shall be mortise type application. Equip panic devices with hex bolts.

.17 Hinges

.1 Provide mortise type hinges, steel based for interior doors and stainless steel or brass for exterior doors or interior doors exposed to moisture.

.2 Provide hinges with stainless steel pins; non removable for exterior and public interior exposure, non rising for non security exposure.

.3 Provide full length continuous geared hinges, continuous pin and barrel hinges or full mortise type heavy weight butt hinges on all high frequency use or extreme weighted doors.

.4 Where doors are required to swing 180 degrees, provide ball bearing type swing clear hinges sufficient to clear trim.

.18 Locks, Cylinders, Latches and Bolts

.1 Locks are to be ANSI Grade 1 mortise type unless specified otherwise.

.2 Equip all locks with anti-friction latches with auxiliary latch guard. All fire rated doors must have a minimum latch throw as indicated on the fire door label.

.3 Where lever trim is required, provide levers containing concealed mounting and constructed of solid cast or forged material.

.4 Locks must be lever type.

.5 Provide locks in accordance with current barrier free accessibility requirements as set out by the OBC or by the jurisdiction having authority, when located in the barrier free path of travel.

.6 Strikes shall be ANSI standard size with curved lip strikes for latch bolts and no lip strikes for deadlocks. Provide complete with wrought iron boxes finished to match strike.

.7 Provide Cylinders and thumb turns with the correct cam or tailpiece to operate hardware correctly.

.8 Automatic flush bolts are to be equipped on all fire rated pairs of doors with regular use. Provide a coordinator in conjunction with automatic flush bolts.

.9 Provide a filler bar when using coordinators for a clean architectural appearance.

.19 Keying

.1 Supply the following:

.1 1 key cabinet with the required capacity plus 30%.

.2 3 keys per lock.

.3 10 copies of each master key and sub-master key.

.4 Construction keys as required.

.5 1 extractor key.

.6 List of keys.

.7 Code chart of keys and cylinders.

.2 Coding of keys used for this project will the first code of each master key. Codes not used in this project will be used later by the Owner.

.3 All permanent keys, including master keys, list of keys, the key code chart, the blank keys and all pinning shall be delivered directly from the manufacturer to the Owner, at the time of installation of the permanent cylinders, in clearly identified envelopes. Tag all keys.

.20 Exit Device

.1 All exit devices installed on labelled fire doors shall carry a ULC or Warnock Hersey Label.

.2 Coordinate exit devices with astragals, coordinators, carry open bars and thresholds for correct and safe operation.

.3 All exit devices shall have exposed metal to match architectural finishes used on other hardware.

.4 Exit devices are push pad style only.

.5 Provide non-fire rated exit devices with hex key dogging feature (Cylinder dogging may be required in lieu of hex key dogging).

.6 Provide Power supplies of same manufacturer when using electrified exit devices.

.7 Match style and finish of trims on exit devices for locksets used.

.21 Closers

.1 All closers shall be hydraulically controlled and full rack and pinion in operation.

.2 All closers shall be fully adjustable including the following features: back check, speed control, and latch speed control.

.3 Provide mounting plates where required on special frame applications.

.4 Install all necessary attaching brackets, mounting channels, and cover plates where necessary for correct application of door closers.

.5 Supply to the Owner any special keys and wrenches as usually packed with door closers.

.6 Closers complete with a cover unless specified otherwise by the Consultant. Provide cover of matching architectural finish to the other hardware used in the project.

.7 Coordinate closers with overhead stops & holders.

.22 Push Plates and Door Pulls

.1 Provide and install stainless steel plates in type #304 stainless steel and install secure with screw fastening.

.2 Length of kick plates shall be 1-1/2" less than door width for single doors and 1" less than door width for doors in pairs.

.3 All stainless steel plates are 0.050" thick, free of rough or sharp edges. Corners and edges to have slight radiuses. Install kick plates and armor plates on both sides of the door with 3M tape or counter sunk screws as specified.

.4 Where door pulls are scheduled on one side of door and push plates on other side, issue installations instructions to ensure that the pull is secured through door from reverse side and countersunk flush with door installation of push plate. Locate push plate to cover fasteners for door pulls.

.23 Door Stops and Holders

.1 Wall stops are only to be used on wall conditions such as block or masonry. If necessary to mount on drywall, provide proper backing to ensure no damage to the wall.

.2 Supply floor stops of sufficient height to suit floor conditions and the undercut of the door.

.3 Provide gray rubber exposed resilient parts.

.4 Surface mount overhead door stops may be used unless they conflict with the door closer. All overhead stops are to be set to 90 degree opening unless stated otherwise.

.5 All door stops shall be heavy duty and of high quality.

.24 Door Seals and Thresholds

.1 Perimeter seals must be provided that fully seal all gaps between the floor, door and frame. Perimeter seal must protect against weather, smoke and sound.

.2 Frame gasketing must be constructed of neoprene. The aluminum housing must have a rib to prevent against distortion during installation.

.3 Provide aluminum frames with felt inserts by door supplier.

.4 Install Thresholds in a manner that ensures the door bottom comes in full contact.

.5 All thresholds shall be aluminum and installed with lead shields and stainless steel screws.

.6 Cut ends of thresholds to follow exactly the door frame profile.

.7 Provide barrier-free thresholds to all units identified as barrier free (BF) on balcony doors.

3 Execution

3.1 INSTALLATION

.1 Subcontractor installing the hardware shall carefully follow manufacturers' instructions for installation of all finish hardware.

.2 For mounting heights of various hardware items refer to the following, unless otherwise indicated on the Drawings:

.1 Locksets: 1024mm (40-5/16") from centre of lever to finished floor.

.2 Deadlocks: 1220mm (48") from centre of cylinder to finished floor.

.3 Mortise Night Latches: 1024mm (40-5/16") from centre of cylinder to finished floor.

.4 Panic Bolts: 1024mm (40-5/16") from centre of crossbar to finished floor.

.5 Push Plates: 1143mm 45" from centre of plate to finished floor.

.6 Guard Bars: 1024mm (40-5/16") from centre of bar to finished floor.

.7 Door Pulls: 1067mm (42") from centre of pull to finished floor.

.8 Blank Strike: 1024mm (40-5/16") from centre of strike to finished floor.

.9 Blank Fronts: 1024mm (40-5/16") from centre of strike to finished floor.

3.2 PERFORMANCE

.1 Adjustment and Cleaning:

.1 Provide services of competent mechanic without additional cost to Owner. Mechanic shall inspect installation of all hardware furnished under this Section and supervise all adjustments (by trades responsible for fixing) necessary to leave hardware in perfect working order.

3.3 HARDWARE SCHEDULE

.1 Refer to attached Schedule of Finishing Hardware.

Hardware Group No. 1

For use on Door #(s):
ED1-13
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	THRESHOLD	625A (1 X WIDTH)		A	ZER
1	EA	HARDWARE	BALANCE OF EXISTING HARDWARE TO REMAIN			UNK

NOTE: VERIFY THRESHOLD DEPTH REQUIRED PER DETAILS AND SITE CONDITIONS

Hardware Group No. 2

For use on Door #(s):
ED1-30A ED1-30B
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	SURF. AUTO OPERATOR	9542 AS REQ (120/240 VAC)		ANCLR	LCN
1	EA	SWITCH	8310-806K			LCN
2	EA	ACTUATOR, TOUCH	8310-852T		630	LCN
2	EA	ESCUTCHEON	8310-876		630	LCN
1	EA	MOUNTING PLATE	9540-18		ANCLR	LCN
1	EA	HARDWARE	BALANCE OF EXISTING HARDWARE TO REMAIN			UNK

Hardware Group No. 3

For use on Door #(s):
ED1-30C ED1-30D
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	PANIC HARDWARE	CD-98-L-NL-06		626	VON
1	EA	RIM CYLINDER	20-057		626	SCH
2	EA	MORTISE CYLINDER	20-061 XQ11-948		626	SCH
4	EA	PRIMUS CORE	20-740-XP EV29 T		626	SCH
1	EA	HARDWARE	BALANCE OF EXISTING HARDWARE TO REMAIN			UNK

Hardware Group No. 4

For use on Door #(s):
ED2-06A ED2-06B
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
1	EA	DOOR SAVER	4B17			630	RCY
1	EA	CLASSROOM LOCK	ND70RD RHO			626	SCH
1	EA	PRIMUS CORE	20-740-XP EV29 T			626	SCH
1	EA	ELECTRIC STRIKE	6400 FSE 12/24 VAC/VDC			630	VON
1	EA	SURF. AUTO OPERATOR	9542 AS REQ (120/240 VAC)			ANCLR	LCN
1	EA	SWITCH	8310-806K				LCN
2	EA	ACTUATOR, TOUCH	8310-852T			630	LCN
2	EA	ESCUTCHEON	8310-876			630	LCN
1	EA	MOUNTING PLATE	9540-18			ANCLR	LCN
1	EA	HARDWARE	BALANCE OF EXISTING HARDWARE TO REMAIN				UNK

NOTE: REMOVE DEADBOLT AND INSTALL NEW LOCKSET

Hardware Group No. 5

For use on Door #(s):
ED3-04A ED3-04B
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	PANIC HARDWARE	CD-98-L-NL-06		626	VON
1	EA	RIM CYLINDER	20-057		626	SCH
1	EA	MORTISE CYLINDER	20-061 XQ11-948		626	SCH
2	EA	PRIMUS CORE	20-740-XP EV29 T		626	SCH
1	EA	HARDWARE	BALANCE OF EXISTING HARDWARE TO REMAIN			UNK

1 General

1.1 SUMMARY

.1 Section Includes the following:

.1 Non-load-bearing steel framing systems for interior partitions.

.2 Suspension systems for interior ceilings and soffits.

.3 Grid suspension systems for gypsum board ceilings.

1.2 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA):

.1 CSA S136-07, North American Specification for the Design of Cold-Formed Steel Structural Members.

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-7.1-98, Lightweight Steel Wall Framing Components

.3 American Society for Testing and Materials International (ASTM):

.1 ASTM A641/A641M-09a, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

.2 ASTM A653/A653M-11 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM A792/A792M-10, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.4 ASTM A875/A875M-10, Specification for Steel Sheet, Zinc-5% Aluminum Alloy-coated by the Hot Dip Process.

.5 ASTM A1003/A1003M-12, Specification for Steel Sheet, Carbon, Metallic and Non-Metallic Coated for Cold Formed Framing Members.

.6 ASTM C11-10a, Standard Terminology Relating to Gypsum and Related Building Materials.

.7 ASTM C473-12, Standard Test Methods for Physical Testing of Gypsum Panel Products.

.8 ASTM C645-11a, Standard Specification for Nonstructural Steel Framing Members.

.9 ASTM C665-12, Standard Specification for Mineral-Fibre Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

.10 ASTM C754-11, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.11 ASTM C834-10, Standard Specification for Latex Sealants.

.12 ASTM C841-03(2008)e1, Standard Specification for Installation of Interior Lathing and Furring.

.13 ASTM C954-11, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033" to 0.112" in Thickness.

.14 ASTM C955-11c, Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases

.15 ASTM C1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.4 Canadian Sheet Steel Building Institute (CSSBI):

.1 CSSBI S6-2011, Guide Specification for Lightweight Steel Framing

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit manufacturer's product data for each materials specified including recommended application rates and methods of installation.

.3 Informational Submittals: Provide the following submittals during the course of the work:

.1 Product Certificates: For each type of code-compliance certification for studs and tracks.

.2 Shop Drawings: Submit shop drawings showing the design, construction and relevant details of furring, enclosures and partitions which require a fire rating.

1.4 QUALITY ASSURANCE

.1 Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Stud Manufacturers Association (SSMA).

.2 Contractor executing work of this Section shall have a minimum of five (5) years continuous experience in successful installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 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.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact, in accordance with GA-238 and manufacturer's recommendations.

2 Products

2.1 PERFORMANCE REQUIREMENTS

.1 Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.

.2 STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 FRAMING SYSTEMS

.1 Framing Members, General: Comply with ASTM C754 for conditions indicated.

.1 Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.

.2 Steel sheet components shall comply with ASTM C645 requirements for metal, unless otherwise indicated.

.3 Steel for non-loadbearing members shall have metallic coats that conform to ASTM A653M or ASTM A792M with minimum metallic coating weighs (mass) of Z120 and AZM150 respectively.

.4 Framing members shall comply with the CAN/CSA S136 - North American Specification for the Design of Cold Formed Steel Structural Members, for conditions indicated.

.5 Isolate where necessary to prevent electrolysis due to dissimilar metal-to-metal contact or metal-to-masonry and concrete contact. Use bituminous paint, butyl tape or other approved divorcing material.

.2 Studs and Tracks: ASTM C645.

.1 Steel Studs and Tracks:

.1 Minimum 0.0179" (25 gauge), screwable with crimped web and returned flange. Provide knockout openings in web at 150mm (6") O.C. to accommodate (if required) horizontal mechanical and electrical service lines, and bracing. Widths as indicated on drawings. Provide structural studs where indicated.

.2 Framing behind all fire resistant gypsum board shall be minimum 0.0329" (20 gauge).

.3 Where metal stud framing forms walls are to be thermally insulated as indicated on drawings, provide metal studs with integrated fastening system for glass fibre/mineral fibre insulation.

.4 Provide special shapes indicated on drawings as part of steel stud/drywall assemblies.

.3 Slip-Type Head Joints: Where indicated, provide one of the following:

.1 Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 2” (51-mm) minimum vertical movement.

.2 Double-Track System: ASTM C645 top outer tracks, inside track with 2” (51 mm) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.

.3 Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

.4 Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

.1 Minimum Base-Steel Thickness: As indicated on Drawings.

.5 Cold-Rolled Channel Bridging: Steel, 0.0538” (1.367 mm) minimum base-steel thickness, with minimum ½” (13 mm) wide flanges.

.1 Depth: As indicated on Drawings.

.2 Clip Angle: Not less than 1-1/2” x 1-1/2” (38 mm x 38 mm), 0.068” (1.72 mm) thick, galvanized steel.

.6 Hat-Shaped, Rigid Furring Channels: ASTM C645.

.1 Depth: As indicated on Drawings.

.7 Resilient Furring Channels: ½" (13 mm) deep, steel sheet members designed to reduce sound transmission.

.1 Configuration: hat shaped.

.8 Cold-Rolled Furring Channels: 0.053" (1.34 mm) uncoated-steel thickness, with minimum ½" (13 mm) wide flanges.

.1 Depth: As indicated on Drawings

.2 Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329" (0.8 mm).

.3 Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062" (1.59 mm) diameter wire, or double strand of 0.048" (1.21 mm) diameter wire.

.9 Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4" (32 mm), wall attachment flange of 7/8" (22 mm), minimum uncoated-steel thickness of 0.0179" (0.455 mm), and depth required to fit insulation thickness indicated.

2.3 SUSPENSION SYSTEMS

.1 Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062" (1.59 mm) diameter wire, or double strand of 0.048" (1.21 mm) diameter wire.

.2 Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16" (4.12 mm) in diameter.

.3 Flat Hangers: Steel sheet, in size indicated on Drawings.

.4 Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538" (1.367 mm) and minimum ½" (13 mm) wide flanges.

.1 Depth: As indicated on Drawings.

.5 Furring Channels (Furring Members):

.1 Cold-Rolled Channels: 0.0538" (1.367 mm) uncoated-steel thickness, with minimum ½" (13 mm) wide flanges, ¾" (19 mm) deep.

.2 Steel Studs and Tracks: ASTM C645.

.1 Depth: As indicated on Drawings.

.3 Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch (22 mm) deep.

.4 Resilient Furring Channels: 1/2"' (13 mm) deep members designed to reduce sound transmission.

.1 Configuration: Hat shaped.

.6 Grid Suspension System for Gypsum Board Ceilings: ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.

2.4 AUXILIARY MATERIALS

.1 General: Provide auxiliary materials that comply with referenced installation standards.

.1 Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

.2 Isolation Strip at Exterior Walls: Provide one of the following:

.1 Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.

.2 Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8” (3.2 mm) thick, in width to suit steel stud size.

3 Execution

3.1 EXAMINATION

.1 Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 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.

.1 Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

.2 Coordination with Sprayed Fire-Resistive Materials:

.1 Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24” (610 mm) o.c.

.2 After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

.1 Installation Standard: ASTM C754.

.1 Gypsum Plaster Assemblies: Also comply with requirements in ASTM C841 that apply to framing installation.

.2 Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

.2 Install framing and accessories plumb, square, and true to line, with connections securely fastened.

.3 Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

.4 Install bracing at terminations in assemblies.

.5 Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

.1 Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

.2 Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

.3 Install studs so flanges within framing system point in same direction.

.4 Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

.1 Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.

.2 Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

.1 Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

.3 Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

.4 Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

.5 Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

.6 Curved Partitions:

.1 Bend track to uniform curve and locate straight lengths so they are tangent to arcs.

.2 Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6” (150 mm) o.c.

.5 Direct Furring:

.1 Screw to wood framing.

.2 Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

.6 Z-Shaped Furring Members:

.1 Erect insulation, vertically and hold in place with Z-shaped furring members spaced 24” (610 mm).

.2 Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24” (610 mm) o.c.

.3 At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12” (305 mm) from corner and cut insulation to fit.

.7 Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8” (3 mm) from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

.1 Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

.1 Hangers: 48” (1219 mm).

.2 Carrying Channels (Main Runners): 48” (1219 mm)

.3 Furring Channels (Furring Members): 24” (610 mm), unless otherwise indicated on the Drawings.

.2 Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

.3 Suspend hangers from building structure as follows:

.1 Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

.1 Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

.2 Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

.1 Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

.3 Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.

.4 Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.

.5 Do not attach hangers to steel roof deck.

.6 Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.

.7 Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.

.8 Do not connect or suspend steel framing from ducts, pipes, or conduit.

.4 Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

.5 Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

.6 Installation Tolerances: Install suspension systems that are level to within 1/8” in 12’ (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirement for supply and installation of components required for a complete gypsum board assembly with proprietary components as follows:

.1 Gypsum Board Panels:

.1 Standard Gypsum Board

.2 Fire-Rated Gypsum Board 'Type X'

.3 Gypsum Ceiling Board

.4 Tile Backer Board

.5 Abuse Resistance Gypsum Board

.6 Exterior Sheathing Board

.7 Exterior Soffit Board

.2 Gypsum Wallboard Accessories:

.1 Screws, tape, joint compound and all other accessories required for gypsum board ceiling and wall partitions.

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials International (ASTM):

.1 ASTM A641/A641M-09a, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

.2 ASTM A653/A653M-11 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM A792/A792M-10, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.4 ASTM A875/A875M-10, Specification for Steel Sheet, Zinc-5% Aluminum Alloy-coated by the Hot Dip Process.

.5 ASTM A1003/A1003M-12, Specification for Steel Sheet, Carbon, Metallic and Non-Metallic Coated for Cold Formed Framing Members.

.6 ASTM C11-10a, Standard Terminology Relating to Gypsum and Related Building Materials.

.7 ASTM C473-12, Standard Test Methods for Physical Testing of Gypsum Panel Products.

.8 ASTM C475/C475M-12, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.9 ASTM C514-04(2009)e1, Standard Specifications for Nails for the Application of Gypsum Board.

.10 ASTM C645-11a, Standard Specification for Nonstructural Steel Framing Members.

.11 ASTM C665-12, Standard Specification for Mineral-Fibre Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

.12 ASTM C754-11, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.13 ASTM C834-10, Standard Specification for Latex Sealants.

.14 ASTM C840-11, Standard Specification for Application and Finishing of Gypsum Board.

.15 ASTM C841-03(2008)e1, Standard Specification for Installation of Interior Lathing and Furring.

.16 ASTM C954-11, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033" to 0.112" in Thickness.

.17 ASTM C955-11c, Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases

.18 ASTM C1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.19 ASTM C1047-10a, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

.20 ASTM C1177/C1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.21 ASTM C1178/C1178M-11, Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.

.22 ASTM C1186-08, Standard Specification for Flat Fiber-Cement Sheets.

.23 ASTM C1278/C1278M-07a(2011), Standard Specification for Fiber-Reinforced Gypsum Panel.

.24 ASTM C1396/C1396M-11, Standard Specification for Gypsum Board.

.25 ASTM C1629/C1629M-06(2011), Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.

.26 ASTM C1658/C1658M-12, Standard Specification for Glass Mat Gypsum Panels.

.27 ASTM D3273-12, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

.28 ASTM D3274-09, Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Fungal or Algal Growth, or Soil and Dirt Accumulation.

.29 ASTM D3678-97(2008)e1, Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Interior-Profile Extrusions.

.2 Gypsum Association (GA):

.1 GA-214-10, Recommended Levels of Gypsum Board Finish.

.2 GA-216-10, Application and Finishing of Gypsum Board.

.3 GA-231-06, Assessing Water Damage to Gypsum Board.

.4 GA-238-03, Guidelines for the Prevention of Mold Growth on Gypsum Board.

.3 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S101-07, Standard Methods of Fire Endurance Tests of Building Construction and Materials

.2 CAN/ULC S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.3 ULC List of Equipment and Materials

.4 Underwriters' Laboratories (UL), Standards for Safety acceptable to the Standards Council of Canada (SCC)

1.3 QUALITY ASSURANCE

.1 Contractor executing work of this Section shall have a minimum of five (5) years continuous experience in successful installation of work of type and quality shown and specified.

.2 Submit proof of experience upon Consultant's request.

1.4 SUBMITTALS

.1 Provide submittals in accordance with the requirements of Division 01.

.2 Shop Drawings: Submit shop drawings showing the design, construction and relevant details of furring, enclosures and partitions which require a fire rating.

.3 Product Data: Submit manufacturer's current technical literature for each component.

.4 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.

.5 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 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 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.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact, in accordance with GA-238 and manufacturer's recommendations.

.4 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.

1.6 PROJECT CONDITIONS

.1 Establish and maintain environmental conditions for application and finishing gypsum wallboard to comply with ASTM C 840 and in accordance with manufacturer's written instructions.

.2 In cold weather (outdoor temperatures less than 13 deg. C, controlled heat in the range of 13 deg. C to 21 deg. C must be provided. Recommended temperature must be maintained twenty-four (24) hours before, during, and after entire gypsum board joint finishing and until the permanent heating system is in operation or the building is occupied.

.1 Minimum temperature of 10 deg. C shall be maintained during gypsum board application.

.3 Ventilate building spaces to remove excess moisture and humidity during the drying process. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

2 Products

2.1 MATERIALS – WALLBOARD (GWB)

.1 Standard Gypsum Board:

.1 Conforming to ASTM C1396, ivory paper faced, tapered edges, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, 1/2" thick unless indicated otherwise on drawings.

.1 Sheetrock Brand Gypsum Panels by CGC Inc.

.2 ProRoc Regular by CertainTeed.

.3 ToughRock Gypsum Wallboard by Georgia-Pacific Canada.

.4 Or approved equivalent.

.2 Fire-Rated Gypsum Board 'Type X':

.1 Conforming to ASTM C1396, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, tapered edges, 16mm (5/8") thick, as indicated on drawing.

.1 Sheetrock Brand Gypsum Panels, Firecode Core by CGC Inc.

.2 ProRoc Type X by CertainTeed.

.3 ToughRock Fireguard Gypsum Board by Georgia-Pacific Canada.

.4 Or approved equivalent.

.3 Gypsum Ceiling Board:

.1 Sag Resistant Gypsum Board: Meeting requirements of ASTM C1396M, ceiling board manufactured to have more sag resistance than regular type gypsum board with long edges tapered, and as follows:

.1 Location: Ceiling surfaces.

.2 Acceptable Materials:

.1 Sheetrock Interior Ceiling Board by CGC Inc.

.2 Tough Rock CD Ceiling Board by Georgia Pacific Canada.

.3 ProRoc Interior Ceiling Board by CertainTeed.

.4 Or approved equivalent.

.4 Tile Backer Board:

.1 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.

.4 Or approved equivalent.

.5 Abuse Resistant Gypsum Board:

.1 Manufactured to produce greater resistance to surface indentation and impact penetration resistance than standard gypsum panels:

.1 Gypsum panels with glass fibre reinforced core, tapered edges, minimum 5/8” thickness, Type X ULC fire rating, conforming to ASTM C1396M and tested to the following performance ratings.

.2 Acceptable Materials:

.1 Sheetrock Abuse Resistant Firecode by CGC Inc.

.2 Abuse Resistant Type X by CertainTeed.

.3 ToughRock Abuse Resistant Fireguard by Georgia Pacific Canada.

.4 Or approved equivalent.

.6 Exterior Sheathing Board:

.1 Glass mat faced, water-resistant treated core gypsum board, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, 13mm (1/2") thick, silicone treated gypsum core, front and back faces penetrated with inorganic glass fibre mats, square edge, conforming to ASTM C1177. Mould resistant panel score of 10 when tested in accordance with ASTM D3273 and evaluated to ASTM D3274.

.1 Securock Glass-Mat Sheathing by CGC Inc.

.2 Dens-Glass Gold by Georgia-Pacific Canada.

.3 GlasRoc Sheathing by CertainTeed.

.4 Or approved equivalent.

.7 Exterior Soffit Board:

.1 Mould and moisture resistant cement board, non-combustible, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, 13mm (1/2") thick, aggregated portland cement core wrapped in polymer-coated, glass-fiber mesh. panel score of 10 when tested in accordance with ASTM D3273:

.1 Acceptable Materials:

.1 Durock by CGC Inc.

.2 PermaBase Cement Board by CertainTeed

.3 ToughRock Fireguard Soffit Board by Georgia-Pacific Canada.

.4 Or approved equivalent.

2.2 ACCESSORIES

.1 Concrete Anchors:

.1 Self-drilling tie wire anchors, "Red-Head No. T-32" by Phillips Drill Company, Division of ITT Industries of Canada Ltd., (or approved alternate).

.2 Concrete Inserts:

.1 Hot-dip galvanized "turtle back" type concrete inserts to suit conditions as approved by Consultant, by Acrow-Richmond National Concrete Accessories, Division of Premetalco Inc., (or approved alternate).

.3 Mineral Fibre Acoustical Insulation: As indicated in Section 07 21 16.

.4 Gypsum Wallboard Accessories:

.1 In general, gypsum wallboard accessories shall conform to ASTM C1047.

.2 Corner Beads:

.1 Made from galvanized steel sheet conforming to ASTM A653, minimum 0.0179" (25 gauge). Minimum width of flanges 28mm for 13mm (1-1/8" for 1/2") thick wallboard and 32mm for 16mm (1-1/4" for 5/8") thick wallboard.

.3 Casing Beads:

.1 Made from galvanized steel sheet conforming to ASTM A653, minimum 30 gauge, U-shaped designed for finishing with joint compound.

.4 Control Joints:

.1 Made from galvanized sheet steel conforming to ASTM A653, minimum 0.0179" (25 gauge), or roll-formed zinc-alloy to resist corrosion, with expansion joint material perforated flanges.

.1 'Zinc Control Joint No. 093' by CGC Inc.

.2 (or approved alternate).

.5 Reveals:

.1 Galvanized sheet steel conforming to ASTM A653, minimum 0.0179" (25 gauge), in profiles as indicated on drawings.

.5 Wallboard Screws:

.1 Corrosion resistant, self-drilling, self-tapping gypsum wallboard screws conforming to ASTM C1002 (Type S) and ASTM C954 (Type S-12), 25mm (1") long No. 6 for single layer application, 41mm (1-5/8") long No. 7 for double layer application.

.2 At fire rated construction, type and size of wallboard screw shall be same as used in fire-rating test.

.6 Joint Compound for Interior Gypsum Board:

.1 Conforming to ASTM C475 and as recommended by gypsum wallboard, fire-rated gypsum wallboard and exterior wallboard manufacturers to suit conditions.

.7 Joint Compound for Tile Backing Panels:

.1 Gypsum based tile backing board: Use setting type taping and setting type, sandable topping compounds.

.8 Joint Compound for Exterior Sheathing Boards and Soffit Panels:

.1 Fibreglass mesh tape.

.9 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.

.3 Or approved equivalent.

.10 Resilient Sponge Tape:

.1 Closed cell neoprene sponge type tape with self-sticking adhesive on one side. 'Permastik 122X' by Jacobs and Thompson Ltd., or foamed vinyl type tape, 'Arnofoam' by Arno Adhesive Tape Incorporated, (or approved alternate).

.11 Adhesive:

.1 Conforming to CGSB 71-GP-25M, and as recommended by manufacturer and compatible with contacted surfaces.

3 Execution

3.1 EXAMINATION

.1 Examine gypsum wallboard panels for damage and existence of mould. Install only undamaged panels.

.2 Examine gypsum wallboard in accordance with GA-231 for water damage.

.3 Examine areas and substrates, with installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.

.4 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 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.

.2 Coordinate installation of gypsum board suspension systems with installation of acoustical ceiling tiles (ACT) suspension systems. Where gypsum board suspension systems abut ACT systems, ensure that ceiling tiles grid fit into gypsum grid without affecting overall design and appearance.

.3 Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION - GENERAL

.1 Conform to ASTM C840, except as otherwise specified herein. Co-operate with mechanical, electrical and other trades to accommodate fixtures, fittings and other items in wallboard areas.

.2 Review extent of temporary heat provided. Carry out the work of this Section only when temperature is maintained and controlled in the range of 13 deg. C to 21 deg. C for at least twenty-four (24) hours before installing gypsum board and shall be maintained until joint compound and adhesives are dried or cured.

.3 Bring gypsum board into contact, but do not force into place.

3.4 GYPSUM WALLBOARD - SINGLE LAYER APPLICATION

.1 Metal Studs:

.1 Apply gypsum wallboard with screws. Erect wallboard with long dimension at right angles to supports. For fire rated partitions, erect board vertically or horizontally according to the ULC listing. Locate end joints over supporting members.

.2 Locate vertical joints at least 305mm (12") from the jamb/head/sill lines of openings.

.3 For parallel application space screws at 200mm (8") O.C. at board edges at 305mm (12") O.C. on board fields.

.2 Fasteners:

.1 Perimeter screws shall be not less than 10mm (3/8") from edges and ends and shall be opposite the screws on adjacent boards.

.2 Screws shall be driven with a power screw gun and set with countersunk head slightly below the surface of the board.

.3 Joints:

.1 Finish all joints.

3.5 GYPSUM WALLBOARD - DOUBLE LAYER APPLICATION

.1 General:

.1 Lay out work to minimize end joints on the face layer and to offset parallel joints between face and base layers by at least 254mm (10"). Apply the face layer at right angles to the base layer.

.2 Base Layer:

.1 The base layer shall be same as face layer or wallboard backing board applied at right angles to framing members. Secure base layers with screws spaced 305mm (12") O.C. to each member. Perimeter screws shall be opposite the screws on adjacent boards.

.2 The surface of the erected base layer shall be straight, plumb or level, and without protrusions before the face layer is applied.

.3 Face Layer:

.1 Apply face layer at right angles to base layer with adhesive. Apply adhesive with a notched spreader to leave 10mm x 13mm (3/8" x 1/2") ribbons, 38mm (1-1/2") apart over entire back side of face layer. Erect wallboard immediately after spreading adhesive.

.2 Supplement adhesive with screw fasteners. Provide temporary support for wallboard until adhesive bond has fully developed.

.3 As an alternative to adhesive specified, joint compound mixed with water in accordance with manufacturer's directions may be used. Allow joint compound and water mixture to stand thirty (30) minutes before using.

.4 Joints:

.1 Finish joints in face layers only, unless otherwise required to achieve fire resistant ratings indicated, as hereinafter specified.

3.6 TILE BACKING PANELS

.1 Install standard gypsum board panels in areas not subject to wetting to produce a flat surface.

.2 Install water resistant gypsum board in locations requiring tile applications in washrooms, and as indicated on the Drawings.

.3 Shim surfaces to produce a uniform plane across panel surfaces where tile backing panels abut other types of panels in the same plane.

3.7 EXTERIOR SHEATHING BOARD

.1 Install exterior sheathing board to exterior walls in accordance with manufacturer's written instructions. Seal all cut edges, ends, utility holes and fastener heads, as recommended by manufacturer.

.2 Sufficient anchors must be provided on each structural stud prior to erection of stud. Sequentially lift anchors as exterior sheathing board is being installed such that each anchor rests on edge of the exterior sheathing board.

.3 Tape and fill all joints and fastener heads using materials recommended by exterior sheathing board manufacturer.

3.8 FIRE RESISTANT ASSEMBLIES

.1 Fire resistance rating of gypsum board assemblies and framing shall be as called for on drawings or schedules, and as required to conform with applicable codes and requirements of authorities having jurisdiction.

.2 Appropriate ULC designs as listed in current ULC list of equipment and materials, Volume II, Building Construction, shall be placed when applicable. Extend partitions full height through ceiling space unless otherwise noted on drawings.

.3 Vertical bulkheads in ceiling spaces over fire rated glazed partitions, doors and the like shall have same fire rating as the door or partition over which they occur. All such bulkheads shall be of drywall construction unless otherwise noted.

.4 Use fire rated gypsum board as specified.

.5 Where lighting fixtures, diffusers, and the like are recessed into fire rated ceilings or bulkheads, provide enclosure to maintain required fire rating. Form removable panel to give access to fixture outlet box.

.6 Where fire hose cabinets or other fixtures or equipment are recessed in fire rated walls or partitions, provide drywall enclosure or backing to maintain required fire rating, unless otherwise detailed.

3.9 CONTROL JOINTS

.1 Install control joints using metal control joint strip as specified where:

.1 A partition, furring or column fireproofing abuts a structural element, dissimilar wall or partition assembly, or other vertical penetration, or ceiling.

.2 A ceiling or soffit abuts a structural element, dissimilar wall or partition assembly or other vertical penetrations.

.3 Wings of "L", "U" and "T"-shaped ceiling/soffit areas are joined;

.4 Construction changes within the plane of the partition or ceiling or soffit.

.5 Partition, restrained ceiling or furring run exceeds 9144mm (30').

.6 Unrestrained ceiling dimensions exceed 15240mm (50') in either direction.

.7 Expansion or control joints occur in the base exterior wall.

.8 Wallboard is installed over masonry control joints.

.9 And elsewhere as indicated on the drawings.

.2 Install in accordance with manufacturer's instructions. Where application is on furring members and double furring members at control joints, place one furring member on each side of the control joint.

3.10 BULKHEADS

.1 Fur out bulkheads in areas indicated and as required to conceal mechanical, electrical or other services in rooms where drywall finishes are scheduled, and elsewhere if called for on drawings.

.2 Ensure hangers are installed as to prevent splaying.

3.11 PRESSED STEEL (HOLLOW METAL) FRAMES

.1 Install pressed steel (hollow metal) frames where they occur in gypsum wallboard partitions.

.2 Anchor frames securely to studs using a minimum of three (3) anchors per jamb for jambs up to 2134mm (7') high and minimum of four (4) anchors per jamb for jambs over 2134mm (7') high.

3.12 THERMAL BREAK

.1 Install self-sticking resilient sponge tape at edges of wallboard in contact with metal windows and exterior door frames to provide a thermal break.

.2 Adhere tape to casing bead and compress during installation.

3.13 FINISHING

.1 Before proceeding with installation of finishing materials ensure the following:

.1 Wallboard is fastened and held close to framing and furring.

.2 Fastening heads in wallboard are slightingly below surface in dimple formed by driving tool.

.2 Levels of Gypsum Wallboard Finish:

.1 Level 0: Temporary construction only.

.2 Level 1: Plenum areas and above ceilings. Where a fire-resistance rating is required finishing should be in accordance with reports of fire tests of assemblies that have met the requirements of the fire rating imposed.

.3 Level 2: Areas of water resistant gypsum backing board under tile, exposed areas where appearance is not critical.

.4 Level 3: Service corridors and areas to receive heavy or medium textured coatings or heavy-duty wall coverings.

.5 Level 4: Areas to receive light textured coatings or lightweight wall coverings.

.6 Level 5: Areas to receive gloss, semi-gloss or flat sheen paints and critical lighting conditions. Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges, and apply skim coat over entire surface for corridors, long hallways, walls and ceilings longer than 7500 mm or walls higher than 3600 mm , and for all curved or angled wall surfaces.

.3 Finish gypsum wallboard in strict accordance with ASTM C840, GA-214 and GA-216 and as follows:

.1 Fill and tape joints and internal corners and fill screw depressions in board face and smooth out along corner beads and metal strip with joint compound.

.2 Mix joint compound (powder) in accordance with manufacturer's written instructions.

.3 Prefill "V" grooves of rounded edges with special setting type joint compound using a 127mm to 150mm (5" to 6") joint finishing knife. Finish flush with tapered surface ready for tape reinforcing application. Allow prefill material to dry thoroughly before application of embedding compound and tape.

.4 Apply joint compound in thin uniform layer. Embed reinforcing tape accurately centred on joint and securely pressed in, leaving sufficient compound under tape to provide proper bond. Immediately apply skim coat over tape application. Allow to dry thoroughly before application of next coat.

.5 Apply fill coat finishing the tapered depression flush with board surfaces. Allow to dry thoroughly before application of finish coat.

.6 Apply finish coat extending slightly beyond the filler coat and feathered out onto the board surface. Do not apply finish coat to gypsum board scheduled to be sprayed with acoustic surfacing finish.

.7 Sand between coats and following the finishing coat, where necessary, and leave surface smooth and ready for painting.

.8 Finish screw depressions with filler material and finish coat as specified above.

.9 Joint and depression finish shall in no case protrude beyond the plane of the board surface.

.10 Furnish corner beads and metal trim flush with board surface using filler and finishing coats feathered out approximately 50mm (2") and 100mm (4") respectively onto the board surface.

.11 Provide metal casing beads at exposed edges, at junctions of gypsum board with dissimilar material, at control joints and at junction with columns. Casing beads are required at perimeter of gypsum wallboard ceilings and soffits. Fasten with screws at 305mm (12") O.C. along entire length.

.12 Finish gypsum board to receive a Level 4 finish, unless indicated on the Drawings as a Level 5 finish.

3.14 REPAIRS

.1 After taping and finishing has completed, and before decoration, repair all damaged and defective work, including non-decorated surfaces.

.2 Patch holes or openings 13mm (1/2") or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.

.3 Repair holes or openings over 13mm (1/2"), or equivalent size, with 16mm (5/8") thick gypsum wallboard secured in such a manner as to provide solid substrate equivalent to undamaged surface.

.4 Tape and refinish scratched, abraded or damaged finished surfaces including cracks and joints in non-decorated surface to provide smoke tight construction, fire protection equivalent to the fire rated construction and STC equivalent to the sound rated construction.

3.15 PROTECTION

.1 Protect installed products from damage during remainder of construction period.

.2 Remove and replace panels that are damaged.

END OF SECTION

PART 1 - GENERAL

1.1 References

.1 American Society for Testing and Materials (ASTM):

.1 ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

.2 ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

.3 ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

.4 ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

.5 ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

.6 ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

.7 STM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.

.8 ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.

.9 ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.

.10 ASTM E 1264 Classification for Acoustical Ceiling Products.

.11 ASTM E 1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

.12 ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

.13 ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material.

.2 ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality"

1.2 Equivalent Products

.1 As per Section 01 25 00 – Alternatives & Substitutions

.2 Submittals which do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified); Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

1.3 SUBMITTALS

.1 Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

.2 Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.

.3 Shop Drawings: Layout and details of acoustical ceilings. Show locations of items which are to be coordinated with, or supported by the ceilings.

.4 Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical

performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

.5 If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

1.4 QUALITY ASSURANCE

.1 Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

.2 Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

.1 Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.

a. Flame Spread: 25 or less

b. Smoke Developed: 50 or less

.2 Fire Resistance Ratings: As indicated by reference to design designations in UL Fire Resistance Directory, for types of assemblies in which acoustical ceilings function as a fire protective membrane and tested per ASTM E 119.

a. Protect lighting fixtures and air ducts to comply with requirements indicated for rated assembly.

.3 Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

.2 Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

.3 Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.6 PROJECT CONDITIONS

.1 All ceiling products and suspension systems must be installed and maintained in accordance with manufacturer written installation instructions for that product in effect at the time of installation and best industry practice. Prior to installation, the ceiling product must be kept clean and dry, in an environment that is between 32°F (0°C) and 120°F (49°C) and not subject to Abnormal Conditions. Abnormal conditions include exposure to chemical fumes, vibrations, moisture from conditions such as building leaks or condensation, excessive humidity, or excessive dirt or dust buildup.

1.7 WARRANTY

.1 Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:

.1 Acoustical Panels: Sagging and warping as a result of defects in materials or factory workmanship.

.2 Grid System: Rusting and manufacturer's defects

.3 Acoustical Panels designated as inherently resistive to the growth of micro-organisms installed with corresponding suspension systems: Visible sag and will resist the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.

.2 Warranty Period Humiguard:

.1 Acoustical panels: Ten (10) years from date of substantial completion.

.2 Grid: Ten (10) years from date of substantial completion.

.3 Acoustical panels and grid systems with HumiGuard Plus or HumiGuard Max performance supplied by one source manufacturer is thirty (30) years from date of substantial completion.

.3 The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.8 MAINTENANCE

.1 Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

.1 Acoustical Ceiling Units: Furnish quantity of full-size units equal to 5.0 percent of amount installed, for each ceiling type/pattern.

.2 Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed, for each ceiling type/pattern.

.3 Linear Acoustic Baffles: Furnish quantity of full-size units equal to 5.0 percent of amount installed, for each ceiling type/pattern.

PART 2-PRODUCTS

2.1 MANUFACTURERS

.1 Ceiling Panels: Model numbers for acoustic ceiling tiles and grid as manufactured by Armstrong World Industries, are listed to establish a standard of quality for design, function, materials, performance, workmanship, and appearance. The following manufacturers may be submitted for evaluation by the architect by following the conditions of the Product Substitutions Section 01 25 00. The architect shall be the sole judge as to the acceptability of all products submitted for substitution.

.1 CertainTeed.

.2 Canadian Gypsum Company (CGC).

.3 Equivalents per Section 01 25 00

2.2. ACOUSTICAL CEILING UNITS

.1 Acoustic Ceiling Tile ACT

.1 Surface Texture: Fine

.2 Composition: Mineral Fibre

.3 Color: White

.4 Size: 24in X 48in X 7/8in

.5 Edge Profile: Square

.6 Noise Reduction Coefficient (NRC): 0.75.

.7 CAC: 35

.8 Fire Performance: ASTM E84 and CAN/ULC S102 surface burning characteristics. Flame Spread Index 25 or less. Smoke Developed Index 50 or less (UL labeled.)

.9 Flame Spread: ASTM E 1264; Type XII, Form 2, Pattern E Fire Class A

.10 Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.88.

.11 Antimicrobial Protection: Inherent - Resists the growth of mold/mildew and bacterial growth.

.12 Acceptable Product: Ultima High NRC 1943 as manufactured by Armstrong World Industries, or equivalent.

2.3 SUSPENSION SYSTEMS FOR ACOUSTICAL CEILING UNITS

.1 Components: All main beams and cross tees shall be commercial quality aluminum as per ASTM A 653. Main beams and cross tees are double-web steel construction with 15/16 IN type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished aluminum in baked polyester paint.

.1 Structural Classification: ASTM C 635 LD.

.2 Color: White Aluminum and match the actual color of the selected ceiling tile, unless noted otherwise.

.3 Acceptable Product: Prelude XL 15/16" Exposed Tee as manufactured by Armstrong World Industries, Inc.

.2 Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

.3 Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 12 gauge.

.4 Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner.

.5 Accessories

.1 Shadow molding with ½” (13mm) reveal, exposed flange same width as exposed runners, to be used at interface with walls/bulkheads.

.6 Floating Edge Trim: extruded aluminum floating edge channel to be provided at all locations where ACT ceiling does not terminate at wall/bulkhead.

.1 Acceptable product: Axiom Classic as manufactured by Armstrong.

.2 Colour: to be selected by Consultant from standard colour range (1 colour thoughout).

.3 Height: 3-7/8 and/or as detailed

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations. (Exception: HumiGuard Max Ceilings)

3.2 PREPARATION

.1 Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

.2 Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

.1 Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 INSTALLATION

.1 Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.

.2 Suspend main beam from overhead construction with hanger wires spaced 4-0 on center along the length of the main runner. Install hanger wires plumb and straight.

.3 Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.

.4 For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.

.5 Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.4 INTERFACE WITH OTHER WORK

.1 Co-ordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.

3.5 ADJUSTING AND CLEANING

.1 Replace damaged and broken panels.

.2 Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.

.1 Ceiling Touch-Up Paint, (Item #5760, 8oz. bottles) (Item #5761, quart size cans), "global white" latex paint should be used to hide minor scratches and nicks in the surface and to cover field tegularized edges that are exposed to view.

.3 Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes, but is not limited to, the following:

.1 Resilient tile materials:

.1 Rubber sheet flooring

.2 Rubber base

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM):

.1 ASTM F1344-12, Standard Specification for Rubber Floor Tile

.2 ASTM F1516-13, Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when Recommended)

.3 ASTM F1869-11, Standard Test Method for Measuring Moisture Vapour Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Close spaces to traffic during flooring installation and until time period after installation recommended in writing by manufacturer; install flooring and accessories after other finishing operations, including painting and ceiling construction have been completed.

.2 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings, attended by the Contractor, 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.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals:

.1 Product Data: Submit one copy of product data for each type of product specified.

.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 Samples for Selection: Submit manufacturer's colour charts and samples for initial selection consisting of full range of colours and patterns available for each type of product indicated.

.4 Samples for Verification:

.1 Resilient Flooring: Submit samples of each different specified product for verification of colour and pattern in manufacturer's standard size, but not less than 150mm x 150mm (6” x 6”) in size for tile.

.3 Informational Submittals: Provide the following submittals during the course of the work:

.1 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 vapour emission rate.

.4 Maintenance Data and Operating Instructions:

.1 Operation and Maintenance Data: Submit manufacturer's written instructions for maintenance and cleaning procedures, include list of manufacturers recommended cleaning and maintenance products, and name of original installer and contact information in accordance with Division 01.

.5 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for incorporation into the Operation and Maintenance Manual. Keep one copy of WHMIS safety data sheets on site for reference by workers.

.6 Maintenance Materials:

.1 Provide five percent (5%) of each colour and type of resilient flooring specified, boxed and labelled.

.2 Store maintenance materials on the premises as directed by the Owner.

1.5 QUALITY ASSURANCE

.1 Contractor executing work of this Section shall have a minimum of five (5) years continuous experience in successful and installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.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 flooring and seams in accordance with manufacturer's training or certification program.

1.6 DELIVERY, STORAGE, HANDLING AND PROTECTION

.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.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

.4 Restrict traffic by other trades during installation.

1.7 ENVIRONMENTAL CONDITIONS

.1 Temperature of room, floor surface and materials shall not be less than 21 deg C for forty-eight (48) hours before, during and for forty-eight (48) hours after installation. Concrete floors shall be aged for a minimum of twenty-eight (28) days and shall be dry before application of the resilient flooring.

.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 twenty-four (24) hour period as measured by one (1) 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.

.3 Avoid exposure to high humidity, cold drafts and abrupt temperature changes.

1.8 WARRANTY

.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.

.2 Defects shall include, but not limited to, bond failure, and extensive colour fading.

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design Manufacturers: Manufacturers named in this Section were 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 Health-Conscious Production: Rubber flooring to be free from red listed ingredients (LBC Red List v4.0) and is manufactured without bisphenol A (BPA), formaldehyde, halogens, heavy metals, isocyanates, phthalates and polyvinyl chloride (PVC). HPD (Health Product Declaration) and EPD (Environmental Product Declaration) available.

.3 Approved manufacturers:

.1 Mondo Flooring

.2 Nora Rubber Flooring

.3 Tarkett / Johnsonite

.4 Or approved equivalent.

2.2 RESILIENT SHEET FLOORING MATERIALS

.1 Resilient Rubber Sheet Flooring (RES): Conforming to ASTM F1859 and the following:

.1 Material: prefabricated resilient rubber flooring, calendered and vulcanized with a base of synthetic rubber, stabilizing agents and pigmentation

.2 Classification: Homogeneous rubber compound with a random scattered design.

.3 Colour: As selected by the Consultant from manufacturers standard product line; allow for 2 colours.

.4 Surface: smooth.

.5 Dimensions: 10m by 1.9m

.6 Thickness: Overall Thickness: Nominal 3mm

.7 Surface Burning (CAN/ULC-S102.2): FSC1 of 125 and SD of 370

.8 Slip Resistance (ASTM D2047): Static coefficient of friction, Neolite dry 0.8

.9 Hardness (ASTM D2240): Shore type “A”, 97

.10 Basis of Design Material: Mondo Harmonie Rubber Sheet Flooring, or approved equivalent.

2.3 STAIR TREADS

.1 PVC/phthalate free, rubber stair treads complete with safety abrasive strips to comply with ASTM F-2169. Colour to be selected by Consultant from standard colour range.

.2 Acceptable product:

.1 #40 Heavy Duty Abrasive Strip Square Nose Tread by Roppe

.2 Equivalent per Section 01 25 00

2.4 RUBBER BASE

.1 Rubber thermoplastic wall base (RB) to ASTM F1861 consisting of a blend of a thermoplastic and rubber backing covered with a durable colored top layer

.2 Dimensions: 107.95mm high x 9.53mm thick x 2440mm lengths

.3 Colour: To be selected by Consultant from manufacturer's full colour range; allow for 3 colours.

.4 Surface burning: Class A per ASTM E84/NFPA 253, FSR 50/SDS 175 per CAN/ULC-S102.2

.5 Acceptable product:

.1 Contours, PV4060 #60 Candid by Roppe

.2 Equivalent per Section 01 25 00

2.5 TACTILE WALKING SURFACE INDICATOR

.1 Solid Color Rubber Tiles manufactured from a homogeneous composition of 100% synthetic rubber, high quality additives, and colorants to meet the performance requirements of ASTM F 1344, Class 1-A and 1-B Standard Specification for Rubber Floor Tile. Tactile Walking Surface Tiles to meet the Canadian Standards Association (CSA) B651-12, current ISO/FDIS 23599 Assistive Products for The Blind and Vision-Impaired Persons – Tactile Walking Surface Indicators, Division A of Ontario Regulation 332/12, and Accessibility for Ontarians with Disabilities Act (AODA).

.2 Tactile Walking surface indicator to be provided across stair width x minimum 915mm depth at stairs (or as indicated on drawings), within resilient floor locations. Colour: To be selected by Consultant from manufacturer's full colour range; allow for 2 colours.

.1 Size: 24" x 24"; 4.0 mm dome height with 3.2 mm base thickness; 7.2 mm overall thickness.

.3 Acceptable product:

.1 Tactile Warning Tile (Attention Tile) Rubber Tiles as manufactured by Johnsonite

.2 Equivalent per Section 01 25 00

2.6 CONTRAST STRIP

.1 Silicon carbide non-slip hard-wearing strip for indoor applications. Colour: To be selected by Consultant from manufacturer's full colour range; allow for 2 colours.

.1 Size: 2" x ramp width as indicated on drawings.

.2 Adhesive: polyurethane or as recommended by manufacturer.

.2 Acceptable product:

.1 N3070 Ecoglo as manufactured by Kinesik

.2 Equivalent per Section 01 25 00

2.7 RESILIENT ACCESSORIES

.1 Trowellable Levelling and Patching Compounds: As indicated in Section 03 35 00.

.2 Heat Welding Bead: Solid strand product recommended by flooring manufacturer for heat welding seams, and as follows:

.1 Colour and Pattern: Colour: As selected by Consultant from manufacturer's full range of colours to contrast with field colour of resilient flooring.

.3 Fillers and Primers:

.1 Types and brands approved, acceptable to flooring material and resilient base manufacturers for the applicable conditions. Use non-shrinking latex compound.

.4 Resilient Floor Tile Adhesive:

.1 Standard Tile: Waterproof, clear setting type and brands as recommended by the tile manufacturer.

.5 Sealer and Wax:

.1 Coordinated with Owners preferred long term maintenance program, sealer or wax as appropriate to flooring materials specified.

3 Execution

3.1 EXAMINATION

.1 Testing and Inspections: Test moisture emission rate of concrete subfloor prior to installing flooring, using the calcium chloride test method in accordance with ASTM F1869.

.2 Examine substrates, areas, and conditions affecting work are in accordance with manufacturer's requirements, and as follows:

.1 Verify that floor surfaces are smooth and flat to plus or minus 3mm over 3m (1/8” over 10’); notify Consultant in writing where floor tolerances are not within acceptable values.

.2 Verify that concrete slabs exhibit normal alkalinity of between 5 and 9 and that they are free of carbonization or dusting deleterious to flooring installation or adhesive bond.

.3 Verify that subfloors are free of cracks, ridges, depressions, scale, and foreign deposits that could interfere with flooring installation.

3.2 PREPARATION

.1 Comply with resilient flooring manufacturer's written installation instructions for preparing substrates indicated to receive flooring.

.2 Fill cracks, holes, and depressions in substrates using trowellable levelling and patching compounds in accordance with manufacturers written instructions, and as indicated in Section 03 35 00.

.3 Remove coatings from concrete substrates, including curing compounds and other substances that are incompatible with flooring adhesives, and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer; do not use solvents.

.4 Broom and vacuum clean substrates immediately before installing resilient flooring.

3.3 INSTALLATION: SHEET FLOORING

.1 Comply with resilient flooring manufacturer's written installation instructions.

.2 Unroll flooring and allow stabilizing before cutting and fitting in accordance with manufacturer’s installation instructions.

.3 Apply primer in strict accordance with manufacturer's printed instructions. Permit primer to dry.

.4 Apply adhesive uniformly with an approved notchtooth spreader at the recommended rate. (Mechanical spreader not approved). Do not spread more adhesive than can be covered before initial set takes place. Use waterproof adhesive throughout. Follow manufacturer's instructions.

.5 Lay flooring with seams parallel to building lines to produce a minimum number of seams. Border widths minimum 1/3 width of full material.

.6 Run sheets in direction of traffic. Double cut sheet joints and continuously seal heat weld according to manufacturer's printed instructions.

.7 Accurately scribe flooring around walls, and other floor conditions.

.8 Each type of material used shall be from one manufacturer throughout the work and material in each area shall be of same production run.

.9 Install metal edge strips at unprotected or exposed edges where flooring terminates.

3.4 INSTALLATION: BASE

.1 Ensure substrate/background meets the requirements of ASTM F1861 and Manufacturer Installation Instructions and Technical Data.

.2 Fill cracks, holes, depressions and irregularities in the substrate/background to prevent transferring through to the surface of the resilient wall base.

.3 Lay out base to keep number of joints at minimum.

.1 Select the appropriate adhesive for the application and job site conditions.

.2 Install material according to roll sequence or with like run numbers.

.3 Ensure material is rolled appropriately into the adhesive using a hand roller.

.4 Install straight and level to variation of 1:1000.

.5 Scribe and fit to door frames and other obstructions.

.6 Conduct initial maintenance prior to final usage per the Manufacturer Care & Maintenance Documents. Do not conduct initial maintenance until adhesive has cured per the adhesive technical data.

3.5 CLEANING AND PROTECTION

.1 Cleaning, sealing and finishing of resilient flooring in accordance with the manufacturer's instructions and recommendations.

.2 Work shall be handed over to the Owner free of blemishes and in perfect condition.

END OF SECTION

PART 1.0 - GENERAL

1.1 References

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-4.2- [92], Textile Test Methods.

.2 CGSB 4-GP-36M- [78], Carpet Underlay, Fiber Type.

.3 CAN/CGSB-4.129- [93], Carpets for Commercial Use.

.4 CGSB 20-GP-23M- [78], Cushion, Carpet, Flexible Polymeric Material.

.5 CAN/CGSB-25.20- [95], Surface Sealer Floors.

1.2 Samples

.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit duplicate 675 x 900 mm pieces of each carpet type specified.

.3 Include installation recommendations for each type of substrate as specified in carpet manufacturer's installation guidelines and/or Carpet & Rug Institute Installation Standard 2011, where applicable.

1.3 Closeout Submittals

.1 Submit carpet maintenance recommendations as outlined by the carpet manufacturer for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

.2 Include information on recycling of carpet including manufacturer's reprocessing program. Indicate which portions of materials are recyclable. Ensure compliance with Section 2.

1.4 Regulatory Requirements

.1 Prequalification: compliance with Department of Consumers and Corporate Affairs regulations under "Hazardous Products Act", Part II of the Schedule, tested to CAN/ULC-S102.2.

.2 Indoor Air Quality: compliance with CRI Indoor Air Quality Program, CRI -IAQ requirements for maximum total volatile chemicals released into air. Label each carpet product with CRI -IAQ label.

.3 Provide documentation that product meets or exceeds following criteria based on an emission factor measured in mg/m /hr:

.1 Total Volatile Organic Compounds - 0.5.

.2 Formaldehyde - 0.05.

.3 4-phenylcyclohexene - 0.05.

.4 Styrene - 0.4.

1.5 Delivery, Storage and Handling

.1 Label packaged materials. For tile products indicate nominal dimensions of tile.

.2 Store packaged materials in original containers or wrapping with manufacturer's seals and labels intact.

.3 Store carpeting and accessories in location as directed by Owner.

.4 Prevent damage to materials during handling and storage. Keep materials under cover and free form dampness.

.5 Maintain temperature of store room at a minimum of 20C, for at least 24 hours immediately before the installation

1.6 Waste Management and Disposal

.1 Place materials defined as hazardous or toxic waste in designated containers.

.2 Ensure emptied containers are sealed and stored safely for disposal away from children.

.3 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

.4 Fold up metal banding, flatten and place in designated area for recycling.

.5 Collect and separate plastic and/or paper packaging for recycling.

.6 Use the least toxic sealants and adhesives necessary to comply with requirements of this section.

.7 Close and seal, tightly, all partly used sealant and adhesive containers and store protected in well ventilated, fire-safe area at moderate temperature.

.8 Place used hazardous sealant tubes and adhesive containers in areas designated for hazardous materials.

.9 Collect, package and store carpet cut-offs and waste material for recycling and return to recycler in accordance with Waste Management Plan.

1.7 Project/Site Environmental Requirements

.1 Moisture: Ensure substrate is within moisture limits prescribed by manufacturer.

.2 Temperature: Maintain ambient temperature of not less than [18] C from [72] hours before installation to at least 72 hours after completion of work.

.3 Relative humidity: Maintain relative humidity between 10 and 65% RH for 48 hours before, during and 48 hours after installation.

.4 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

.5 Ventilation:

.1 Ventilate area of work as directed by client by use of approved portable supply and exhaust fans.

1.8 Extra Materials

.1 Provide extra materials of carpet, carpet base, and adhesives in accordance with Section 01 78 00 - Closeout Submittals.

.2 Extra Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10.67 sq. yd. (8.9 sq. m).

.3 Extra materials to be from same production run as installed materials.

.4 Identify each package of carpet and each container of adhesive.

.5 Deliver to Owner and store where directed by Owner.

PART 2.0 - PRODUCTS

2.1 Acceptable Manufacturers/Products

.1 Carpet Tile CPT-01 (Auditorium & Stage Ramp)

.1 Dot-to-dot and Didley Dot Collection as manufactured by Interface.

.2 Allow for one (1) field colour and one (1) accent colour, to be selected by Consultant from full manufacturer colour range.

.3 Size: 305mm x 1219mm (12in x 48in)

.4 Equivalents per Section 01 25 00

.2 Carpet Tile CPT-02 (Balcony Stair Treads & Risers)

.1 Airmaster Classic as manufactured by Tarkett.

.2 Allow for one (1) colour, to be selected by Consultant from full manufacturer colour range.

.3 Size: 500mm x 500 mm (20in x 20in)

.4 Equivalents per Section 01 25 00

.3 Installation Method

.1 To be selected by Consultant from manufacturer recommended installation methods prior to the time of installation.

2.2 Performance Characteristics

.1 Critical Radiant Flux Classification, Flooring Radiant Panel ASTM E 648: Not less than 0.45 W/sq. cm.

.2 Smoke Density: Less than 450 per ASTM E662.

.3 Methanamine Pill Test CPSC FF1-70: Must pass pill test.

.4 Tuft Bind: Not less than 8 lbf (36 N) according to ASTM D 1335.

.5 Delamination: Not less than 3.5 lbf/in. according to ASTM D 3936.

.6 Dimensional Tolerance: Within 1/32 inch of specified size dimensions, as determined by physical measurement.

.7 Dimensional Stability: 0.119 percent or less according to ISO 2551 (Aachen Test).

.8 Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 129 ad AATCC 164.

.9 Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) according to AATCC 16, Option E.

.10 Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.

.11 Emissions: Provide carpet tile that complies with testing and product requirements of Carpet & Rug Institute's "Green Label Plus" program.

2.3 Accessories

1 Wood base as detailed.

.2 Carpet grippers: types recommended by carpet manufacturer.

.3 Seaming tape: types recommended by carpet manufacturer for purpose intended.

.4 Seaming adhesive: type recommended by carpet manufacturer for purpose intended.

.5 Binder bars: type recommended by carpet manufacturer.

.6 Adhesive:

.1 Acrylic release type: recommended by carpet manufacturer.

.2 Low VOC content in accordance with CRI requirements:

.1 Total volatile organic compounds: [10.0]mg/m /hr.

.2 Formaldehyde: [0.05] mg/m /hr.

.3 2-Ethyl-1l-Hexanol: [3.0] mg/m /hr.

.7 Carpet protection: non-staining heavy duty kraft paper.

.8 Concrete floor sealer: to CAN/CGSB-25.20, Type1.

.9 Subfloor filler: white premix latex requiring only water to produce cementitious paste.

.10 Metal Edge/Transition Strips: Extruded aluminum with mill finish of width shown and height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints. Provide at edging between carpet flooring and all other floor materials. Submit for review by Consultant prior to installation.

2.5 RECLAIMATION

.1 All carpet provided under this contract to be removed at the end of its' life cycle is at no cost to the Owner and must be sent for reclamation. Manufacturers must provide certification that reclaimed carpet will not go to landfill.

.2 Reclamation to be third party certified.

3.0 - EXECUTION

3.1 Preparation

1 Prepare floor surfaces in accordance with Contract Carpet Manual, Standard for Installation of Textile Floorcovering Materials No.001.

.2 Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

.1 Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing moisture and pH tests as recommended by carpet tile manufacturer.

.2 Use trowelable leveling and patching compounds that contain a cementitious base with a latex additive, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

.3 Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

.3 Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

.4 Pre-condition carpeting following manufacturer's printed instructions.

.3 Install toeless type resilient base before proceeding with carpeting.

3.2 Installation

.1 Install carpeting using minimum of pieces.

.2 Install in accordance with manufacturer's printed instructions and in accordance with Contract Carpet Manual, Standard for Installation of Textile Floorcovering Materials No.001.

.3 Finish installation to present smooth wearing surface free from conspicuous seams, burring and other faults.

.4 Use material from same dye lot. Ensure colour, pattern and texture match within any one visual area. Maintain constant pile direction.

.6 Fit neatly around architectural, mechanical, electrical and telephone outlets, and furniture fitments, around perimeter of rooms into recesses, and around projections.

3.3 Application of Rubber Base

.1 Lay out base to keep number of joints at minimum.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base.

.4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.

.7 Cope internal corners. Use premoulded corner units for right angle external corners. Use formed straight base material for external corners of other angles.

3.4 Protection of Finished Work

.1 Perform the following operations immediately after installing carpet tile:

.1 Remove excess adhesive, and other surface blemishes using cleaner recommended by carpet tile manufacturer.

.2 Remove yarns that protrude from carpet tile surface.

.3 Vacuum carpet tile using commercial machine with face-beater element.

.2 Protect installed carpet tile to comply with Carpet & Rug Institute Installation Standard 2011, "Protecting Indoor Installations."

.3 When construction or move-in activities will continue where new carpet is installed, provide non-staining building material paper to protect carpet. Do not use plastic sheeting as it can trap moisture, and self-sticking plastic sheeting can transfer adhesive residue to carpet that will attract soil.

.4 When heavy objects are moved over carpet within 24 hours of installation, use plywood over carpet to prevent buckling and wrinkling.

.5 Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION

1 General

1.1 SUMMARY

.1 Section includes surface preparation and the application of paint systems on the following interior and exterior substrates:

- .1 Concrete;
- .2 Concrete masonry units (CMU)
- .3 Steel and iron;
- .4 Galvanized metal;
- .5 Hollow metal doors and frames;
- .6 Gypsum board;
- .7 Cotton or canvas insulation covering.

1.2 REFERENCE STANDARDS

.1 Environmental Choice Paints and Surface Coatings, Low VOC Product Listings Program (ECP):

- .1 Paints and Surface Coatings, Low VOC Product Listings

.2 The Master Painters Institute (MPI):

- .1 New Surfaces: Architectural Painting Specification Manual.

.3 The Society for Protective Coatings (SSPC):

- .1 Coating Materials Guidelines
- .2 Surface Preparation Guidelines
- .3 Application, Inspection and Quality Control Guidelines

1.3 DEFINITIONS

.1 Gloss Levels: Standard coating terms defined by MPI Manual apply to products of this Section as follows:

- .1 MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
- .2 MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- .3 MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- .4 MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
- .5 MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
- .6 MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
- .7 MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

.2 Gloss Values: Generally, provide paints and coatings having the following sheens when installed on the following substrates:

- .1 Walls: Eggshell (G3) or Satin (G4) as selected by Consultant at a later date.
- .2 Trim and Doors: Semi-gloss (G5).
- .3 Ceilings: Flat (G1).

1.4 SUBMITTALS

.1 Provide required information in accordance with Division 01.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit list of all painting materials used for the Work to the Consultant for review prior to ordering materials for each paint system indicated, including block fillers and primers.

.1 Material List: An inclusive list of required coating materials indicating each material and cross reference specific coating, finish system, and application; identify each material by manufacturer's catalogue number and general classification.

.2 Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

.2 Samples: Provide stepped samples, defining each separate coat, including block fillers and primers using representative colours required for the project; label each sample for location and application, and as follows:

.1 Drawdown Samples: Provide three (3) drawdown sample charts (cards) for each type, texture and colour of finish specified for verification purposes before ordering paint materials.

.3 Informational Submittals: Provide the following submittals when requested by the Consultant:

.1 Certification: Submit certification reports for paint products indicating that they meet or exceed low VOC and coloured base requirements listed in this Section.

1.5 PROJECT CLOSEOUT SUBMISSIONS

.1 Operation and Maintenance Data: Submit copies of paint manufacturer’s written maintenance information for inclusion in the operations manual in accordance with Division 01, including specific warning of any maintenance practice or materials that may damage or disfigure the finished Work.

.2 Maintenance Materials: Deliver maintenance materials to Owner in quantities indicated and in accordance with Division 01, that match products installed; packaged with protective covering for storage, and identified with labels describing contents and building location and as follows:

.1 Paints and Coatings: Minimum of 4-4L containers of field colours and 4-1 L containers of each accent colour, and all remnants.

1.6 QUALITY ASSURANCE

.1 Conform to the standards contained in the MPI Manual.

.2 Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in service performance, and as follows:

.1 Have a minimum of five (5) years proven satisfactory experience and shall show proof before commencement of work that he will maintain a qualified crew of painters throughout the duration of the work.

.2 When requested provide a list of the last three comparable jobs including, name and location, specifying authority, start and completion dates and cost amount of the painting work.

.3 Apprentices may be employed provided they work under the direct supervision of a qualified journeyman in accordance with trade regulations.

.3 Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats and as follows:

.1 Use only paint manufacturers and products as listed under the Approved Products section of the MPI Manual Architectural Painting Specification Manual.

1.7 MOCKUPS

.1 Mockups: Apply mockups of each paint system indicated and each colour and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

.1 Consultant will select one surface to represent surfaces and conditions for application of each paint system.

.1 Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).

.2 Other Items: Consultant will designate items or areas required.

.2 Final approval of colour selections will be based on mockups.

.1 If preliminary colour selections are not approved, apply additional mockups of additional colours selected by Consultant at no added cost to Owner.

.3 Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Consultant specifically approves such deviations in writing.

.4 Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 7 deg C (45 deg F).

.1 Maintain containers in clean condition, free of foreign materials and residue.

.2 Remove rags and waste from storage areas daily.

1.9 FIELD CONDITIONS

.1 Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 10 and 35 deg C (50 and 95 deg F).

.2 Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 3 deg C (5 deg F) above the dew point; or to damp or wet surfaces.

1.10 WARRANTY

.1 Provide upon completion of the work, a Warranty Certificate, in the name of the Owner, stating that the work of this section was performed in accordance with these specifications and the MPI manual (latest edition), and is warranted against defects in material or installation, for a period of two (2) years from Date of Substantial Performance.

2 Products

2.1 MANUFACTURERS

.1 Subject to compliance with requirements, manufacturers that have attained the prerequisites for ecologically sustainable labelling mark on their products and may be incorporated into the Work include; but are not limited to, the following:

.1 Dulux Paints

.2 Sherwin-Williams LLC

.3 Benjamin Moore and Co. Limited

.4 ICI Paints (Canada) Inc.

.5 Equivalents per Section 01 25 00

2.2 PAINT, GENERAL

.1 MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists".

.2 Material Compatibility:

.1 Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

.2 For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

.3 VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

.1 Flat Paints and Coatings: 50 g/L.

.2 Nonflat Paints and Coatings: 50 g/L.

.3 Dry-Fog Coatings: 150 g/L.

.4 Primers, Sealers, and Undercoaters: 100 g/L.

.5 Rust-Preventive Coatings: 100 g/L.

.6 Zinc-Rich Industrial Maintenance Primers: 100 g/L.

.7 Pretreatment Wash Primers: 420 g/L.

.8 Shellacs, Clear: 730 g/L.

.9 Shellacs, Pigmented: 550 g/L.

.4 Paint Colour and Manufacturer (PT): As selected by the Consultant from the manufacturer’s standard product line. Carry five (5) colours and three (3) accent colours in Bid Price.

2.3 PREPARATORY COATS

.1 CMU Block Filler:

.1 Benjamin Moore; Coronado Super Kote 5000 Latex Block Filler (958-11).

.2 PPG; Speedhide Interior/Exterior Masonry Latex Block Filler (6-7).

.3 SW; PrepRite Block Filler Interior/Exterior Latex (B25W25).

3 Execution

3.1 EXAMINATION

.1 Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

.2 Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

.1 Concrete: 12 percent.

.2 Fiber-Cement Board: 12 percent.

.3 Masonry (Clay and Concrete Masonry Units): 12 percent.

.4 Wood: 15 percent.

.5 Portland Cement Plaster: 12 percent.

.6 Gypsum Board: 12 percent.

.3 Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

.4 Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

.5 Proceed with coating application only after unsatisfactory conditions have been corrected.

.1 Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

.1 Comply with manufacturer's written instructions and recommendations in "MPI Painting Specification Manual" applicable to substrates and paint systems indicated.

.2 Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

.1 After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

.3 Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

.1 Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

.4 Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

.1 Use abrasive blast-cleaning methods if recommended by paint manufacturer.

.5 CMU / Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

.6 Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:

.1 SSPC-SP 3.

.7 Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

.8 Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

.9 Gypsum Wallboard: Repair all surfaces in gypsum wallboard with wallboard joint finishing compound or spackling compound, filled out flush and sanded smooth. Clean all surfaces and taped joints of dust, dirt and other contaminants and be sure they are thoroughly dry before applying paint.

.10 Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

.11 Mix and prepare paint materials according to manufacturer's written instructions.

.1 Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

.2 Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

.3 Use only thinners approved by paint manufacturer and only within recommended limits.

3.3 APPLICATION

.1 Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

.1 Use applicators and techniques suited for paint and substrate indicated.

.2 Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.

.3 Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

.4 Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

.5 Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

.2 Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match colour of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

.3 Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

.1 The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.

.1 Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

.2 Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

.3 If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and

appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

.2 Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

.4 Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

.1 Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.

.2 Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.

.3 Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

.5 Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and colour breaks.

.6 Apply block fillers to CMU at a rate to ensure complete coverage with pores filled.

.7 Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

.1 Paint the following work where exposed in equipment rooms and where exposed in occupied spaces:

.1 Equipment, including panelboards.

.2 Uninsulated metal piping.

.3 Uninsulated plastic piping.

.4 Pipe hangers and supports.

.5 Metal conduit.

.6 Plastic conduit.

.7 Tanks that do not have factory-applied final finishes.

.8 Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

.8 Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

.1 Colour: Flat (gloss level 1), nonspecular, black.

3.4 FIELD QUALITY CONTROL

.1 Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

.1 Contractor shall touch up and restore painted surfaces damaged by testing.

.2 If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

.1 At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

.2 After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

.3 Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Consultant, and leave in an undamaged condition.

.4 At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

.1 Concrete Substrates:

.1 Latex System - MPI INT 3.1A:

.1 Primer: Alkali resistant, water based.

.2 Intermediate Coat: Latex, interior, matching topcoat.

.3 Topcoat: Latex, interior (gloss as selected by the Consultant).

.2 CMU Substrates:

.1 Latex System - MPI INT 4.2A:

.1 Primer: CMU block filler.

.2 Intermediate Coat: Latex, interior, matching topcoat.

.3 Topcoat: Latex, interior (gloss as selected by the Consultant).

.3 Structural Steel Substrates:

.1 Water-Based Dry Fall Finish - MPI INT 5.1C

.2 High-Performance Architectural Latex System - MPI INT 5.1R:

.1 Primer: Acrylic.

.2 Intermediate Coat: Latex, interior, high performance architectural; matching topcoat.

.3 Topcoat: Latex, interior, high performance architectural (gloss as selected by the Consultant).

.3 Coordinate with existing structural steel elements scheduled to receive applied fireproofing and/or intumescent fireproofing.

.4 Steel (Factory-Primed) Substrates:

.1 High-Performance Architectural Latex System:

.1 Primer: Acrylic (applied over factory primer).

.2 Intermediate Coat: Latex, interior, high performance architectural; matching topcoat.

.3 Topcoat: Latex, interior, high performance architectural (gloss as selected by the Consultant).

.5 Galvanized-Metal Substrates:

.1 High-Performance Architectural Latex System - MPI INT 5.3M:

.1 Prime Coat: Primer, galvanized, water based.

.2 Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.

.3 Topcoat: Latex, interior, high performance architectural, semi-gloss (MPI Gloss Level 5).

.6 Hollow Metal Doors and Frames.

.1 High-Performance Architectural Latex System - MPI INT 5.3M:

.1 Prime Coat: Primer, galvanized, water based.

.2 Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.

.3 Topcoat: Latex, interior, high performance architectural, semi-gloss (MPI Gloss Level 5).

.7 Gypsum Board Substrates:

.1 Latex System - MPI INT 9.2A:

.1 Primer: Sealer, latex, interior.

.2 Intermediate Coat: Latex, interior, matching topcoat.

.3 Topcoat: Latex, interior (gloss as selected by the Consultant).

.8 Cotton or Canvas Insulation-Covering Substrates: Including pipe and duct coverings.

.1 Latex System - MPI INT 10.1A:

.1 Prime Coat: Primer sealer, latex, interior.

.2 Topcoat: Latex, interior, flat (MPI Gloss Level 1).

3.7 EXISTING SURFACES

.1 Repaint existing surfaces where they are scheduled to be painted or where finish is damaged by alteration work. Extend new paint finish over full height and/or width of area affected, to a straight line in location determined by Consultant.

.2 All existing surfaces to be repainted shall receive as many coats of new paint, as required to hide existing finish

.3 Materials used for repainting shall be equivalent quality to those specified for new work, but in each case shall be compatible with finishes to which they are applied.

.4 Where compatibility of new coating with existing surface is uncertain, apply test patch of approximately 0.5m2 and check for results.

.5 Prepare existing surfaces to be repainted as follows:

.1 Clean as required to remove dirt, dust, oil, grease, lose paint, rust and any other foreign matter which would prevent proper bonding of new finish.

.2 Peeled, chipped, scratched and otherwise damaged surfaces shall be filled, sanded and repaired as required to provide consistent surface with texture matching that of adjacent area.

END O SECTION

PART 1- GENERAL

1.1 SYSTEM DESCRIPTION

1. This document will describe in general the system components for the Theatre Arts Audio system. It will describe how the various elements are connected together and interact. The manufacturer's specifications for the listed equipment item will be the standard against which substitute items will be evaluated. If an alternate product is proposed, provide full technical literature with the submission. It is the responsibility of the AV Contractor to provide all equipment items and accessories to make each piece of equipment operative in the system, and the system as a whole to operate as per the design intent.

2. The intent of this specification is to define parameters for furnishing and installing a complete working system to the Owner. The audio/video equipment provider shall provide coordination with all associated trades to insure a proper and correct installation. The system is designed to meet specific operational requirements. Performance deviations will not be accepted.

3. Work under this specification shall consist of providing labour and miscellaneous materials for installation and testing of the same.

1.2 REFERENCE DOCUMENTS

1. The documents relative to this specification are:

    1. Bidder information (Division 0), Division 1 General Requirements, and addenda issued during the request for proposal period.

    2. Attached “AV” drawings and schedules.

    3. All other related architectural, structural, mechanical and electrical drawings, which are available for viewing through the General Contractor.

2. The related drawings which form part of this specification are:

    1. Drawings AV-0001 thru AV-7002

    2. Schedule “AV-A” Division of Responsibilities

    3. Appendix “AV-A” Equipment List

    4. Drawings E-0.1 thru E-2.1

1.3 SUBMITTALS

1. Three (3) sets of full system submittals shall be furnished for approval within 15 days of award of Contract. Prior to fabrication of equipment, two sets shall be returned appropriately marked as the approval document.

2. Bidder shall provide any additional information, including equipment demonstration, as required by the consultant to verify compliance with specifications.

1.4 QUALITY ASSURANCE

1. Bidder shall be one who has been continuously engaged in the supply and installation of A/V integrated systems & equipment for a minimum of ten years.

2. The bidder shall have a factory authorized stocking service center with at least one full time service technician on staff. In addition, the manufacturer shall have a toll free 24-hour hotline with a maximum response time of 20 minutes, 24 hours a day and 365 days a year.

3. All equipment, where applicable standards have been established, shall be built to the standards of Underwriters Laboratories, Inc., the National Electric Code and the United States Institute for Theatre Technology. Permanently installed power distribution equipment such as dimmer racks and distribution shall be CSA or C-UL Listed, and/or CE marked (where applicable) and bear the appropriate labels. Portable equipment such as consoles and fixtures shall be UL and C-UL Listed, ETL Listed and/or CE marked (where applicable) and bear the appropriate labels

1.5 SUBSTITUTIONS

1. Where specified by name and model, the A/V systems have been designed utilizing the equipment described in these documents. Substitutions must be submitted for review 9 days prior to bid closing with all applicable specification and product data sheets to be considered by the design team. If the alternate is approved for substitution the bidder will be notifed in writing.

PART 2– PRODUCT

2.1 CONNECTOR PLATES WIRE, AND TERMINATION

1. Plates

    1. Provide all custom control panels, connectors, connector plates, and terminations as shown in the drawings or where required to complete a functional and reliable installation.

2. For all plates to be supplied, detail drawings and a sample of finish are required for approval before final fabrication of panels begins.

3. All A/V connector plates shall be fabricated from aluminum, finished with a matte black finish. Plates may be either laser engraved, or engraved and filled with a white epoxy ink or Laser etched.

2. Wire

    1. Provide all necessary audio, video, snake, microphone, speaker, network, DMX and communications wires.

    2. All supplied wiring is to be rated FT4 unless specified otherwise.

    3. All cabling is to be Manufactured by Belden.

    4. All wires are to be labelled in a logical manner

3. Termination

    1. All terminations are to be validated via a continuity tester.

2.2 MAINS LOUDSPEAKERS

1. The Main Left and Right Loudspeakers shall be the D&B 12S, The Main Center speakers shall be the D&B 12SD. The above mentioned speakers shall conform to the following specifications.

    1. The 2-way biaxial, passive loudspeaker shall consist of a 12" low frequency driver with a neodymium magnet assembly and a 1.4" neodymium compression driver mounted on a rotatable CD-Horn.

    2. The bass-reflex enclosure shall be made from marine plywood with an impact resistant black paint finish. Special colours according to RAL table and a weather resistant option shall be available upon request. The drivers shall be protected by a powder coated metal grill with an acoustically transparent foam.

    3. The cabinet shall be Ball Impact Resistant according to DIN 18032-3 for schools and sports halls.

    4. The cabinet shall incorporate two M8 threaded inserts on the rear panel for the secure attachment of wall mounts. The cabinet shall incorporate one M10 threaded inserts on the top and bottom panel for the secure attachment of mounting brackets. The connection panel on the back shall be recessed and fitted with two NL4 sockets and a two pole screw terminal block. A cover plate for protection of the connection panel shall be included.

5. The loudspeaker shall only be operated by a dedicated, compatible controller amplifier.

6. The 12S loudspeaker shall have a nominal dispersion angle of 75° x 50° (hor. x vert.). The 12SD loudspeaker shall have a nominal dispersion angle of 110° x 55° (hor. x vert.).

7. The power handling capacity shall be 300 W RMS and 1600 W peak (10 ms)

8. The frequency response (–5dB) measured on axis shall be 48 Hz to 18 kHz with a maximum sound pressure of at least 130 dB or 133 dB respectively when operated with one of its dedicated controller amplifiers

9. The dimensions (W x H x D) shall not exceed 338 x 638 x 365 mm (13.3" x 25.12" x 14.37") and shall weigh no more than 17 kg (37 lb).

10. The speakers shall be mounted with D&B mounting accessories as per the bid sheet

2.3 SUBWOOFERS

1. The Subwoofers shall be the D&B 27S and shall conform to the following specifications.

    1. The loudspeaker shall be an integrated cardioid subwoofer consisting of a 15" driver in a bass-reflex design radiating to the front and a 12" driver in a two chamber bandpass design radiating to the rear, with both drivers to be powered by a single amplifier channel.

    2. The enclosure shall be made from marine plywood with an impact resistant black paint finish. Special colours according to RAL table and a weather resistant option shall be available upon request.

    3. The drivers shall be protected by a powder coated metal grill with an acoustically transparent foam.

    4. The cabinet shall be Ball Impact Resistant according to DIN 18032-3 for schools and sports halls.

    5. The cabinet shall incorporate two M10 threaded inserts on each side panel for the secure attachment of brackets.

    6. The connection panel on the back shall be recessed and fitted with two NL4 sockets and a two pole screw terminal block. A cover plate for protection of the connection panel shall be included.

    7. The loudspeaker shall only be operated by a dedicated, compatible controller amplifier.

8. The power handling capacity shall be 500 W RMS and 2000 W peak (10 ms). The frequency response (–5 dB) measured on axis shall be 40 Hz to 140 Hz with a maximum sound pressure of at least 128 dB or 131 dB respectively when operated with one of its dedicated controller amplifiers. The dimensions (W x H x D) shall not exceed 580 x 490 x 700 mm (22.83" x 19.29" x 27.56") and shall weigh no more than 41 kg (90 lb).

2.4 FRONT FILLS

1. The Front Fills shall be the D&B 44S and shall conform to the following specifications.

    1. The loudspeaker shall be passive 2-way design housing two 4.5" neodymium drivers built into a bass-reflex design and two 1.25" HF dome tweeters mounted on a rotatable CD horn thus providing rotatable dispersion characteristics of 90° x 30° (hor. x vert.). The frequency response shall extend from 90 Hz to 17 kHz. The loudspeaker shall be used as a stand-alone system or supplemented by actively driven subwoofers.

    2. The cabinet shall be a compact mechanical design with an asymmetric cabinet shape. The enclosure shall be injection molded with an impact resistant paint finish. The front of the cabinet shall be protected by a rigid metal grill. Two M8 threaded inserts shall be incorporated in the back panel to connect to different rigging accessories.

    3. A swivel bracket shall be available to allow the loudspeaker to be used as a main or fill system either flown or mounted on a high stand. In horizontal orientation, the cabinet shall be usable as a frontfill loudspeaker.

    4. Different brackets shall enable mounting under ceilings or balconies as a single unit or in closely coupled clusters of two cabinets.

    5. An optional back box shall be available for flush mounting the loudspeaker into ceilings or walls, either in horizontal or in upright position. Within the back box, the loudspeaker shall be able to be tilted up or down by 20° in 5° increments. The back box shall be just 140 mm high to allow in-stair mounting.

    6. The loudspeaker shall only be operated by a dedicated, compatible controller amplifier.

    7. The power handling capacity shall be 150 W RMS and 500 W peak (10 ms). The frequency response (–5 dB) measured on axis shall be 90 Hz to 17 kHz with a maximum sound pressure of at least 123 dB.

    8. The dimensions (W x H x D) shall not exceed 390 x 128 x 150 mm (15.3" x 5" x 5.9") and shall weigh no more than 3.6 kg (8 lb).

    9. The speakers shall be mounted with D&B mounting accessories as per the bid sheet.

2.5 SIDE FILLS

1. The Side Fills shall be the D&B 8S and shall conform to the following specifications.

    1. The 2-way, passive loudspeaker shall consist of a 8" low frequency driver with a neodymium magnet assembly and a coaxially mounted 1" compression driver. The bass-reflex enclosure shall be made from marine plywood with an impact resistant black or white paint finish. Special colours according to RAL table and a weather resistant option shall be available upon request.

    2. The drivers shall be protected by a powder coated metal grill with an acoustically transparent foam. The cabinet shall incorporate two M8 threaded inserts on the rear panel for the secure attachment of wall mounts. The cabinet shall incorporate one M8 threaded inserts on the top and bottom panel for the secure attachment of mounting brackets. The connection panel on the back shall be recessed and fitted with two NL4 sockets and a two pole screw terminal block. A cover plate for protection of the connection panel shall be included.

    3. The loudspeaker shall have a nominal conical dispersion angle of 100°.

    4. The loudspeaker shall only be operated by a dedicated, compatible controller amplifier.

    5. The power handling capacity shall be 150 W RMS and 800 W peak (10 ms). The frequency response (–5 dB) measured on axis shall be 70 Hz to 20 kHz with a maximum sound pressure of at least 124 dB or 127 dB respectively when operated with one of its dedicated controller amplifiers. The dimensions (W x H x D) shall not exceed 224 x 352 x 205 mm (8.81" x 3.86" x 8.07") and shall weigh no more than 7.4 kg (16 lb).

    6. The speakers shall be mounted with D&B mounting accessories as per the bid sheet.

2.6 BALCONY SPEAKERS

1. The Balcony Speakers shall be the D&B 10S and shall conform to the following specifications.

    1. The 2-way biaxial, passive loudspeaker shall consist of a 10" low frequency driver with a neodymium magnet assembly and a 1.4" neodymium compression driver mounted on a rotatable CD-Horn.

    2. The bass-reflex enclosure shall be made from marine plywood with an impact resistant black paint finish. Special colours according to RAL table and a weather resistant option shall be available upon request. The drivers shall be protected by a powder coated metal grill with an acoustically transparent foam.

    3. The cabinet shall be Ball Impact Resistant according to DIN 18032-3 for schools and sports halls.

4. The cabinet shall incorporate two M8 threaded inserts on the rear panel for the secure attachment of wall mounts. The cabinet shall incorporate one M10 threaded inserts on the top and bottom panel for the secure attachment of mounting brackets.

5. The connection panel on the back shall be recessed and fitted with two NL4 sockets and a two pole screw terminal block. A cover plate for protection of the connection panel shall be included.

6. The loudspeaker shall have a nominal dispersion angle of 75° x 50° (hor. x vert.).

7. The loudspeaker shall only be operated by a dedicated, compatible controller amplifier.

8. The power handling capacity shall be 200 W RMS and 1200 W peak (10 ms).

9. The frequency response (–5dB) measured on axis shall be 60 Hz to 18 kHz with a maximum sound pressure of at least 127 dB or 130 dB respectively when operated with one of its dedicated controller amplifiers.

10. The dimensions (W x H x D) shall not exceed 283 x 580 x 350 mm (11.14" x 22.83" x 13.78") and shall weigh no more than 13 kg (29 lb).

11. The speakers shall be mounted with D&B mounting accessories as per the bid sheet.

2.7 MAINS & SUBWOOFER AMPLIFIERS

1. The Amplifier type for the Mains loudspeakers and Subwoofers shall be the D&B 40D and shall conform to the following specifications.

    1. The amplifier shall be four channel incorporating digital signal processors (DSP) to provide loudspeaker specific configurations and functions and dedicated protection circuits. It shall be equipped with digital and analog signal inputs as well as link outputs, remote control and monitoring capabilities via Ethernet (OCA/AES70). User interface shall be a 4.3" (480 x 272 pix.) color touchscreen while remote control shall be via dedicated remote control software.

    2. Four analog input connectors shall be provided also acting as link output.

    3. Two digital input connectors shall be provided, each accepting a 2 channel digital (AES3) audio signal.

    4. Analog inputs shall be electronically balanced with an input impedance of 32 kOhms.

    5. The digital inputs shall be transformer balanced with an input impedance of 110 ohms while the digital link output shall be electronically balanced providing analog signal buffering (refresh) and power fail relay (Bypass).

    6. Connector type for all audio inputs and link outputs shall be 3-pin Phoenix Euroblock male.

7. Signal processing shall utilize 96 kHz sampling rate while the latency shall not exceed 0.3 msec.

8. A/D conversion shall be 27 bit utilizing dual-stacked A/D converters, while the internal processing shall be a combination of high-resolution fixed point and floating point processing.

9. The output connectors shall be 2 x Phoenix 4-pin Euroblock female.

10. Output configurations shall be selectable for Dual Channel, Mix TOP/SUB and 2-Way Active modes.

11. Eight GPI and four GPO lines shall be provided on an Phoenix Euroblock male connector as additional digital lines and shall allow either level (Hi/Lo active) or edge (rising/falling) triggering.

12. In addition a FAULT contact shall be provided on an 3-pin Phoenix Euroblock male to allow a general device error to be remotely indicated.

13. It shall incorporate two user definable 16-band equalizers for independent application to each channel allowing parametric filters, notch, hi- and lo- shelf filters as well as asymmetric filters.

14. A signal delay capability of up to 10 sec. shall be incorporated for independent application to each channel.

15. It shall contain a signal generator offering pink noise or sine wave program.

16. Compensation for cable length shall be incorporated to improve impulse response.

17. Load monitoring and System check functions shall be included to ascertain the status of the loudspeaker impedance. Load monitoring shall allow impedance monitoring to determine the status of an LF or HF driver in systems with multiple elements, even if these are crossed over passively.

18. Input monitoring shall be included to allow detection of incoming pilot signals.

19. A Fallback function shall be available to enable the definition of primary (Regular) and secondary (Fallback) signal paths for analog and digital input signals with two different modes (Manual or Auto). It shall ensure that any secondary or emergency signal fed to the Fallback inputs is transmitted when required.

20. A Override function shall be available to allow any of the signal inputs, either analog or digital, to be set as a major signal path with highest priority for general messages or emergency services.

21. An AutoStandby function shall automatically switch the amplifier to Standby mode after a predefined time when the incoming signal level at the individually specified inputs drops below a defined threshold. The function shall be independent of the mute status of the respective channels. An AutoWakeup function shall automatically

repower the amplifier, when an input signal is present and exceeds a defined threshold.

22. A switched mode power supply shall be incorporated and shall allow automatic mains range selection of 100 to 127 V AC and 208 to 240 V AC, 50 - 60 Hz mains power supply voltages.

23. Active power factor correction (PFC) shall be incorporated to provide a clean and efficient sinusoidal current draw.

24. Mains voltage monitoring, mains inrush current limiter, self-resetting overtemperature, under- and overvoltage protection shall be incorporated.

25. It shall have temperature and signal controlled fans for cooling the internal assemblies.

26. A dedicated energy saving mode shall enable the amplifier to automatically switch between normal and low power consumption modes depending on the current output level requirements.

27. The power amplifier channels shall have ground fault protection, output pop-noise suppression, DC offset protection, output HF voltage limitation, output current limitation/protection and self-resetting overtemperature protection.

28. The output power shall be 4 x 2000/2400 W into 8/4 ohms (EIA-426-B signal with a crest factor (CF) of 12 dB, all channels driven) while the maximum output voltage shall be at least 180 Vpeak and the maximum output current shall be 35 Apeak. THD+N (20 Hz – 20 kHz) shall be < –86 dB/0.005% and the Crosstalk (20 Hz – 20 kHz) shall be < –70 dBr while the dynamic range (SNR - digital input unweighted) shall be at least 116 dBr.

29. The dimensions (H x W x D) shall not exceed 2RU x 19" x 465 mm (18.3") and shall weigh no more than 13.3 kg (29.3 lb).

2.8 FILL AMPLIFIERS

1. The Amplifier type for the Fill type loudspeakers shall be the D&B 5D and shall conform to the following specifications.

    1. The amplifier shall be four channel incorporating a digital signal processor (DSP) to provide loudspeaker specific configurations and functions and dedicated protection circuits.

    2. It shall be equipped with Dante network audio and analog signal inputs as well as remote control and monitoring capabilities via Ethernet (OCA/AES70).

    3. User interface shall be front panel Led indicators and via remote control software.

4. Analog inputs shall be electronically balanced with an input impedance of 15 kOhm.Connector type for the analog audio inputs shall be 3-pin Euroblock 3.5 mm male connectors.

5. Signal processing shall utilize 48 kHz sampling rate with 24 Bit ADC/ DAC conversion while the latency shall not exceed 1.1 msec.

6. The output connectors shall be 2 x 4-pin Euroblock 5.08 mm female connectors.

7. Four GPI lines shall be provided on a 6-pin Euroblock 3.5 mm male connector as digital control lines. The GPIs shall allow either level (Hi/Lo active) or edge (rising/falling) triggering and shall also provide a VCA functionality. In addition a DC-Out with 12 V/50 mA shall be provided.

8. A FAULT contact shall be provided on a 3-pin Euroblock 3.5 mm male connector to allow a general device error to be remotely indicated.

9. The amplifier shall incorporate one user definable 8-band equalizer for independent application to each channel allowing parametric filters, notch, hi- and lo- shelve filters as well as asymmetric filters.

10. A signal delay capability of up to 300 msec (100 m / 328 ft) shall be incorporated for independent application to each channel.

11. It shall contain a signal generator offering pink noise or sine wave program.

12. Load monitoring and System check functions shall be included to ascertain the status of the loudspeaker impedance. Load monitoring shall allow impedance monitoring to determine the status of an LF or HF driver in systems with multiple elements, even if these are crossed over passively.

13. Input monitoring shall be included to allow detection of incoming pilot signals.

14. A Fallback function shall be available to enable the definition of primary (Regular) and secondary (Fallback) signal paths for analog and network audio input signals with two different modes (Manual or Auto). It shall ensure that any secondary or emergency signal fed to the Fallback inputs is transmitted when required.

15. An Override function shall be available to allow a dedicated input to be set as a major signal path with highest priority for general messages or emergency services.

16. An AutoStandby function shall automatically switch the amplifier to Standby mode after a predefined time when the incoming signal level at the individually specified inputs drops below a defined threshold. The function shall be independent of the mute status of the respective channels.

17. An AutoWakeup function shall automatically repower the amplifier, when an input signal is present and exceeds a defined threshold.

18. A universal range switched mode power supply shall be incorporated and allow mains range of 100 to 240 V AC, 50 - 60 Hz mains power supply voltages. Mains inrush current limiter, self-resetting overtemperature and overvoltage protection shall be incorporated. Power factor compensation (PFC) shall be incorporated to provide a clean and efficient sinusoidal current draw.

19. It shall have a temperature-controlled fan for cooling the internal assemblies.

20. The power amplifier channels shall have output pop-noise suppression, DC offset protection, output HF voltage limitation, output current limitation/protection and self-resetting overtemperature protection. The fan noise emission shall not exceed 42 dB(A).

21. The output voltage shall be 120 Vpeak. The output power rating shall be 4 x 600 W into 8/4 ohms at a crest factor (CF) of 12 dB, all channels driven.

22. The S/N ratio (unweighted, RMS) shall be > 108 dBr (analog input) and > 111 dBr (digital input).

23. The dimensions (H x W x D) shall not exceed 1 RU x 9.5" x 435 mm (1 RU x 9.5" x 17.1") and shall weigh no more than 4.6 kg (10 lb).

2.9 DIGITAL DECODER

1. The Digital Decoder is required for the Mains/Subwoofer Amplifiers to work on a Dante network. The Digital Decoder shall be the D&B DS10 and conform to the following Specifications.

    1. 16-output channels bridged connecting the Dante audio network to the AES3 digital audio standard, integrating directly with the D&B system in mobile and installation setups.

    2. Four AES3 digital input channels for signal flexibility, with sampling rates from 32 to 192 kHz, synchronized via a Sample Rate Converter (SRC).

    3. Outputs shall consist of 16 channels (8 x AES3) supporting sampling rates of 48 or 96 kHz, synchronized via the Dante network.

    4. Includes an integrated 5-port Ethernet switch, providing redundancy, Multicast Filtering, and VLAN modes, and allow connection of a laptop to control amplifiers via OCA (Open Control Architecture) protocol.

    5. The front panel shall be compatible with the D80 Touring rack assembly, allowing seamless integration within existing system configurations.

    6. Power supply shall support mains voltage from 100 to 240 V, 50–60 Hz, with overvoltage protection up to 400 V.

7. Control and indicators shall include a BYPASS/NETWORK toggle switch, LED indicators for port modes and audio loss, as well as SYNC ERROR and RX Subscription indicators.

8. The device shall be compact with dimensions not exceeding 1 RU x 19" x 232 mm (1 RU x 19" x 9.1") and shall weigh no more than 3.75 kg (8.26 lb).

9. The DS10 shall support metadata transfer, including Dante channel labels, to compatible D&B four-channel amplifiers.

2.10 DSP

1. The DSP shall be the Q-SYS Core 110f and shall conform to the following specifications.

    1. The system processor shall provide up to 128 x 128 networked audio channels individually configurable as either Q-LAN or AES67 formatted networked audio. Networked audio channel count will reduce to 80 x 64 (Q-SYS version 9.7 and later) or 64 x 64 (Q-SYS version 9.6 and earlier) when using video bridging capability on the built-in USB Type-B Device port. Additionally, the system processor shall include 8 x 8 Software-based Dante network audio channels and is licensable for up to 32 x 32 Software-based Dante capacity. Software-based Dante channels used subtract from the overall 64 x 64 network audio capacity. The system processor shall support 24 total analog I/O capacity and shall be presented in the following groupings; 8 Mic/Line inputs, 8 Line outputs and 8 Flex Channel I/O which shall be software definable analog inputs or outputs in single channel increments in any combination ratio. The system processor shall be capable of connecting to any host PC, Mac or embedded device via USB and will present itself as up to four virtual external sound devices each offering Speakerphone (with or without Acoustic Echo Cancellation) or a Soundcard plus a single USB Webcam for Soft-Codec conferencing and other applications.

    2. The system shall perform all of its real-time audio, video and control processing using Intel(r) processors running a purpose built, real-time Linux operating system developed by QSC, LLC. The system processor shall operate natively on a standard gigabit Ethernet infrastructure available from a broad range of network infrastructure manufacturers, employing DiffServ quality of service, IGMP, IEEE 1588-2008 (PTPv2) precision time protocol, UDP/IP audio and video transport with floating-point format audio data representation. The system shall support 802.1x authentication. The system shall not require IEEE 802.1AS, IEEE 802.1Qat, or IEEE 802.1Qav support on the network infrastructure to function. The overall system latency from analog input to synchronized analog outputs anywhere on the network shall be 3.167 mS. The system shall also be able to achieve an overall system latency of 3.167 mS over Layer-3 routed network infrastructure without any additional hardware, software or connection services between subnets.

    3. The system processor shall manage external control interfaces such as Touchscreen Controllers, Paging Stations, Networked Audio I/O Expanders, Network Connected Amplifiers, AV-to-USB Bridging interfaces and IP-based PTZ Conference Room Cameras.

    4. The system processor shall have the following front panel controls and indicators: Unit ID button, ID green LED, and Power On blue LED. A web interface shall provide

basic network, services, and security configuration, status, and log retrieval. The system processor shall be natively integrated into Q-SYS Designer Software for network discovery, real-time configuration, control, monitoring, supervision, and management.

5. On the rear panel, the system processor shall have one 3-pin RS232 Euro Block Connector, HDMI Video Out, RJ11 for POTS telephony, USB Type-B Device port to provide AV-to-USB Bridging capability. Q-SYS Network: LAN A RJ45 1000 Mbps only, LAN B: RJ45 1000 Mbps only.

6. The system processor shall offer up to 16 channels of built-in Acoustic Echo Cancelation at the default tail length of 200 mS which can optionally be configured via software for 100 mS, 300 mS or 400 mS tail length affecting minimum and maximum channel capacity on a linear sliding scale.

7. The system processor shall natively offer up to 4 Softphone instances assignable to the built-in network interface ports.

8. The system processor shall include support for up to 4 tracks of audio recording and 16 tracks of audio playback. Audio playback capacity may be expanded by field application of software licenses to expand this capacity to either 32 in combination with field-installable media drive expansion in available small, medium, or large options.

9. The system processor shall store, and operate from, a single design that shall be comprised of audio, video, and control components, wiring, links, text, and graphics on a single or multiple schematic pages. Designs shall include any of the following audio DSP, video, test and measurement components, control components, and layout components: Acoustic Echo Cancellers, Audio Players, Audio Streaming components, Crossfaders, Crossovers, Delay components, Auto Gain control elements, Compressors, Gates, Duckers, Expanders, Ambient Noise Compensators, Limiters, Gain blocks, Graphic Equalizers, Parametric Equalizers, FIR Filters, All-Pass Filters, Band-Pass Filters, Band-Stop Filters, High-Pass Filters, Low-Pass Filters, FIR High-Pass filters, FIR Low-Pass Filters, Dual-Shelf Equalizers, Notch Filters, Meters, Matrix Mixers, Gain-Sharing Automatic Mixers, Gated Automatic Mixers, Signal Routers, Public Address Routers, Room Combiners, Signal Presence Meters, SIP Softphone instances, Tone Generators, Noise Generators, Dual Trace FFT Measurement Modules, Real Time Analyzers, Signal Injectors, Signal Probes, Logic, Value and Position control functions, Lua scripting components, Command Buttons and Triggers, Camera Router, USB Audio Bridge, USB Video Bridge.

10. The system processor shall be optionally enabled with a comprehensive control engine having user space access to a Lua programming environment and ability to host 3rd party plugin integrations via a field applicable software license.

11. The system processor shall support custom user control interfaces on either proprietary touch screen controllers, network computers utilizing a control application, iOS devices, or any device with a standard web browser. Custom control interfaces shall be capable of having multiple user-selectable pages with different controls on each.

12. The system processor shall be 1RU with an enclosure measuring 1.75" x 19" x 11.12" (44 mm x 483 mm x 356 mm). The system processor and control engine shall be the Q-SYS Core 110f network + analog I/O processor (v2).

2.11 WIRELESS MICROPHONE SYSTEM

1. The Wireless Microphone system shall be the Shure QLX-D and conform to the following specifications.

    1. The digital wireless system shall operate in the VHF 174-216MHz, UHF TV band 470-932 MHz, ISM band 902-928 MHz, 1.5G band 1492-1525 MHz, and 1.8G band 1785-1805 MHz with the specific range being dependent on the user's locale.

    2. The system shall include the option of changing the operating frequency in order to avoid RF interference. Preconfigured group, channel and frequency setups shall be available to ensure that multiple systems in use do not interfere with one another.

    3. All transmitters shall be powered by either a Shure SB900 or SB900A Lithium Ion Battery or 2 AA batteries and shall have a power on/off switch. When operated with the Shure SB900 or SB900A Battery the system shall display remaining run time in hours and minutes (accurate to within 15 minutes). The bodypack will have an LED indicating that power is on. Available transmitters shall include: a body pack for use with lapel or headset microphones,guitars, basses, and other electric instruments, and a handheld microphone for vocals.

    4. The transmitter front end shall optimize itself for standard inputs without requiring transmitter gain adjustments thus allowing all gain changes to be made at the receiver, which provides a 60dB range of system gain. Overall system signal to noise ratio shall be >120dB.

    5. The system shall be capable of AES-256 encryption that is conforming to the US Government National Institute of Standards and Technology (NIST) publication FIPS-197.

    6. The system shall use technology such as Shure's advanced digital predictive diversity to optimize RF stability.

    7. The receiver shall include an RF level meter, an audio level meter, and a Networking Interface connector for computer control and monitoring.

2.12 HEARING ASSIST RECEIVERS

1. The Hearing Assist Receiver shall be the Listen LR-3200-072 and shall be utilized with the existing Listen Transmitter. A Listen LA-430 Neck Loop shall be provided to work with the receiver. The Receiver shall conform to the following Specifications.

    1. The RF receiver shall be capable of receiving on one of 3 default wide band channels (A, E, H).

2. The receiver shall tune to a single channel and user shall not be able to change the channel.

3. The receiver shall have a signal-to-noise ratio of 70 dB or greater with DSP SQ™ noise reduction technology disabled and 80 dB or greater with SQ™ enabled and shall have an audio frequency response of 50 Hz – 15 kHz (±3 dB).

4. The receiver shall have the option of being lanyard or belt clip worn and the lanyard shall have the option of an integrated neck loop.

5. The receiver shall have a USB connector used for inventory control, set up, charging and firmware upgrades.

6. The receiver shall incorporate automatic battery charging circuitry and use a non-proprietary lithium ion battery.

7. The receiver shall fully charge in under 2.5 hours and have a battery run time of over 24 hours.

8. The receiver shall have additional charging contacts to allow multiple charging options.

2.13 AUDIO NETWORK SWITCH

1. The Audio Network Switch shall be the Netgear M4250-26G4XF-PoE+. The switch shall work in conjunction with a labelled 24 port patch panel installed in the rack. The switch shall conform to the following specifications.

    1. The network switch model shall have a 1U rackmount form factor.

    2. The switch shall provide 24 RJ45 PoE+ ports with a power budget of 300W.

    3. The switch shall include 4 SFP+ ports supporting 1G and 10G uplinks.

    4. The device shall support a quad-core Cortex-A57 ARMv8 CPU operating at 1.8 GHz with 2 GB RAM.

    5. The switch shall be equipped with a fixed C14 power supply and an on/off switch.

    6. The device shall support fanless operation with acoustic levels up to 67 dBA under maximum load conditions.

    7. The switch shall support industry-standard management protocols including CLI, Telnet, SSH, SNMP, and sFlow.

    8. The device shall provide a dedicated AV web-based GUI interface for AV installations with profiles for Dante, Q-SYS, AES67, AVB audio, and mixed audio/video/control profiles.

9. The switch shall support Layer 2 and Layer 3 switching with a full suite of protocols including static routing, RIP, and PIM.

10. The device shall offer IGMP Plus for automated IGMP configuration across multiple M4250 switches.

11. The switch shall support Audio Video Bridging (AVB) standards, including IEEE 802.1AS, 802.1Qav, 802.1Qat, 802.1ak for low-latency transport.

12. The device shall support up to 4,000 VLANs for network segmentation.

13. The switch shall provide PoE scheduling for automated power management of connected devices.

14. The switch shall include advanced Quality of Service (QoS) features with 8 priority queues and support for DiffServ, 802.1p, and policy-based routing

15. The switch shall support a variety of multicast routing features, including PIM-SM, PIM-DM, and SSM.

2.14 WIRED MICROPHONES AND STANDS

1. The wired microphones shall be the Shure SM58 and shall be mounted on the K&M 210/9 mic stand. The wired microphones shall conform to the following specifications

    1. The microphone shall be a cardiod dynamic microphone type.

    2. The microphone shall have a frequency response range of 50 to 15,000 Hz, tailored for vocals with a brightened midrange and bass rolloff.

    3. The microphone shall have a cardioid polar pattern to isolate the main sound source and minimize background noise.

    4. The microphone shall have a sensitivity of –54.5 dBV/Pa at 1,000 Hz (1 Pa = 94 dB SPL).

    5. The rated impedance shall be 150 Ω, with an actual impedance of 300 Ω, suitable for low impedance microphone inputs.

    6. The microphone shall feature a dark gray, enamel-painted, die-cast metal case with a matte-finished, silver-colored, spherical steel mesh grille.

    7. The connector shall be a three-pin professional audio XLR type.

    8. The microphone shall include a pneumatic shock-mount system to reduce handling noise.

9. The microphone shall be equipped with a built-in spherical wind and pop filter.

10. The microphone shall weigh 298 g and measure 162 mm in length and 51 mm in width

PART 3– EXECUTION

3.1 GENERAL

1. The A/V Contractor is to combine the new equipment being called for in this specification with the existing A/V Equipment rack, Microphone DSP's, Playback and Video Preview screens/monitors to facilitate a functional presentation system.

2. The A/V Contractor shall confirm all dimensions, distances and placement prior to fabrication and supply of equipment. It shall be the responsibility of the Contractor to report any discrepancies to the Consultant for clarification.

3. Protect all finished and unfinished Work of this and other Divisions from damage due to carrying out of this Work.

4. Make good any damage caused directly or indirectly to walls, floors, ceilings, woodwork, brickwork, finishes, etc.

5. Make good any damage to Owner's property or other trade's work caused by improperly locating or carrying out work.

6. LABELING

7. Equipment

    1. All control stations, wall plates, and outlets shall be permanently marked in a clear logical manner utilizing engraved or silkscreened lettering

8. Wire

    1. All control wiring must be individually and clearly marked with permanent labelling, in a logical manner showing source and destination.

3.2 INSTALLATION

1. Care shall be exercised by the Electrical & AV Contractors during installation to avoid damage to cables and equipment. All joints and connections shall be made with low residue rosin multicore solder. All wiring shall be executed in strict adherence to professional practice and standards.

2. All cables shall be continuous between their terminated ends. No splices, connections, etc. shall be permitted between the ends of any cable.

3. All cables shall be clearly and permanently marked in a logical numerical or legend fashion at each end by means of an industry accepted standard system, such as Brady or Panduit self-laminating markers. The numerical identification scheme shall be carried to the wiring diagrams that are to be part of the as-built drawings. Wiring lists shall be included in the project manual.

4. The A/V Contractor shall observe current standards for connecting the shield drain wire of shielded audio cables. All cable shields shall be insulated at their terminated ends with sleeves or heat shrinkable tubing and shield drain wires shall be protected by a piece of PVC tubing from the point where they exit the jacket of the cable to the connection.

5. The A/V Contractor shall take all necessary precautions to prevent electromagnetic and electrostatic interference (hum, buzz, etc.) and the completed audio systems shall be entirely free of noise and interference of this nature.

6. The audio system equipment will be powered from a single phase of the distribution panel on several circuits. These circuits will be supplied and installed by the Electrical Contractor retained by the owner. The A/V Contractor shall be responsible for providing, installing and connecting power circuit devices within the system equipment enclosures, should such be required.

7. All equipment cable shall be held firmly in place. This includes cable and wire harnesses. No cable shall be left sitting loose unless so designated.

8. All control, connector and custom panels shall be clearly, logically and permanently marked before installation. The most suitable means is direct engraving.

9. The highest quality of workmanship is anticipated and required. Proper soldering techniques are mandatory. The use of service loops in the cable bundles is encouraged. The use of support bars on heavy bundles of cables where no support is provided on the equipment is essential. In no circumstances shall the weight of the cable be borne entirely by the connector or connection strip.

10. All cables must have stranded conductors. In the case of small gauge shielded cables, the drain wire must be the same gauge as the signal leads. Any cable not meeting these standards will be rejected outright by the Systems Designers and the AV Contractor will be required to replace it throughout the project.

    1. Install, mount and secure all specified equipment as per Schedule “AV-A” Division of Responsibilities.

    2. Supply & Install all required low voltage control cabling.

11. Terminate all low voltage (<70.7V) cable as mentioned in this specification and as shown on the drawings.

    3. Install & Setup any supplied portable equipment.

    4. Fully Test all systems prior to requesting final inspection.

3.3 SHOP DRAWINGS AND MANUALS

1. Shop drawings as outlined herein are to be submitted for review and coordination prior to the start of equipment installation and shall consist of the following:

    1. Complete materials list with description, model number, quantity and technical specifications on all equipment to be installed.

    2. Complete original functional block diagrams, systems circuit diagrams and detail drawings that clearly illustrate how all components relate and are interconnected. All cables and terminations are to be clearly identified and documented in wiring lists. Full documentation of interconnection wiring between components is to be included. These documents will be reviewed and approved by the Systems Designers prior to the start of construction. 10 complete sets of approvals are required.

    3. Under no circumstances will wiring diagrams from sales brochures be considered as circuit or functional diagrams for this project.

3.5 PROGRAMMING, TESTING & COMMISSIONING

1. CLIENT is to be provided with any and all software programs, configuration files and source code of all items supplied or required to complete this installation at time of completion.

2. CLIENT will supply the successful bidder with a sample Touchpanel Layout if required to allow the A/V contractor to align the new touch panels functionality with the existing CLIENT systems.

3. A qualified Service Representative employed full time by the manufacturer’s rep shall visit the job site during the installation to inspect, test and adjust the system.

3.6 TRAINING

1. The Contractor shall provided two (2) x four (4) hour training sessions to the Owner’s Representatives at a date and time to be determined by the Owner.

2. The First Session will cover a system overview for the supplied system, standard maintenance procedures, and equipment repair.

3. The Second Session will focus on systems operation and programming.

3.7 AS BUILT DRAWINGS & MANUALS

1. Three (3) Printed & three (3) Electronic (USB) copies of the system As-Built Drawings and Owner's Manuals shall be provided.

3.8 WARRANTY

1. Manufacturer shall warrant products under normal use and service to be free from defects in materials and workmanship for a period of two years from date of delivery.

2. Warranty shall cover repair or replacement of such parts determined defective upon inspection.

3. Warranty does not cover any product or part of a product subject to accident, negligence, alteration, abuse or misuse. Warranty does not cover any accessories or parts not supplied by the manufacturer.

4. Warranty shall not cover any labour expended or materials used to repair any equipment without manufacturer's prior written authorization.

END OF SECTION

Part 1: GENERAL

1.1 SYSTEM DESCRIPTION

1. The intent of this specification is to define parameters for furnishing and installing a complete working system to the Owner. The performance lighting system provider shall provide coordination with all associated trades to insure a proper and correct installation. The system is designed to meet specific operational requirements. Performance deviations will not be accepted.

2. The system shall be designed for the control of architectural and theatrical lighting and shall consist of factory pre-wired relay and processing rack enclosures containing relays, power supplies, breakers, terminals and/or control electronics.

3. System shall work in conjunction with specified low-voltage control stations.

4. The System shall be a LED fixture lighting system controlled from both a DMX wired control console. Preset stations for quick preset recall shall be provided where drawn.

1.2 REFERENCE DOCUMENTS

1. The documents relative to this specification are:

    1. Bidder information (Division 0), Division 1 General Requirements, and addenda issued during the request for proposal period.

    2. Related architectural, structural, mechanical and electrical drawings, which are available for viewing through the General Contractors office via request.

2. The related drawings, schedules & appendix which form part of this specification are:

    1. Drawings AV-0001 thru AV-7002
    2. Schedule “AV-A” Division of Responsibilities
    3. Appendix “AV-A” Equipment List
    4. Drawings E-0.1 thru E-2.1

1.3 SUBMITTALS

1. Three (3) sets of full system submittals shall be furnished for approval within 30 days of award of Contract. Prior to fabrication of equipment, two sets shall be returned appropriately marked as the approval document.

2. Manufacturer shall provide any additional information, including equipment demonstration, as required by the consultant to verify compliance with specifications.

1.4 QUALITY ASSURANCE

1. Manufacturer shall be one who has been continuously engaged in the manufacturing of lighting control equipment for a minimum of ten years.

2. The manufacturer shall have a factory authorized stocking service center with at least one full time service technician on staff located within 150 miles of the job site. In addition, the manufacturer shall have a toll free 24-hour hotline with a maximum response time of 30 minutes, 24 hours a day and 365 days a year.

1.5 SUBSTITUTIONS

1. Where specified by name and model, the A/V systems have been designed utilizing the equipment described in these documents. Substitutions must be submitted for review 9 days prior to bid closing with all applicable specification and product data sheets to be considered by the design team. If the alternate is approved for substitution the bidder will be notifed in writing.

1.6 STANDARDS

1. All equipment, where applicable standards have been established, shall be built to the standards of Underwriters Laboratories, Inc., the National Electric Code and the United States Institute for Theatre Technology. Permanently installed power distribution equipment such as relay panels and distribution shall be CSA or C-UL Listed, and/or CE marked (where applicable) and bear the appropriate labels. Portable equipment such as consoles and fixtures shall be UL and C-UL Listed, ETL Listed and/or CE marked (where applicable) and bear the appropriate labels.

Part 2: PRODUCT

2.1 DATA PLUG-IN STATIONS

1. General

    1. The Plug-in Stations shall consist of the appropriate connectors required for the functional intent of the system. These stations shall be available with CAT6A connector.

3. Physical

    1. Station faceplates shall be .80” aluminum, finished in fine texture, scratch-resistant black powder coat. Silk-screened graphics shall be white.

    2. The station panel shall mount into an industry standard back box, depending on size and quantity of connectors. A terminal block shall be supplied for contractor terminations.

2.4 POWER DISTRIBUTION – OUTLET BOXES

1. General

    1. Connectors shall be available as 20A, 50A and 100A grounded, 20A twist lock and 20A “U” ground (dual rated “T-slot”); other connectors shall be available as specified.

    2. 20 amp circuits shall use screw-less tension clamp terminals listed for 20 – 8 gauge wire.

3. Terminals that place a screw directly on the wire are not acceptable.

4. Outlet boxes shall be supplied with appropriate brackets and hardware for mounting as shown on the drawings

5. Standard mounting options shall include pipe or wall mounting

6. Brackets shall be made from ASTM A 36 steel

7. Hardware shall be ASTM A307 grade 5.

10. Power distribution equipment shall be listed by a nationally recognized test lab (nrtl / CSA).

2. Physical

1. Outlet boxes shall be 6.25” H x 3.3” D and fabricated from 18 gauge galvanized steel and finished in black fine-texture powder coat paint.

2. Covers shall be fabricated from 16-gauge galvanized steel

3. Outlet boxes shall be available in any length specified in increments of 3-inches with a maximum length of up to 3-feet.

4. Outlets shall be spaced on 18” centers, or as otherwise specified.

5. Outlets shall be mounted on individual 3” panels.

6. Circuits shall be labeled with 1.25” lettering.

7. Circuits shall be labeled on the front side of the outlet box with white lettering on black background labels.

8. Circuits shall be labeled using specified labeling per plans and drawings.

2.7 COLOUR MIXING LIGHT EMITTING DIODE (LED) WASH FIXTURE

1. General

1. The fixture shall be a colour-mixing high-intensity LED illuminator with DMX control of intensity and colour. The fixture shall be a ColorSource Fresnel V as manufactured by Electronic Theatre Controls, Inc. or approved equivalent.

2. All LED fixtures shall be provided by a single manufacturer to ensure compatibility

3. The fixture shall be UL 1573 listed for stage and studio use

4. The fixture shall comply with the USITT DMX-512 A standard

2. Physical

1. The fixture shall be contained in a rugged all-metal die-cast housing, free of burrs and pits.

2. The housing shall have a rugged black powder coat finish

    a. White or silver/gray powder coat finishes shall be available as colour options
    b. Other powder coat colour options shall be available on request

3. Power supply, cooling and electronics shall be integral to each unit.

4. Fixture housing shall provide two easy-access slots for secondary lenses and other accessories

    a. Slots shall be equipped with locking retaining clip

5. The unit shall ship with:

    a. Theatrical-style hanging yoke as standard
    b. 5’ power lead with Edison connector as standard

6. Available options shall include but not be limited to:

    a. Floor stand conversion Kit
    b. Bare-end or Twist-lock type-equipped power leads
    c. PowerCon to PowerCon cables for fixture power linking
    d. Multiple secondary lens options to include multiple angles in the following patterns:

        I. Linear
        II. Round
        III. Oblong

7. Light output shall be via a round aperture

8. Aperture and accessory slots shall accommodate standard 7.5” accessories such as used in other similar-sized fixtures

9. Accessories available as options shall include but not be limited to:

    a. Gel/diffusion frames
    b. Top hats
    c. Barn doors
    d. Egg crate louvers
    e. Multiple secondary lensing options

3. Environmental and Agency Compliance

    1. The fixture shall be UL and cUL LISTED and/or CE rated, and shall be so labeled when delivered to the job site.

2. The fixture shall be UL LISTED to the UL1573 standard for stage and studio use

3. The fixture shall be rated for IP-20 dry location use.

4. Thermal

    1. The fixture shall be cooled with a variable speed fan.

    2. The fixture shall utilize advanced thermal management systems to maintain LED life to an average of 70% intensity after 20,000 hours of use

    3. Thermal management shall include multiple temperature sensors within the housing to include:

        a. The LED array
        b. The control board

5. The fixture shall operate in an ambient temperature range of 0°C (32°F) minimum, to 40° C (104°F) maximum ambient temperature.

6. Electrical

    1. The fixture shall be equipped with 100V to 240V 50/60 Hz internal power supply

    2. The fixture shall support power in and thru operation

        a. Power in shall be via Neutrik® PowerCon™ input connector
        b. Power thru shall be via Neutrik ® PowerCon ™ output connector
        c. Fixture power wiring and accessory power cables shall be rated to support linking of multiple fixtures up to the capacity of a 15A breaker

    3. The fixture requires power from non-dim source

    4. Power supply outputs shall have self-resetting current limiting protection

    5. Power supply shall have power factor correction

7. LED Emitters

    1. The fixture shall contain 5 different LED colours to provide colour characteristics.

    2. All LEDs used in the fixture shall be high brightness and proven quality from established and reputable LED manufacturers.

        a. Fixture shall utilize Luxeon® Z™ LED emitters or approved equivalent.

    3. Manufacturer of LED emitters shall utilize an advanced production LED binning process to maintain colour consistency.

    4. LED emitters should be rated for nominal 20,000 hour LED life to 70% intensity

5. All LED fixtures (100% of each lot) shall undergo a minimum three-hour burn-in test during manufacturing.

6. LED system shall comply with all relevant patents

8. Calibration

1. Fixture shall be calibrated at factory to achieve consistent colour between fixtures built at different times and/or from different LED lots or bins

a. Calibration data shall be stored in the fixture as a permanent part of on-board operating system
b. All arrays, including replacement arrays shall be calibrated to the same standard to insure consistency
c. Fixtures not offering LED calibration shall not be acceptable

9. Colour

1. These emitters shall be made up of a minimum of red, green, blue.

10. Dimming

1. The LED system shall use 15-bit nonlinear scaling techniques for high-resolution dimming.

2. The dimming curve shall be optimized for smooth dimming over longer timed fades.

3. The LED system shall be digitally driven using high-speed pulse width modulation (PWM)

4. LED control shall be compatible with broadcast equipment in the following ways:

a. PWM control of LED levels shall be imperceptible to video cameras and related equipment
b. PWM rates shall be adjustable by the user via RDM to avoid any visible interference to video cameras and related equipment

11. Control and User Interface

1. The fixture shall be USITT DMX 512A-compatible via In and Thru 5-pin XLR connectors

2. The fixture shall be compatible with the ANSI RDM E1.20 standard

3. All fixture functions shall accessible via RDM protocol for modification from suitably equipped control console

a. Temperature sensors within the luminaire shall be viewable in real time via RDM
b. Fixtures not offering RDM compatibility, feature set access or temperature monitoring via RDM shall not be compatible

4. The fixture shall be equipped with a segment display for easy-to-read status and control

5. The fixture shall be equipped with a button user-interface

6. The fixture shall offer RGB control

7. The fixture shall operate in Regulated mode for droop compensation

12. The fixture shall offer stand-alone functionality eliminating the need for a console

    a. Fixture shall ship with 10 preset colours accessible as a stand-alone feature
    b. Fixture shall ship with 5 Sequences accessible as a stand-alone feature
    c. Each color and sequence can be modified by the end user
    d. Fixtures can be linked together with standard DMX cables and controlled from designated master fixture

9. Up to 32 fixtures may be linked

    a. Fixtures in a stand-alone state shall restore to the settings present prior to power cycling, eliminating the need for reprogramming.

2.7 COLOUR MIXING LIGHT EMITTING DIODE CYCLORAMA FIXTURE

1. General

    1. The fixture shall be a colour-mixing high-intensity LED illuminator with DMX control of intensity and colour. The fixture shall be a ColorSource® CYC as manufactured by Electronic Theatre Controls, Inc. or approved equivalent.

    2. All LED fixtures shall be provided by a single manufacturer to ensure compatibility

    3. The fixture shall be CE compliant and UL 1573 listed for stage and studio use

    4. The fixture shall comply with the USITT DMX512-A standard

2. Physical

    1. The fixture shall be contained in a rugged all-metal die-cast housing, free of burrs and pits.

    2. The housing shall have a rugged black powder coat finish

        1. White or silver grey powder coat finishes shall be available as colour options

        2. Other powder coat colour options shall be available on request

3. Power supply and electronics shall be integral to each unit.

4. Fixture housing shall provide built in spill control

5. Fixture shall operate directly on the ground or by hanging via yoke

6. The unit shall ship with:

    1. Theatrical-style hanging yoke as standard

    2. 1.8m power Neutrik® PowerCON to bare ends power cable

7. Available options shall include but not be limited to:

    1. DMX input via XLR5 or RJ45 connector

8. Light output shall be produce an asymmetrical beam

9. Lensing shall be designed to provide smooth coverage both horizontally and vertically for seamless blending from fixture to fixture

10. With a minimum setback from the cyclorama of 60cm, the fixtures shall be able to achieve a 2-to-1 spacing ration and maintain smooth coverage

3. Environmental and agency compliance

    1. The fixture shall be Ce compliant and UL/ cUL Listed, and shall be so labelled when delivered to the job site.

    2. The fixture shall be rated for IP20 dry location use.

4. Thermal

    1. The fixture shall be natural convection cooled and shall not use a fan

    2. The fixture shall utilise advanced thermal management systems to maintain LED life to an average of 70% intensity after 50,000 hours of use

        1. Thermal management shall include multiple temperature sensors within the housing to include:

        2. The LED array

        3. The control board

    3. The fixture shall operate in an ambient temperature range of 0°C minimum to 40° C maximum.

5. Electrical

    1. The fixture shall be equipped with an 100V to 240V 50/60 Hz internal power supply

    2. The fixture shall support power in and thru operation

    3. Power in shall be via Neutrik® PowerCON input connector

    4. Power thru shall be via Neutrik ® PowerCON output connector

    5. Fixture power wiring and accessory power cables shall be rated to support linking of multiple fixtures up to the capacity of a 15A breaker

    6. The fixture requires power from non-dim source

    7. Power supply shall have power factor correction

6. LED Emitters

    1. The fixture shall contain 5 different LED colours to provide colour characteristics as described in Section H below.

    2. All LEDs used in the fixture shall be high brightness and proven quality from established and reputable LED manufacturers.

    3. Fixture shall utilize Luxeon® C LED emitters

    4. Manufacturer of LED emitters shall utilise an advanced production LED binning process to maintain colour consistency.

5. LED emitters should be rated for nominal 50,000 hour LED life to 70% intensity

6. LED system shall comply with all relevant patents

7. Fixtures shall have a flicker free mode that will set the LED refresh rate to 25,000 Hz for flicker-free operation on camera

7. Calibration

    1. Fixture shall be calibrated at factory for achieve consistent colour between fixtures built at different times and/or from different LED lots or bins

    2. Calibration data shall be stored in the fixture as a permanent part of on-board operating system

    3. All arrays, including replacement arrays shall be calibrated to the same standard to ensure consistency

    4. Fixtures not offering LED calibration shall not be acceptable

    5. Fixture shall have droop compensation to overcome thermal droop in the LEDs to maintain output levels and colour point.

8. Colour

    1. The fixture shall utilise a minimum of 42 LED emitters

    2. These emitters shall be made up of Red, Green, Blue, Indigo and Lime

9. Dimming

    1. The LED system shall use 15-bit non-linear scaling techniques for high-resolution dimming.

    2. The dimming curve shall be optimised for smooth dimming over longer timed fades.

    3. The LED system shall be digitally driven using high-speed pulse width modulation (PWM)

    4. LED control shall be compatible with broadcast equipment in the following ways:

    5. PWM control of LED levels shall be imperceptible to video cameras and related equipment

    6. PWM rates shall be adjustable by the user via RDM to avoid any visible interference to video cameras and related equipment

10. Control and user interface

    1. The fixture shall be USITT DMX512-A compatible via In and Thru 5-pin XLR connectors or RJ45 connectors

    2. The fixture shall be compatible with the ANSI RDM E1.20 standard

3. All fixture functions shall accessible via RDM protocol for modification from suitably equipped control console

4. Temperature sensors within the luminaire shall be viewable in real time via RDM

5. Fixtures not offering RDM compatibility, feature set access or temperature monitoring via RDM shall not be compatible

6. The fixture shall be equipped with a 7-segment display for easy-to-read status and control

7. The fixture shall be equipped with a three-button user-interface

8. The fixture shall offer multiple control modes including but not limited to:

9. RGB

10. 5 channel (IRGBS)

11. Direct

12. Single channel

13. The fixture shall operate in Regulated mode for droop compensation

14. The fixture shall offer stand-alone functionality eliminating the need for a console

15. Fixture shall ship with 12 preset colours accessible as a stand-alone feature

16. Fixture shall ship with 5 Sequences accessible as a stand-alone feature

17. Each preset can be modified by the end user

18. Fixtures can be linked together with standard DMX cables and controlled from a designated master fixture

    1. Up to 32 fixtures may be linked

19. Fixtures in a stand-alone state shall restore to the settings present prior to power cycling, eliminating the need for reprogramming

20. Fixtures without stand-alone operation features described in a, b, c, d, and e shall not be acceptable.

2.8 BUTTON STATION AND OCCUPANCY SENSOR

1. General

    1. The control station shall be the Echo Inspire Station Series as manufactured by ETC, Inc., or approved equivalent. It shall be a remote station on an EchoConnect network that can recall presets, provide direct zone control, recall presets actions for a control system.

    2. The station shall consist of a dual function (control/ record) push-button with an integral bi-color backlight for each corresponding button and fader.

    3. The system shall support up to sixteen independent stations

2. Mechanical

    1. Control stations shall operate using eight buttons.

    2. All button stations shall be available with cream, black or white decorator style faceplates.

    3. Manufacturer's standard colours shall conform to the RAL CLASSIC Standard.

    4. Stations shall have bi-color backlights for each button and fader

        a. Indicators shall utilize a specific colour backlight for active status

        b. Indicators shall utilize specific colour for inactive to assist in locating stations in dark environments. Stations that do not provide a lit inactive or deactivated state shall not be allowed

    5. Stations shall support an off backlight state of inactive status when required.

    6. All faceplates shall be designed for flush or surface mounting and have no visible means of attachment

    7. Station faceplates shall be constructed of ABS plastic and designed based on a standard decorator style faceplate. Station faceplates shall be indelibly marked for each button or fader function.

    8. Control station electronics shall mount directly behind the faceplate. The entire assembly shall mount into a single gang back box. Back boxes for flush mounted stations shall be industry standard back boxes. The manufacturer shall supply back boxes for surface mounted stations.

3. Electrical

    1. Control station wiring shall be EchoConnect control wiring utilizing low-voltage, Class II unshielded twisted pair, type Belden 8471 or equivalent, and one #14 ESD drain wire (when not installed in grounded metal conduit).

    2. The station shall operate on class 2 voltage provided by the control system via the EchoConnect network.

    3. Station wiring must be topology free. It may be point-to-point, bus, loop, home run or any combination of these.

    4. Wiring termination connectors shall be provided with all stations.

5. Control stations shall be UL/ cUL listed and CE marked and meet WEE Compliance

4. Station Addressing

    1. Station addressing shall be via two 16 position rotary dials and will be set by installers or factory personnel. Station addressing shall require only a space assignment and a device ID assignment.

    2. Multiple stations may have overlapping control of presets and zones

2.10 GENERAL

1. Refer to “AV” Drawings and Schedules attached.

PART 3: EXECUTION

3.1 GENERAL

1. The Lighting Contractor shall confirm all dimensions, distances and placement prior to fabrication and supply of equipment. It shall be the responsibility of the Contractor to report any discrepancies to the Consultant for clarification.

2. Protect all finished and unfinished Work of this and other Divisions from damage due to carrying out of this Work.

3. Make good of any damage caused directly or indirectly to walls, floors, ceilings, woodwork, brickwork, finishes, etc.

4. Make good of any damage to Owner’s property or other trade’s work caused by improperly locating or carrying out work.

3.2 LABELING

1. Equipment:

    1. Label all equipment as per drawings.

2. All control stations, wall plates, and outlets shall be permanently marks in a clear logical manner utilizing engraved or silkscreened lettering

3. Wire:

    1. All control wiring must be individually clearly marked with permanent labeling, in a logical manner showing source and destination.

3.3 INSTALLATION

1. Install, mount and secure all specified equipment as per Schedule “AV-A” Division of Responsibilities.

2. Supply all required low voltage control cabling.

3. Terminate all low voltage connections.

4. Supply and Install Lighting Pipe Battens

5. Division 26 Electrical contractor to coordinator with Division 11 Theatrical Supplier and provide all specified wiring and connections as per Schedule “AV-A” Division of Responsibilities.

6. Hang & Focus any supplied lighting fixtures and protective cage equipment.

7. Fully Test all systems prior to requesting final inspection.

Provide certified factory technician to complete system commissioning and programming.

8. Provide standard programming of the preset buttons with presets suitable for an elementary school performance theatre.

9. Ensure the console is patched, magic sheet / stage map is created and basic submasters are programmed for use by untrained teaching staff. These submasters should be suitable for an elementary school performance theatre.

3.4 CUTTING AND PATCHING

1. Do not cut, remove or burn structural parts or sections of the building, whether they are steel, concrete or masonry without the written authorization of the Consultant.

2. Should cutting of previously finished Work of other trades be required to allow installation of Work, patch, repair and make good as required or alternatively pay all costs for the trade concerned to perform the Work.

3.5 COMMISSIONING

1. A qualified service representative employed full time by the manufacturer shall visit the job site after the installation is complete and prior to the commissioning of the system to inspect, test and adjust the system. Instruction shall be provided for the owners’ representatives in the operation and maintenance of the system. These services shall not exceed one (1) day and shall be provided with a minimum of fourteen (14) days written notice by the contractor.

3.6 ENERGIZATION

1. A qualified Service Representative employed full time by the manufacturer shall visit the job site after the installation is complete and prior to the energization of the system to inspect, test and adjust the system. Instruction shall be provided for the Owners’ representatives in the operation and maintenance of the system. These services shall not exceed one (1) day and shall be provided with a minimum of fourteen (14) days written notice by the contractor.

3.7 MANUFACTURER SERVICES

1. Service shall be provided directly by the manufacturer and service visits shall be made within twenty four (24) hours.

3.8 TRAINING

1. The Contractor shall provided two (2) x two (2) hour training sessions to the Owners Representatives at a date and time to be determined by the Owner.

3.9 AS BUILT DRAWINGS & MANUALS

1. Three (3) Printed & three (3) Electronic copies of the system As-Built Drawings and Owners Manuals shall be provided.

3.10 WARRANTY

1. Manufacturer shall warrant products under normal use and service to be free from defects in materials and workmanship for a period of two (2) years from date of delivery.

2. Warranty shall cover repair or replacement of such parts determined defective upon inspection.

3. Warranty does not cover any product or part of a product subject to accident, negligence, alteration, abuse or misuse. Warranty does not cover any accessories or parts not supplied by the manufacturer.

4. Warranty shall not cover any labour expended or materials used to repair any equipment without manufacturer's prior written authorization.

END OF SECTION

PART 1- GENERAL

1.1 SYSTEM DESCRIPTION

1. This document will describe in general the system components for the Theatre Arts Video system. It will describe how the various elements are connected together and interact. The manufacturer's specifications for the listed equipment item will be the standard against which substitute items will be evaluated. If an alternate product is proposed, provide full technical literature with the submission. It is the responsibility of the AV Contractor to provide all equipment items and accessories to make each piece of equipment operative in the system, and the system as a whole to operate as per the design intent.

2. The intent of this specification is to define parameters for furnishing and installing a complete working system to the Owner. The audio/video equipment provider shall provide coordination with all associated trades to insure a proper and correct installation. The system is designed to meet specific operational requirements. Performance deviations will not be accepted.

3. Work under this specification shall consist of providing labour and miscellaneous materials for installation and testing of the same.

1.2 REFERENCE DOCUMENTS

1. The documents relative to this specification are:

    1. Bidder information (Division 0), Division 1 General Requirements, and addenda issued during the request for proposal period.

    2. Attached “AV” drawings and schedules.

    3. All other related architectural, structural, mechanical and electrical drawings, which are available for viewing through the General Contractor.

2. The related drawings which form part of this specification are:

    a. A/V Drawings Package
    b. Schedule “AV-A” Division of Responsibilities
    c. Appendix “AV-A” Equipment List & Bid Form
    d. Drawings E-0.1 thru E-2.1

1.3 SUBMITTALS

1. 3 sets of full system submittals shall be furnished for approval within 15 days of award of Contract. Prior to fabrication of equipment, two sets shall be returned appropriately marked as the approval document.

2. Bidder shall provide any additional information, including equipment demonstration, as required by the consultant to verify compliance with specifications.

1.4 QUALITY ASSURANCE

1. Bidder shall be one who has been continuously engaged in the supply and installation of A/V integrated systems & equipment for a minimum of ten years.

2. The bidder shall have a factory authorized stocking service center with at least one full time service technician on staff. In addition, the manufacturer shall have a toll free 24-hour hotline with a maximum response time of 20 minutes, 24 hours a day and 365 days a year.

    1. All equipment, where applicable standards have been established, shall be built to the standards of Underwriters Laboratories, Inc., the National Electric Code and the United States Institute for Theatre Technology. Permanently installed power distribution equipment such as dimmer racks and distribution shall be CSA or C-UL Listed, and/or CE marked (where applicable) and bear the appropriate labels. Portable equipment such as consoles and fixtures shall be UL and C-UL Listed, ETL Listed and/or CE marked (where applicable) and bear the appropriate labels

1.5 SUBSTITUTIONS

1. Where specified by name and model, the A/V systems have been designed utilizing the equipment described in these documents. Substitutions must be submitted for review 7 days prior to bid closing with all applicable specification and product data sheets to be considered by the design team. If the alternate is approved for substitution the bidder will be notifed in writing.

PART 2– PRODUCT

2.1 THEATRE ARTS VIDEO EQUIPMENT

1. Refer to A/V Drawings and Schedules attached.
2. Refer to Appendix “AV-A” of the Bid Form for Equipment Quantities & Model numbers.

2.2 CONNECTOR PLATES, WIRE, AND TERMINATION

1. Plates

    1. Provide all custom control panels, connectors, connector plates, and terminations as shown in the drawings or where required to complete a functional and reliable installation.

    2. For all plates to be supplied, detail drawings and a sample of finish are required for approval before final fabrication of panels begins.

    3. All A/V connector plates shall be fabricated from aluminum, finished with a matte black finish. Plates may be either laser engraved, or engraved and filled with a white epoxy ink or Laser etched.

2.3 WIRE

1. Provide all necessary audio, video, snake, microphone, speaker, network, DMX and communications wires.
2. All supplied wiring is to be rated FT4 when run in EMT and FT6 for use in plenum spaces unless specified otherwise.
3. All cabling is to be Manufactured by Belden.

PART 3– EXECUTION

3.1 GENERAL

1. The A/V Contractor is to combine the new equipment being called for in this specification with the existing A/V Equipment rack, Microphone DSP’s, Playback and Video Preview screens/monitors to facilitate a functional presentation system.

2. The A/V Contractor shall confirm all dimensions, distances and placement prior to fabrication and supply of equipment. It shall be the responsibility of the Contractor to report any discrepancies to the Consultant for clarification.

3. Protect all finished and unfinished Work of this and other Divisions from damage due to carrying out of this Work.

4. Make good any damage caused directly or indirectly to walls, floors, ceilings, woodwork, brickwork, finishes, etc.

5. Make good any damage to Owner’s property or other trade’s work caused by improperly locating or carrying out work.

3.2 LABELING

1. Equipment

    1. All control stations, wall plates, and outlets shall be permanently marked in a clear logical manner utilizing engraved or silkscreened lettering

2. Wire

    1. All control wiring must be individually and clearly marked with permanent labelling, in a logical manner showing source and destination.

3.3 INSTALLATION

1. Care shall be exercised by the Electrical & AV Contractors during installation to avoid damage to cables and equipment. All joints and connections shall be made with low residue rosin multicore solder. All wiring shall be executed in strict adherence to professional practice and standards.

2. All cables shall be continuous between their terminated ends. No splices, connections, etc. shall be permitted between the ends of any cable.

3. All cables shall be clearly and permanently marked in a logical numerical or legend fashion at each end by means of an industry accepted standard system, such as Brady or Panduit self-laminating markers. The numerical identification scheme shall be carried to the wiring diagrams that are to be part of the as-built drawings. Wiring lists shall be included in the project manual.

4. The A/V Contractor shall observe current standards for connecting the shield drain wire of shielded audio cables. All cable shields shall be insulated at their terminated ends with sleeves or heat shrinkable tubing and shield drain wires shall be protected by a piece of PVC tubing from the point where they exit the jacket of the cable to the connection.

5. The A/V Contractor shall take all necessary precautions to prevent electromagnetic and electrostatic interference (hum, buzz, etc.) and the completed audio systems shall be entirely free of noise and interference of this nature.

6. The audio system equipment will be powered from a single phase of the distribution panel on several circuits. These circuits will be supplied and installed by the Electrical Contractor retained by the owner. The A/V Contractor shall be responsible for providing, installing and connecting power circuit devices within the system equipment enclosures, should such be required.

7. All equipment cable shall be held firmly in place. This includes cable and wire harnesses. No cable shall be left sitting loose unless so designated.

8. All control, connector and custom panels shall be clearly, logically and permanently marked before installation. The most suitable means is direct engraving.

9. The highest quality of workmanship is anticipated and required. Proper soldering techniques are mandatory. The use of service loops in the cable bundles is encouraged. The use of support bars on heavy bundles of cables where no support is provided on the

equipment is essential. In no circumstances shall the weight of the cable be borne entirely by the connector or connection strip.

10. All cables must have stranded conductors. In the case of small gauge shielded cables, the drain wire must be the same gauge as the signal leads. Any cable not meeting these standards will be rejected outright by the Systems Designers and the AV Contractor will be required to replace it throughout the project.

11. Install, mount and secure all specified equipment as per Schedule “AV-A” Division of Responsibilities.

12. Supply & Install all required low voltage control cabling.

13. Terminate all low voltage (<70.7V) cable as mentioned in this specification and as shown on the drawings.

14. Install & Setup any supplied portable equipment.

15. Fully Test all systems prior to requesting final inspection.

3.4 SHOP DRAWINGS AND MANUALS

1. Shop drawings as outlined herein are to be submitted for review and coordination prior to the start of equipment installation and shall consist of the following:

    1. Complete materials list with description, model number, quantity and technical specifications on all equipment to be installed.

    2. Complete original functional block diagrams, systems circuit diagrams and detail drawings that clearly illustrate how all components relate and are interconnected. All cables and terminations are to be clearly identified and documented in wiring lists. Full documentation of interconnection wiring between components is to be included. These documents will be reviewed and approved by the Systems Designers prior to the start of construction. 10 complete sets of approvals are required.

    3. Under no circumstances will wiring diagrams from sales brochures be considered as circuit or functional diagrams for this project.

3.5 PROGRAMMING, TESTING & COMMISSIONING

1. CLIENT is to be provided with any and all software programs, configuration files and source code of all items supplied or required to complete this installation at time of completion.

2. CLIENT will supply the successful bidder with a sample Touchpanel Layout to allow the A/V contractor to align the new touch panels functionality with the existing CLIENT systems.

3. A qualified Service Representative employed full time by the manufacturer’s rep shall visit the job site during the installation to inspect, test and adjust the system.

3.6 TRAINING

1. The Contractor shall provided two (2) x four (4) hour training sessions to the Owner's Representatives at a date and time to be determined by the Owner.

2. The First Session will cover a system overview for the supplied system, standard maintenance procedures, and equipment repair.

3. The Second Session will focus on systems operation and programming.

3.7 AS BUILT DRAWINGS & MANUALS

1. Three (3) Printed & three (3) Electronic (USB) copies of the system As-Built Drawings and Owner's Manuals shall be provided.

3.8 WARRANTY

1. Manufacturer shall warrant products under normal use and service to be free from defects in materials and workmanship for a period of two years from date of delivery.

2. Warranty shall cover repair or replacement of such parts determined defective upon inspection.

3. Warranty does not cover any product or part of a product subject to accident, negligence, alteration, abuse or misuse. Warranty does not cover any accessories or parts not supplied by the manufacturer.

4. Warranty shall not cover any labour expended or materials used to repair any equipment without manufacturer's prior written authorization.

END OF SECTION

330 Lansdowne Ave
CSV Lansdowne Auditorium Renovation
22 November 2024

CSV LANDSDOWNE AUDITORIUM UPGRADES

Schedule AV-A
Division of Responsiblities

S = Supply I = Install		Div. 11	Div. 26
Production Lighting Infrastructure			
	Mains Feed to Outlet Boxes		**S+I**
	Load Conduit & Wiring		**S+I**
	Distribution Wire (incl. Terminations)		**S+I**
	Back Boxes, Pull Boxes, Junction Boxes		**S+I**
	Termination Devices and Plates		**S+I**
	None Standard Back Boxes		**S+I**
	Lighting Pipe Batten(s)	**S+I**	
Production Lighting Outlet Boxes			
	Outlet Boxes (9101C) and Termination Lugs	**S**	**I**
	ColorSource Relay Modules	**S+I**	
Production Lighting Controls			
	Control Console + Peripherals	**S+I**	
	Control Plug-In Stations	**S+I**	
	Control Wire	**S**	**I**
	Control Wire Terminations	**S+I**	
	Control Conduit		**S+I**
Production Lighting Fixtures			
	Stage& Studio Lighting Fixtures	**S+I**	
	Accessories	**S+I**	
	Protective Cages	**S+I**	
Production Audio System Infrasctruture			
	Isolation Transformer for Audio System		**S+I**
	Distributed Technical Power		**S+I**
	Switches, Panels, Splitters and etc.		**S+I**
	Control & Signal Conduit		**S+I**
	Control & Signal Back Boxes		**S+I**
	Non Standard Back Boxes	**S**	**I**
	Control & Signal Wire	**S**	**I**
	Loudspeaker Support Steel	**S+I**	
	High Voltage Terminations (>70V)		**S+I**
	Low Voltage Terminations (<70V)	**S+I**	
Production Audio System			
	Loudspeakers	**S+I**	
	Audio Equipment Racks	**S+I**	
	Control & Mixing Console	**S+I**	
	Processing/Controller/Effects Units	**S+I**	
	Sources	**S+I**	
	Microphones, Mic Cables and Stands	**S+I**	
	Patch Bays	**S+I**	
	Connector Plates	**S+I**	
	Protective Cages	**S+I**	
Rigging Infrastructure			
	Stage Lighting Support Pipes	**S+I**	
Drapery & Tracks			
	Pipe Battens	**S+I**	
	Masking Drapery	**S+I**	
	All Additional Support Materials	**S+I**	
	Upstage Traveller & Track	**S+I**	
	Main Drape & Track	**S+I**	
	Misc. Hardware &	**S+I**	

1 - General

1.1 SUMMARY

.1 This Section includes the following:

.1 Floor Mounted Audience Seating

1.2 WORK INCLUDED

.1 This specification requires the fabrication, furnishing, delivery and installation supervision of the Seating System consisting of fixed floor mounted upholstered theatrical/performance chairs.

.2 Field measurements shall be taken to verify or supplement dimensions shown on attached drawing.

1.3 REFERENCE STANDARDS

.1 All work shall be in accordance with applicable municipal, provincial and national codes and by laws including, but not limited to, the Ontario Building and Fire Code, latest edition and the National Building and Fire Code latest edition.

.2 All work related to the installation of specified equipment shall be in accordance with the installation standard set by the specific manufacturer, unless otherwise specified herein or which contravenes the above codes and by-laws (see 1.3.1).

.3 All plywood shall comply with National Bureaus of standards PS183.

.4 Additional standards for which the seating system shall comply will include but not limited to:

.1 American Welding society (AWS):

.1 AWS D1.1 Structural Welding Code - Steel.

.2 AWS D1.3 Structural Welding Code - Sheet Steel.

.2 American Institute of Steel Construction (AISC):

.1 AISC - Design of Hot Rolled Steel Structural Members.

.3 American National Standards Institute (ANSI).

.4 American Iron & Steel Institute (AISI):

.1 AISI - Design Cold Formed Steel Structural Members.

.5 Aluminum Association (AA):

.1 AA - Aluminum Structures, Construction Manual Series.

.6 American Society for Testing Materials (ASTM)

.1 ASTM - Standard Specification for Properties of Materials.

. .7 National Forest Products Association (NFPA):

.1 NFPA - National Design Specification for Wood Construction.

.8 National Bureau of Standards/Products Standard (NBS/PS):

.1 PS1 - Construction and Industrial Plywood.

.9 Americans with Disability Act (ADA)

.1 AODA - Standards for Accessible Design.

.10 Any relevant local municipal standard or guideline (e.g. FADS Facility Accessibility Design Standards)

1.4 SUPPLIER RESPONSIBILITIES

.1 The Supplier shall supervise and instruct other Divisions in tasks related to the Seating Systems.

.2 The Supplier shall notify the Consultant in writing of any equipment, wiring feature or device necessary for the full operation of the System which is not included in the Specification documents or drawings. Failure to supply such notification shall not relieve the Supplier of the responsibility for providing a fully functioning System at the bid price.

.3 The Supplier shall examine all other project documents including, but not necessarily limited to, the existing Architectural, Structural, Electrical and AV drawings in order to determine whether there are any impediments to the installation of a fully functioning System.

.4 The Supplier shall provide complete descriptions including shop drawings of all equipment specified herein for approval by the Consultant.

.5 The Supplier shall convene a coordination meeting with all parties whose work is related to the installation of the System immediately following the awarding of the Contract for a full discussion of the installation requirements and standards. A written report of this meeting shall be provided to the Project Manager and Consultant no more than one week after the meeting.

.6 Full coordination with the General Contractor on site and their sub-trade(s) is required. The Contractor is the constructor as per the local applicable Health and Safety legislation. All documentation shall be provided according to the General Contractor.

.7 The Supplier shall conduct and/or attend periodic site visits during the pre-installation and installation periods with a report being forwarded to the Project Manager and Consultant no more than one week after each visit.

.8 The Supplier shall commission the System upon completion of the installation and shall verify that the System is in first class working order and all components meet or exceed the manufacturer's specifications.

.9 The Supplier shall provide a System which shall include all the necessary components to make the System operate in conformity with professional and industry practices and all incidental and related items necessary to complete the work as described herein even though these items may not be specifically enumerated or described.

.10 The Supplier shall provide all items, articles, materials and operations listed, mentioned or scheduled in the Specification including all tools, labour and incidentals required for the complete and full operation of the System.

1.5 SUBMITTALS

.1 Project Data: Manufacturer's product data for each system. Include the following:

.1 Project list: Ten (10) seating projects of similar size, complexity and in service for at least five (5) years.

.2 Deviations: List of deviations from these project specifications. Deviations from the specifications will be subject to the provisions of the "Alternate Product Substitutions" section above.

.3 Annotated Equipment Cutsheets

.2 Shop Drawings: Indicate chair seating layout. Show all equipment to be furnished with details of accessories to be supplied including necessary electrical service to be provided by others.

.3 Samples: Seat materials and color finish as selected by Architect from manufacturers standard color finishes.

.4 Manufacturer Qualifications: Certification of insurance coverage and manufacturing experience of manufacturer

.5 Engineer Qualifications: Certification by a professional engineer registered in the Province of Ontario that the equipment to be supplied meets or exceeds the design criteria of this specification.

.6 Warranty: Manufacturers standard five-year warranty documents.

1.6 QUALITY ASSURANCE

.1 Welding Standards & Qualification: Comply with AWS D1.1 Structural Welding Code - Steel and AWS D1.3 Structural Welding Code - Sheet Steel.

.2 Supervisor Qualifications: Engage experienced Supervisor who has specialized in installation of audience seating similar to types required for this project and who is acceptable to, or certified by, fixed upholstered chair seating manufacturer.

.3 Engineer Qualifications: Engage professional licensed engineer experienced in providing engineering services of the kind indicated that have resulted in the successful installation of audience seating similar in material, design, fabrication, and extent to those types indicated for this project.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver chair seating in manufacturers packaging clearly labeled with manufacturer name and content.

.2 Handle seating equipment in a manner to prevent damage.

.3 The Supplier shall co-ordinate the delivery of his equipment with the General Contractor and the Consultant and shall ensure that there is no loss of time or inconvenience due to the unavailability of System components.

1.8 PROJECT CONDITIONS

.1 Field Measurements: Coordinate actual dimensions of construction affecting chair seating installation by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid delay of Work.

1.9 SITE EXAMINATION

.1 The Supplier shall conduct regular site visits and shall verify all conditions and dimensions upon which his or her installation depends. The Supplier shall immediately notify the Project Manager of any field conditions and/or dimensions which are at variance with the proposal documents and which may affect the installation of the System. Any decision regarding corrective measures shall be obtained in writing from the Project Manager prior to proceeding with the affected work.

.2 Commencement of the System installation shall imply acceptance of previously executed work and assumption of full costs and responsibility for installation of the System in accordance with the Specifications and Drawings.

.3 The Supplier shall advise the Project Manager and Consultant in writing of any site conditions that may delay or impede the installation of the System.

1.10 WARRANTY

.1 Manufacturer's Product Warranty: Submit manufacturer's standard warranty form for chairs. This warranty is in addition to, and not a limitation of other rights Owner may have under Contract Documents.

.1 Warranty Period: Five (5) years from Date of Substantial Completion.

.2 Beneficiary: Issue warranty in legal name of project Owner.

.3 Warranty Acceptance: Owner is sole authority who will determine acceptance of warranty documents.

1.11 MAINTENANCE AND OPERATION

.1 Instructions: Refer to Section 01 78 00 – Closeout Submittals.

.2 Service: Maintenance and operation of the seating system shall be the responsibility of the Owner or his duly authorized representative, and shall include the following:

.1 Only attachments specifically approved by the manufacturer for the specific installation shall be attached to the seating.

.2 Periodic annual inspections and required maintenance of each seating system shall be performed according to the Operations Manual to ensure safe conditions.

2 - Products

2.1 FLOOR MOUNTED AUDIENCE SEATING

.1 Seating - General

.1 Floor mounted chairs complete with:

.1 Frame

.2 Seat

.3 Back

.4 Intermediate standards

.5 End standards

.6 Armrests

.7 Row numbers

.8 Seat numbers

.9 Counterweight / gravity operated self-lifting seat mechanisms which automatically returns to a uniform 3/4 fold position when not occupied.

.2 The quantity of chairs shall be as shown on the drawings.

.1 As required by the enforced local building code, seating for accessible wheelchair locations will be provided.

.2 Refer to Drawing A0.1 for estimated locations. Exact locations to be confirmed during shop drawings phase.

.3 Chair widths shall vary between 19" to 22". A saw-tooth seating arrangement shall be provided for improved sightlines. Aisles shall be straight.

.4 Basis of Design:

.1 Hussey Quattro Classic

.2 Ducharme Classic

.3 Irwin Citation

.4 Equivalents per Section 01 25 00

.2 Frame

.1 Standards are made of 1" x 3" x 14 gauge (25mm x 76mm x 1.9mm) tubular steel. All structural connections shall be made with S.A.E. stress rated zinc plated or, black oxide steel bolts, washers and nuts. All welds shall be made at the factory by welders that are certified on the equipment and process used.

.2 Expansion bolts shall be of approved type lead drive anchor comprised of the following components:

.1 Bolt - 3/8"(10mm) x 3 1/2"(89mm) expansion anchor.

.2 Sleeve - 3/8"(10mm) I.D. x 1"(25mm) lead (commercially known as 2% antimony lead) with one end recessed to fit cone. Two sleeves per bolt.

.3 Metal shall be chemically cleaned in an iron phosphate wash system. Then applied with an electrostatically sprayed high solids enamel to yield a minimum dry film thickness of 1.5 mils. Enamel shall be baked for 15 minutes in a 300 degree oven.

.4 Standards shall be designed to be fitted with plastic end panels in accordance with the seating plan. Plans shall match the chair and armrest

.3 Seat

.1 The seat assembly shall consist of a stylish padded and upholstered top surface, a polypropylene bottom shell with dual contours, and a dual sprung lifting mechanism. Seat shall have the ability to achieve a full fold position when rearward pressure is applied. Superior comfort shall be derived through careful ergonomic engineering.

.2 Upholstery Pad: The upholstered seat topper shall consist of a 5/8” thick formed ply form base with contoured molded polyurethane foam padding and fabric upholstered cover. Seat padding shall be properly contoured to support the body without causing discomfort. The upholstered seat cover shall exhibit a high degree of tailoring and will be affixed to the base with upholstery staples.

.3 Seat Mechanism: Seat lifting mechanism shall use lubricated lifting springs to provide whisper quiet fail-safe operation. The seat structure shall rotate on a 3/4” [19mm] spanner bar to assure shaft alignment and eliminate binding due to irregular floor conditions. Seats shall be certified to withstand 350,000 lifting cycles and a 600lb static load without failure.

.4 Standard Bottom Cover: Seat shell/bottom shall be constructed of polypropylene plastic to provide a durable yet aesthetic design. The cover shall protect the mechanical parts of the lifting hinge and upholstered seat topper. The shell / bottom shape shall compliment the overall design of the chair.

.5 Fully Enveloped Bottom Cover: Seat shell/bottom cover shall be constructed of polypropylene plastic covered with the specified upholstery laminated with foam for distinctive styling. Tailoring display a superior level of design workmanship and fit. Seams shall be straight, continuous and neat, without unsightly puckering.

.4 Back

.1 Back Foam: Standard seat foam 2” (51mm)

.2 Back Cover Tailoring: Standard Waterfall

.3 Back Shape and Height

.1 Soft Square – 33”. The top corners of the back are conically shaped for stylish looks and a timeless appearance. Overall back height is 33” above the floor allowing proper shoulder support of the chair occupant. The back surface shall be contoured to facilitate proper posture of a seated individual.

.5 Armrests

.1 Armrests, Injection Molded Plastic: Armrests shall be of injection molded, textured polypropylene. Armrest to be secured to standard with concealed fasteners.

.6 Accessories

.1 Each seat shall be provided with an engraved brass plate affixed to the armrest. Configuration of a seat numbering system is to be determined in consultation with the Owner after the contract is awarded. Sample plate shall accompany the chair sample.

2.2 FASTENINGS

.1 Chair Assembly

.1 All welds shall be made at the factory by welders that are certified on the equipment and process used.

.2 All structural connections shall be made with S.A.E. stress rated zinc plated or, black oxide steel bolts, washers and nuts.

.2 Concrete Floor Attachment

.1 Chair stanchions shall each be attached by means of two 1/4" (6mm) mechanical wedge anchors set in holes drilled to a minimum depth of 2" (50mm) in the concrete.

.1 Wedge anchors shall be tested to ASTM E488 criteria. Wedge anchors feature a type 18-8 stainless steel split expansion ring and a threaded stud bolt body and integral cone expander, and a nut and washers. Stanchion shall be placed on the bolts, stanchions to be permanently secured with a flat washer, lock washer and nut.

2.3 FINISHES

.1 Finish for Steel / Aluminum Components: (Indoor) Material shall be pre-treated in an iron phosphate wash system prior to finish application. The finish shall be a specially blended polyester T.G.I.C./Epoxy powder coating with a minimum dry film thickness of 1.5 mils.

.2 Injection molded polypropylene or nylon: Shall be pigmented, in one of manufacturers standard colors and have a textured surface

.3 Fabric: Upholstery material shall be selected from one of manufacturer’s standard fabric offerings.

.4 Colour: Shall be per manufacturer's standards. Seating Contractor shall submit color samples for owner's approval prior to manufacture.

3 – Execution

3.1 EXAMINATION

.1 Verification of Conditions: Verify areas to receive fixed upholstered chair seating are free of impediments interfering with installation and condition of installation substrates are acceptable to receive audience seats in accordance with seating manufacturer's recommendations. Do not commence installation until conditions are satisfactory

3.2 INSTALLATION

.1 Manufacturer’s Recommendations: Comply with seating manufacturer's recommendations for product installation requirements

.2 General: Install fixed upholstered chair system in accordance with manufacturer's installation instructions and final shop drawings. Provide accessories, anchors, fasteners, inserts and other items for installation of seating and for permanent attachment to adjoining construction.

3.3 REMOVAL AND REFURBISHMENT

.1 Refer to Drawing A0.1 for Seating Schedule and Refurbishment plans.

3.4 ADJUSTMENT AND CLEANING

.1 Adjustment: After installation completion, all equipment is to be adjusted for smooth and proper operation.

.2 Cleaning: Clean work area and remove debris from site.

3.5 PROTECTION OF FINISHED WORK

.1 General: Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer to ensure audience seats are without damage or deterioration at time of substantial completion.

END OF SECTION

Part 1 General

1.1 DEFINITIONS

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.2 REFERENCE STANDARDS

.1 CSA Group

- .1 Ontario Electrical Safety Code (28th Edition) - 2021
- .2 CSA C22.1:21, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.
- .3 CSA C235:19, Preferred Voltage Levels for AC Systems, up to 50,000 V.
- .4 CAN/CSA-C22.3 No.1:20, Overhead Systems.

.2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)

- .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

- .1 Submit manufacturer's instructions, printed product literature and data sheets for all electrical equipment in PDF format including product characteristics, performance criteria, physical size, finish, limitations, etc.

.3 Submit for review single revised line electrical diagrams and locate as indicated.

- .1 Electrical distribution system in main electrical room.
- .2 Electrical power generation and distribution systems in power plant rooms.

.4 Shop drawings in PDF format:

- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.
- .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.
- .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
- .4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
- .5 Submit full size drawings and product data to inspection authority having jurisdiction.
- .6 If changes are required, notify Consultant of these changes before they are made.

.5 Certificates:

.1 Provide CSA certified equipment and material.

.2 Where CSA certified equipment and material is not available, submit such material and equipment to inspection authorities having jurisdiction for special approval before delivery to site.

.3 Submit test results of installed electrical systems and instrumentation.

.4 Permits and fees: in accordance with General Conditions of contract.

.5 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.

.6 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Owners Representative and Consultant.

.6 Manufacturer's Field Reports: submit to Consultant and Representative manufacturer's written report, within 5 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for all electrical equipment installed.

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect all equipment and materials.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Operating voltages: to CSA-C235.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

.1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification nameplates for control items in English.

2.2 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.

.2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from inspection authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.3 Factory assemble control panels and component assemblies.

2.3 EQUIPMENT AND CONTROLS

.1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.

.2 Control wiring and conduit: in accordance with Section 26 29 03 - Control Devices except for conduit, wiring and connections below 50 V which are related to control systems specified in mechanical sections and as shown on mechanical drawings.

2.4 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of Owners Representative having jurisdiction.

.2 Decal signs, minimum size 175 x 250 mm.

2.5 WIRING TERMINATIONS

.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.6 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates and labels as follows:

.1 Nameplates: lamicoid 3 mm thick plastic engraving sheet melamine , matt white finish with white face and black core, lettering accurately aligned and engraved into core mechanically attached with self tapping screws

.2 Sizes as follows:

NAMEPLATE SIZES			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

.2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.

.3 Wording on nameplates and labels to be approved by Consultant prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per nameplate and/or label.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Identify equipment with Size 3 labels engraved "ASSET INVENTORY NO. "

.7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.8 Terminal cabinets and pull boxes: indicate system and voltage.

.9 Transformers: indicate capacity, primary and secondary voltages.

2.7 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1

.4 Use colour coded wires in communication cables, matched throughout system.

2.8 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15m intervals.

.3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

Type	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red

Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

2.9 RECEPTACLE AND COMMUNICATIONS IDENTIFICATION

.1 Identify each receptacle with permanent indelible identifying markings, coloured plastic tapes with panel and circuit number.

.2 Identify each communication outlet with permanent indelible identifying markings, coloured plastic tapes with LAN room and port number.

.3 Maintain phase sequence and colour coding throughout.

.4 Colour coding: to CSA C22.1.

2.10 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.1 Paint indoor distribution enclosures light gray to local utility/OESA standard

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable.

.1 Visually inspect substrate in presence of Owners Representative and/or Consultant.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant or Owners Representative.

3.2 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise

.2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise

3.3 NAMEPLATES AND LABELS

.1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed

3.4 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete.

.1 Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 100 mm.

.2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.5 LOCATION OF OUTLETS

.1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.

.2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.

.3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

.4 Locate light switches on latch side of doors.

3.6 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise.

.1 Local switches: not less than 900 mm and not more than 1200 mm.

.2 Wall receptacles:

.1 General: 300 mm.

.2 Above top of continuous baseboard heater: 200 mm.

.3 Above top of counters or counter splash backs: 175 mm.

.4 In mechanical rooms: 1400 mm.

.3 Panelboards: as required by Code or as indicated.

.4 Television outlets: 300 mm.

.5 Wall mounted speakers: to be mounted as per AV drawings.

.6 Door bell pushbuttons: not less than 900mm and not more than 1200 mm.

3.7 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.8 FIELD QUALITY CONTROL

.1 Load Balance:

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Provide upon completion of work, load balance report as directed in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS, phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

.2 Conduct following tests in accordance with Section 01 40 00 - Quality Requirements

.1 Power distribution system including phasing, voltage, grounding and load balancing.

.2 Circuits originating from branch distribution panels.

.3 Lighting and its control.

.4 Control equipment including sequenced operation of systems where applicable.

.5 Systems: fire alarm and communications.

.6 Insulation resistance testing:

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.

.3 Check resistance to ground before energizing.

.3 Carry out tests in presence of Owner Representative and /or Consultant.

.4 Provide instruments, meters, equipment and personnel including necessary after-hours labour as required to conduct tests during and at conclusion of project.

.5 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.9 SYSTEM STARTUP & TRAINING

.1 Instruct operating personnel in operation, care and maintenance of systems, system equipment and components.

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

3.10 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 – Cleaning and Waste Management

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 – Cleaning and Waste Management

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 00 – Cleaning and Waste Management

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

.1 CSA Group (CSA)

.1 CAN/CSA-C22.2 No.65-R2018, Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE).

.2 CAN/CSA-C22.2 No.18.1-13(R2018), Metallic Outlet Boxes. (Tri-national standard, with UL 514A and ANCE NMX- J-023/1).

.3 CSA C22.2 No.18.2-06(R2021), Nonmetallic Outlet Boxes.

.4 CSA C22.2 No.18.3-12(R2017), Conduit, Tubing, and Cable Fittings (Tri-national Standard, with ANCE NMX-J-017 and UL 514B).

.5 CSA C22.2 No.18.4-15(R2019), Hardware for the Support of Conduit, Tubing, and Cable (Bi-National Standard, with UL 2239).

.6 CSA C22.2 No. 18.5-13, Positioning devices (Bi-national standard, with UL 1565).

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC 1Y-2-1961, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for wire and box connectors and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect wire and box connectors from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Bushing stud connectors: to EEMAC 1Y-2 to consist of:

- .1 Connector body and stud clamp for conductors copper stranded.
- .2 Clamp for copper conductors.
- .3 Stud clamp bolts.
- .4 Bolts for copper conductors.
- .5 Sized for conductors as indicated.

.4 Clamps or connectors for armoured cable, TECK cable, mineral insulated cable, and flexible conduit as required to: CAN/CSA-C22.2 No.18.3.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wire and box connectors installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate in presence of Consultant and/or Owners Representative.
- .2 Inform Consultant and/or Owners Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Consultant and/or Owners Representative.

3.2 INSTALLATION

.1 Remove insulation carefully from ends of conductors and cables and:

- .1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.
- .2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65
- .3 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.
- .4 Install bushing stud connectors in accordance with EEMAC 1Y-2.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 – Cleaning and Waste Management

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 – Cleaning and Waste Management

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 00– Cleaning and Waste Management

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

.1 Provide product data in accordance with Section 01 33 00- Submittal Procedures.

1.2 DELIVERY, STORAGE AND HANDLING

.1 Packaging Waste Management: remove for reuse and return by manufacturer of padding, pallets, packaging materials and crates in accordance with Section 01 74 00 – Cleaning and Waste Management

Part 2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated on drawings, with 600V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE, Non Jacketed. Where not indicated on drawings conductors shall be copper.

.3 Copper conductors: size as indicated on drawings, with thermoplastic insulation type T90 Nylon rated at 600 V. Where not indicated on drawings conductors shall be copper.

2.2 TECK 90 CABLE

.1 Cable: in accordance with Section 26 05 00- Common Work Results for Electrical.

.2 Conductors:

.1 Grounding conductor: copper as indicated on drawings.

.2 Circuit conductors: copper as indicated on drawings; size as indicated.

.3 Where not indicated on drawings conductors shall be copper.

.3 Insulation:

.1 Cross-linked polyethylene XLPE.

.2 Rating: 600V.

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: galvanized steel.

.6 Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project.

.7 Fastenings:

.1 One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.

.2 Channel type supports for two or more cables at

.3 Threaded rods: 6 mm diameter to support suspended channels.

.8 Connectors:

.1 Watertight approved for TECK cable.

2.3 MINERAL-INSULATED CABLES

.1 Conductors: solid bare soft-annealed copper, size as indicated.

.2 Insulation: compressed powdered magnesium oxide or silicon dioxide to form compact homogeneous mass throughout entire length of cable.

.3 Outer covering: annealed seamless copper sheath, Type M1 rated 600 V, 250 degrees C .

.4 Overall jacket: none.

.5 Two hour fire rating.

.6 Connectors: watertight, field installed approved for MI cable.

.7 Termination kits: field installed approved for MI cable

2.4 ARMOURED CABLES

.1 Conductors: insulated, copper, size as indicated on drawings. Where not indicated on drawings conductors shall be copper.

.2 Type: AC90.

.3 Armour: interlocking type fabricated from aluminum strip.

.4 Type: jacket over armour and compliant to applicable Building Code classification for this project.

.5 Connectors: anti short connectors.

2.5 ALUMINUM SHEATHED CABLE

.1 Conductors: ACM alloy or aluminum or copper, size as indicated on drawings. Where not indicated on drawings conductors shall be copper.

.2 Insulation: cross linked polyethylene rated 600 V.

.3 Sheath: aluminum applied to form continuous corrugated seamless sheath.

.4 Outer jacket: none.

.5 Fastenings for aluminum sheathed cable:

.1 One hole steel straps to secure surface cables 25 mm and smaller. Two hole steel straps for cables larger than 25 mm. Use aluminum strap only with single conductor cable.

.2 Channel type supports for two or more cables at

.3 Threaded rods: 6 mm diameter to support suspended channels.

2.6 CONTROL CABLES

.1 Type: LVT: 2 soft annealed copper conductors, sized as indicated:

.1 Insulation: thermoplastic.

.2 Sheath: thermoplastic jacket.

.2 Type: low energy 300 V control cable: stranded annealed copper conductors sized as indicated LVT:2 soft annealed copper conductors, sized as indicated:

.1 Insulation: TWH polyethylene.

.2 Shielding: braid over conductors group.

.3 Overall covering: polyethylene jackets.

.3 Type: 600 V conductors, sizes as indicated :annealed copper

.1 Insulation: RW90 cross-linked polyethylene type.

.2 Shielding: conductors.

.3 Overall covering: thermosetting jackets.

Part 3 Execution

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00- Common Work Results for Electrical.

.2 Perform for Consultant and/or Owner Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

.1 Lay cable in cable trays in accordance with Section 26 05 36- Cable Trays for Electrical Systems.

.2 Terminate cables in accordance with Section 26 05 20- Wire and Box Connectors - (0-1000 V).

.3 Cable Colour Coding: to Section 26 05 00- Common Work Results for Electrical.

.4 Conductor length for parallel feeders to be identical.

.5 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

.6 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.

.7 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.

.8 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

3.3 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34- Conduits, Conduit Fastenings and Conduit Fittings.

3.4 INSTALLATION OF TECK90 CABLE (0 -1000 V)

.1 Group cables wherever possible on channels.

.2 Install cable concealed where required by Architect , securely supported by straps and hangers.

3.5 INSTALLATION OF MINERAL-INSULATED CABLES

.1 Install cable concealed or exposed as required , securely supported by straps or hangers.

.2 Support 2 hour fire rated cables at 1 m intervals.

.3 Make cable terminations by using factory-made kits.

.4 Cable terminations: use thermoplastic sleeving over bare conductors.

.5 Do not splice cables unless indicated.

3.6 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible on channels.

3.7 INSTALLATION OF ALUMINUM SHEATHED CABLE

.1 Group cables wherever possible on channels.

3.8 INSTALLATION OF CONTROL CABLES

.1 Install control cables in conduit.

.2 Ground control cable shield.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group

.1 CSA C22.1:21, Canadian Electrical Code, Part 1 latest edition, Safety Standard for Electrical Installations.

.2 CSA C22.2 No.41-12(R2017), Grounding and Bonding Equipment (Tri-National Standard, with NMX-J-590ANCE and UL 467).

.3 CSA C22.2 No.65-18, Wire connectors (Tri-National Standard, with UL 486A-486B NMX-J-543-ANCE).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00- Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for connectors and terminations and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Certificates: obtain inspection certificate of compliance covering high voltage stress from inspection authority and include it with maintenance manuals and as-built drawings.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for connectors and terminations for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect connectors and terminations from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 CONNECTORS AND TERMINATIONS

.1 Copper short barrel compression connectors to CSA C22.2 No.65 as required sized for conductors.

.2 Contact aid for aluminum cables where applicable.

.3 4-way joint boxes dry location type in accordance with Section 26 05 33- Raceway and Boxes for Electrical Systems.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for connectors and terminations installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of General Contractor.

.2 Inform General Contractor of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from General Contractor.

3.2 INSTALLATION

.1 Install stress cones, terminations, and splices in accordance with manufacturer's instructions.

.2 Bond and ground as required to CSA C22.2NO.41:22.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 – Cleaning and Waste Management

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 – Cleaning and Waste Management

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 00 – Cleaning and Waste Management.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00- Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions in PDF format, printed product literature and data sheets for hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations.

1.2 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and Section 01 61 00- Common Product Requirements.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors, off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect hangers and supports from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 SUPPORT CHANNELS

.1 Steel channels, zinc coating, U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted or set in poured concrete walls and ceilings.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for hangers and supports installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Consultant and/or Representative.

.2 Inform Consultant and/or Owners Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant and/or Owners Representative.

3.2 INSTALLATION

.1 Secure equipment to hollow, solid masonry, tile and plaster surfaces with lead anchors.

.2 Secure equipment to poured concrete with expandable inserts.

.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

.4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.

.5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.6 Fasten exposed conduit or cables to building construction or support system using straps.

.1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.

.2 Two-hole steel straps for conduits and cables larger than 50 mm.

.3 Beam clamps to secure conduit to exposed steel work.

.7 Suspended support systems.

.1 Support individual cable or conduit runs with 6 mm diameter threaded rods and spring clips.

.2 Support 2 or more cables or conduits on channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.

.8 For surface mounting of two or more conduits use channels at 5-foot intervals.

.9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.11 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Consultant and/or Owners Representative.

.13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 – Cleaning and Waste Management

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 – Cleaning and Waste Management

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA C22.1:21, Canadian Electrical Code, Part 1.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in PDF format in accordance with Section 01 33 00- Submittal Procedures.

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Provide shop drawings: in accordance with Section 01 33 00- Submittal Procedures.

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.

Part 2 Products

2.1 SPLITTERS

.1 Construction: sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.

.2 Terminations: main and branch lugs to match required size and number of incoming and outgoing conductors as indicated.

.3 Spare Terminals: minimum three spare terminals or lugs on each connection or lug block sized less than 400 A.

2.2 JUNCTION AND PULL BOXES

.1 Construction: welded steel enclosure.

.2 Covers Flush Mounted: 25 mm minimum extension all around.

.3 Covers Surface Mounted: screw-on flat covers.

2.3 CABINETS

.1 Construction: welded sheet steel hinged door, and catch

.2 Type E Empty: flush overlapping sides mounting as required.

.3 Type T Terminal: flush overlapping sides mounting as required containing.

Part 3 Execution

3.1 SPLITTER INSTALLATION

.1 Mount plumb, true and square to building lines.

.2 Extend splitters full length of equipment arrangement except where indicated otherwise.

3.2 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.

.3 Install terminal block as indicated in Type T cabinets.

.4 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.3 IDENTIFICATION

.1 Equipment Identification: to Section 26 05 00- Common Work Results for Electrical.

.2 Identification Labels: size 2 indicating, voltage and phase, system name, fed from.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 Ontario Electrical Safety Code, 28th Edition, 2021.

.2 CSA C22.1:21, Canadian Electrical Code,

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.

.2 Submit samples for floor box in accordance with Section 01 33 00- Submittal Procedures.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements.

.2 Waste Management and Disposal:

.1 Separate waste materials for recycling in accordance with Section 01 74 00 – Cleaning and Waste Management.

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

.5 347 V outlet boxes for 347 V switching devices.

.6 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 GALVANIZED STEEL OUTLET BOXES

.1 One-piece electro-galvanized construction.

.2 Singleand multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated.102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

.3 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

.4 102 mm square or octagonal outlet boxes for lighting fixture outlets.

.5 Extension and plaster rings for flush mounting devices in finished plaster and tile walls.

2.3 MASONRY BOXES

.1 Electro-galvanized steel masonry and multi and single gang boxes for devices flush mounted in exposed block walls.

2.4 CONCRETE BOXES

.1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.5 CONDUIT BOXES

.1 Cast FS boxes with factory-threaded hubs and mounting feet for surface wiring of devices.

2.6 OUTLET BOXES FOR NON-METALLIC SHEATHED CABLE

.1 Electro-galvanized, sectional, screw ganging steel boxes, minimum size 76 x 50 x 63 mm with two double clamps to take non-metallic sheathed cables.

2.7 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

2.8 SERVICE FITTINGS

.1 'High tension' receptacle fitting made of 2 piece die-cast aluminum with brushed aluminum housing finish for two duplex receptacles. Bottom plate with two knockouts for centered or offset installation.12 x 102 mm extension piece as indicated.

Part 3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.

.5 Vacuum clean interior of outlet boxes before installation of wiring devices.

.6 Identify systems for outlet boxes as required.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CAN/CSA-C22.2 No.18.1-13(R2018), Metallic Outlet Boxes (Tri-national standard, with UL 514A and ANCE NMX- J-023/1).

.2 CSA C22.2 No.18.2-06(R2021), Non-metallic Outlet Boxes.

.3 CSA C22.2 No.18.3-12(R2017), Conduit, Tubing, and Cable Fittings (Tri-national Standard, with ANCE NMX-J-017 and UL514B).

.4 CSA C22.2 No.18.4-15(R2019), Hardware for the Support of Conduit, Tubing, and Cable (Bi-National Standard, with UL 2239).

.5 CSA C22.2 No. 18.5-13, Positioning devices (Bi-national standard, with UL 1565).

.6 CSA C22.2 No. 45.1-07(R2017), Electrical Rigid Metal Conduit - Steel (Tri-National standard, with UL 6 and MX-J-534-ANCE-2007)

.7 CSA C22.2 No. 56-17, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

.8 CSA C22.2 No. 83.1-07(R2017), Electrical Metallic Tubing.

.9 CSA C22.2 No. 211.2-06(R2021), Rigid PVC (Unplasticized) Conduit.

.10 CSA C22.2 No. 227.3:15(R2019), Non-metallic Mechanical Protection Tubing (NMPT), A National Standard of Canada latest edition.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.

.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.

.1 Submit cable manufacturing data.

.3 Quality assurance submittals:

.1 Test reports: submit certified test reports.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Instructions: submit manufacturer's installation instructions.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Section 01 74 10 – Cleaning and Waste Management.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

Part 2 Products

2.1 CABLES AND REELS

.1 Provide cables on reels or coils.

.1 Mark or tag each cable and outside of each reel or coil, to indicate cable length, voltage rating, conductor size, and manufacturer's lot number and reel number.

.2 Each coil or reel of cable to contain only one continuous cable without splices.

.3 Identify cables for exclusively dc applications.

.4 Reel and mark shielded cables rated 2,001 volts and above.

2.2 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45.1 hot dipped galvanized steel threaded.

.2 Epoxy coated conduit: to CSA C22.2 No. 45.1, with zinc coating and corrosion resistant epoxy finish inside and outside.

.3 Electrical metallic tubing (EMT): to CSA C22.2 No. 83.1, with couplings.

.4 Rigid PVC conduit: to CSA C22.2 No. 211.2.

.5 Flexible metal conduit: to CSA C22.2 No. 56 , liquid-tight flexible metal.

.6 Flexible PVC conduit: to CSA-C22.2 No. 227.3 .

2.3 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 50 mm and smaller.

.1 Two hole steel straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 5 foot intervals.

.4 Threaded rods, 6 mm diameter, to support suspended channels.

2.4 CONDUIT FITTINGS

.1 Fittings: to CSA C22.2 No. 18.3, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.

.3 Watertight connectors and couplings for EMT.

.1 Set-screws are not acceptable.

2.5 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 200 mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.6 FISH CORD

.1 Polypropylene .

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical and electrical service rooms in unfinished areas.

.3 Surface mount conduits except in finished areas.

.4 Use rigid hot dipped galvanized steel threaded conduit except where specified otherwise.

.5 Use electrical metallic tubing (EMT) except in cast concrete above 2.4 m not subject to mechanical injury.

.6 Use rigid PVC conduit in corrosive areas and underground.

.7 Use flexible metal conduit for recessed lighting fixtures work in movable metal partitions connection to recessed without prewired outlet box, connection to motors and transformers in dry areas.

.8 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.

.9 Use explosion proof flexible connection for connection to explosion proof motors.

.10 Install conduit sealing fittings in hazardous areas.

.1 Fill with compound.

.11 Minimum conduit size for lighting and power circuits: 19 mm.

.12 Install EMT conduit from computer room branch circuit panel to outlet boxes located in sub floor.

.13 Install EMT conduit from computer room branch circuit panel to junction box in sub-floor immediately below panel.

.1 Run flexible conduit from junction box to outlet boxes for each computer in sub-floor.

.14 Bend conduit cold:

.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.15 Mechanically bend steel conduit over 19 mm diameter.

.16 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.17 Install fish cord in empty conduits.

.18 Run 2-25 mm spare conduits up to ceiling space and 2-25 mm spare conduits down to ceiling space from each flush panel.

.1 Terminate these conduits in 152 x 152 x 102 mm junction boxes in ceiling space or in case of an exposed concrete slab, terminate each conduit in surface type box.

.19 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.20 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on surface or suspended channels.

.5 Do not pass conduits through structural members except as indicated.

.6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings.

3.5 CONDUITS IN CAST-IN-PLACE CONCRETE

.1 Locate to suit reinforcing steel.

.1 Install in centre one third of slab.

.2 Protect conduits from damage where they stub out of concrete.

.3 Install sleeves where conduits pass through slab or wall.

.4 Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed.

.1 Use cold mastic between sleeve and conduit.

.5 Conduits in slabs: minimum slab thickness 4 times conduit diameter.

.6 Encase conduits completely in concrete with minimum 25 mm concrete cover.

.7 Organize conduits in slab to minimize cross-overs.

.8 Refer to civil engineers drawings and/or specifications for exact requirements of concrete installation.

3.6 CONDUITS IN CAST-IN-PLACE SLABS ON GRADE

.1 Run conduits 25 mm and larger below slab and encase in 75 mm concrete envelope.

.1 Provide 50 mm of sand over concrete envelope below floor slab.

3.7 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

3.8 CLEANING

.1 Proceed in accordance with Section 01 74 00 – Cleaning and Waste Management.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA C22.2 No. 94.1:15(R2020), Enclosures for Electrical Equipment, Non-Environment Considerations.

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA 250-2020, Enclosures for Electrical Equipment (1000 Volts Maximum).

.3 The Munsell System of Colour Notation

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00- Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for electrical cabinets and enclosures and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for electrical cabinets and enclosures for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location, off ground indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect electrical cabinets and enclosures from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Enclosure constructed with 2.7mm thick minimum steel, with weather and corrosion resistant finish to CSA C22.2 No. 94.1 and NEMA 250 latest edition, Munsell Notation 7.5GY3.5/1.5, size as indicated.

.2 Entire enclosure to be capable of withstanding maximum impact force of 86 MN/m^2area without rupture of material.

.3 Removable enclosure panels with formed edges, galvanized steel external fasteners removable only from inside enclosure.

.4 Equip enclosure with hot dipped galvanized mounting rails 1m adjustable horizontally and vertically to enable mounting of equipment at any location within housing.

- .1 Rails: 14 mm holes and 50 x 14 mm slots on 100 mm centres for horizontal adjustment.
- .2 Holes in side panel flanges in 60 mm increments for vertical adjustment.

.5 Cover: tamperproof, bolt-on, domed to shed water.

.6 Door: 3-point latching, with padlocking means.

.7 Ventilation panel constructed to allow air circulation yet preventing entry of foreign objects, wild life, and vermin.

.8 Door interlocks:

.9 Enclosure construction such as to allow configuration of single or ganged enclosures.

.10 Enclosure capable of being shipped in knocked-down condition.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for electrical cabinet and enclosure installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate in presence of Consultant and/or Owners Representative.
- .2 Inform Consultant and/or Owners Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant and/or Owners Representative.

3.2 INSTALLATION

.1 Assemble enclosure in accordance with manufacturer's instructions and securely mount on building structure with channels, supports and fastenings.

.2 Mount equipment in enclosure.

.3 Label electrical cabinets and enclosure to Section 26 05 00 - Common Work Results for Electrical.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 – Cleaning and Waste Management.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 – Cleaning and Waste Management.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 00 – Cleaning and Waste Management.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA C22.2 No.42:10(R2020), General Use Receptacles, Attachment Plugs and Similar Devices.

.2 CAN/CSA C22.2 No.42.1-13(R2022), Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

.3 CSA C22.2 No.55:15(R2020), Special Use Switches.

.4 CAN/CSA-C22.2 No.111-18, General-Use Snap Switches (Tri-national standard, with UL 20 and NMX-J-005-ANCE)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00- Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for wiring devices and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario of Canada

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for wiring devices for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and Section 01 61 00- Common Product Requirements.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect wiring devices from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 SWITCHES

.1 20A, 120 V and 347 V, single pole, double pole, three-way, four-way switches to: CSA C22.2 No.55 and CSA C22.2 No.111-18.

.2 Manually-operated general purpose AC switches with following features:

- .1 Terminal holes approved for No. 10 AWG wire.
- .2 Silver alloy contacts.
- .3 Urea or melamine moulding for parts subject to carbon tracking.
- .4 Suitable for back and side wiring.
- .5 White toggle.

.3 Toggle operated locking fully rated for tungsten filament LED and fluorescent lamps, and up to 80% of rated capacity of motor loads heating loads.

.4 Switches of one manufacturer throughout project.

2.2 RECEPTACLES

.1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA C22.2 No.42.1 with following features:

- .1 White urea moulded housing.
- .2 Suitable for No. 10 AWG for back and side wiring.
- .3 Break-off links for use as split receptacles.
- .4 Eight back wired entrances, four side wiring screws.
- .5 Triple wipe contacts and rivetted grounding contacts.

.2 Single receptacles CSA type 5-15 R, 125 V, 15 A, U ground with following features:

- .1 White urea moulded housing.
- .2 Suitable for No. 10 AWG for back and side wiring.
- .3 Four back wired entrances, 2 side wiring screws.

.3 Other receptacles with ampacity and voltage as indicated.

.4 Receptacles of one manufacturer throughout project.

2.3 SPECIAL WIRING DEVICES

.1 Special wiring devices:

- .1 Clock hanger outlets, 15 A, 125 V, 3 wire, grounding type, suitable for No. 10 AWG for installation in flush outlet box.

2.4 COVER PLATES

.1 Cover plates for wiring devices to: CSA C22.2 No.42.1.

.2 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.

.3 Plastic white cover plates, thickness 2.5 mm thick cover plates for wiring devices mounted in flush-mounted outlet box.

.4 Sheet metal cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.

.5 Weatherproof double lift spring-loaded cast aluminum cover plates, complete with gaskets for duplex receptacles as indicated.

.6 Weatherproof spring-loaded cast aluminum cover plates complete with gaskets for single receptacles or switches.

2.5 SOURCE QUALITY CONTROL

.1 Cover plates from one manufacturer throughout project.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wiring devices installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Consultant and/or Owner Representative.

.2 Inform Consultant and/or Owner Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Consultant and/or Owner Representative.

3.2 INSTALLATION

.1 Switches:

.1 Install single throw switches with handle in "UP" position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location.

.3 Mount toggle switches at height as indicated in accordance with Section 26 05 00 Common Work Results for Electrical.

.2 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles at height as indicated in accordance with Section 26 05 00-Common Work Results for Electrical.

.3 Where split receptacle has one portion switched, mount vertically and switch upper portion.

.4 Install GFI type receptacles as indicated.

.3 Cover plates:

.1 Install suitable common cover plates where wiring devices are grouped.

.2 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 – Cleaning and Waste Management.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 – Cleaning and Waste Management.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 00 – Cleaning and Waste Management.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.3 Repair damage to adjacent materials caused by wiring device installation.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.

.2 Product Data:

.1 Provide fuse performance data characteristics for each fuse type and size.

.3 Shop Drawings:

.1 Provide shop drawings in accordance with Section 01 33 00- Submittal Procedures.

.2 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Ship fuses in original containers.

.2 Do not ship fuses installed in switchboard.

.3 Store fuses in original containers in moisture free location storage cabinet.

.4 Waste Management and Disposal:

.1 Separate waste materials for recycling in accordance with Section 01 74 19- Waste Management and Disposal.

1.4 EXTRA MATERIALS

.1 Provide maintenance materials in accordance with Section 01 78 00- Closeout Submittals.

.2 Three spare fuses of each type and size installed above 600A.

.3 Six spare fuses of each type and size installed up to and including 600A.

Part 2 Products

2.1 FUSES - GENERAL

.1 Fuse type references L1, L2, J1, R1, etc. have been adopted for use in this specification.

.2 Fuses: product of one manufacturer.

2.2 FUSE TYPES

.1 Class L fuses.

.1 Type L1, time delay, capable of carrying 500% of its rated current for 10 s minimum.

.2 Type L2, fast acting.

.2 Class J fuses.

.1 Type J1, time delay, capable of carrying 500% of its rated current for 10 s minimum.

.2 Type J2, fast acting.

.3 Class R -R fuses.

.1 Type R1, (UL Class RK1), time delay, capable of carrying 500% of its rated current for 10 s minimum, to meet UL Class RK1 maximum let-through limits.

.2 Type R2, time delay, capable of carrying 500% of its rated current for 10 s minimum.

.3 Type R3, (UL Class RK1), fast acting Class R, to meet UL Class RK1 maximum let-through limits.

.4 Class C fuses.

2.3 FUSE STORAGE CABINET

.1 Fuse storage cabinet, manufactured from 2.0mm thick 750aluminum mm high, 600mm wide, 300mm deep, hinged, lockable front access door finished in accordance with Section 26 05 00- Common Work Results for Electrical.

Part 3 Execution

3.1 INSTALLATION

.1 Install fuses in mounting devices immediately before energizing circuit.

.2 Ensure correct fuses fitted to physically matched mounting devices.

.1 Install rejection clips for Class R fuses.

.3 Ensure correct fuses fitted to assigned electrical circuit.

.4 Where UL Class RK1 fuses are specified, install warning label "Use only UL Class RK1 fuses for replacement" on equipment.

.5 Install spare fuses in fuse storage cabinet.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA C22.2 No. 5-16(R2021), Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00- Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for circuit breakers and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Include time-current characteristic curves for breakers with ampacity of 100A and over with interrupting capacity of 22,000 A symmetrical (rms) and over at system voltage.

.4 Certificates:

.1 Prior to installation of circuit breakers in either new or existing installation, Contractor must submit in PDF format copies of a production certificate of origin from the manufacturer. Production certificate of origin must be duly signed by factory and local manufacturer's representative certifying that circuit breakers come from this manufacturer and are new and meet standards and regulations.

.1 Production certificate of origin must be submitted to Consultant and/or Owners Representative for approval.

.2 Delay in submitting production of certificate of origin will not justify any extension of contract and additional compensation.

.3 Any work of manufacturing, assembly or installation to begin only after acceptance of production certificate of origin by Consultant and/or Owners Representative. Unless complying with this requirement, Consultant and/or Owners Representative reserves the right to mandate manufacturer listed on circuit breakers to authenticate new circuit breakers under the contract, and to Contractor's expense.

.4 Production certificate of origin must contain:

.1 Manufacturer's name and address and person responsible for authentication. Person responsible must sign and date certificate.

.2 Licensed dealer's name and address and person of distributor responsible for Contractor's account.

.3 Contractor's name and address and person responsible for project.

.4 Local manufacturer's representative name and address. Local manufacturer's representative must sign and date certificate.

.5 Name and address of building where circuit breakers will be installed:

.1 Project title: [_____]

.2 End user's reference number: [_____]

.3 List of circuit breakers: [_____]

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and Section 01 61 00- Common Product Requirements.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store circuit breakers in dry location off ground indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect circuit breakers from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 BREAKERS GENERAL

.1 Circuit breakers, accessory high-fault protectors Moulded-case circuit breakers, ground-fault circuit-interrupters: to CSA C22.2 No. 5.

.2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.

.3 Common-trip breakers: with single handle for multi-pole applications.

.4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.

.1 Trip settings on breakers with adjustable trips to range from 3-8 times current rating.

.5 Circuit breakers with interchangeable trips as indicated.

.6 Circuit breakers to have minimum interrupting capacity as noted on the drawings.

2.2 THERMAL MAGNETIC BREAKERSDESIGN A

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.3 MAGNETIC BREAKERS DESIGN B

.1 Moulded case circuit breaker to operate automatically by means of magnetic tripping devices to provide instantaneous tripping for short circuit protection.

2.4 CURRENT LIMITING AND SERIES RATED THERMAL MAGNETIC BREAKERS DESIGN C

.1 Thermal magnetic breakers with current limiters.

.1 Time current limiting characteristics of fuses limiters coordinated with time current tripping characteristics of circuit breaker.

.2 Co-ordination to result in interruption by breaker of fault-level currents up to interrupting capacity of breaker.

.2 Series rated breakers to be manufacturer tested and listed. Breakers to be applied following manufacturer's guidelines and accepted best practice.

.1 Breakers applied following manufacturer's guidelines and accepted best practice.

2.5 SOLID STATE TRIP BREAKERS DESIGN D

.1 Moulded case circuit breaker to operate by means of solid-state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, long time, instantaneous, short time tripping and for groundphase fault short circuit protection.

2.6 OPTIONAL FEATURES

.1 Include: as noted on the drawings

.1 Shunt trip.

.2 Auxiliary switch.

.3 Motor-operated mechanism c/w time delay unit.

.4 Under-voltage release.

.5 On-off locking device.

.6 Handle mechanism.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Consultant and/or Owners Representative.

.2 Inform Consultant and/or Owners Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant and/or Owners Representative.

3.2 INSTALLATION

.1 Install circuit breakers as indicated.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 – Cleaning and Waste Management.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 – Cleaning and Waste Management..

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 00 – Cleaning and Waste Management.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group

.1 CAN/CSA-C22.2 No.4:16(R2020), Enclosed and Dead-Front Switches (Tri-National Standard, with ANCE NMX-J-162-2004 and UL 98).

.2 CSA C22.2 No.39-13(R2022), Fuseholder Assemblies.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00- Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions in PDF format, printed product literature and data sheets for disconnect switches - fused and non-fused and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect disconnect switches - fused and non-fused from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 DISCONNECT SWITCHES

.1 Fusible, Horsepower rated and Non-fusible, disconnect switch in CSA enclosure size.

.2 Provision for padlocking in off switch position by locks.

.3 Mechanically interlocked door to prevent opening when handle in ON position.

.4 Fuses: size as indicated, in accordance with Section 26 28 13.01- Fuses - Low Voltage.

.5 Fuseholders: relocatable and to CSA C22.2 No.39 suitable without adaptors, for type and size of fuse indicated.

.6 Quick-make, quick-break action.

.7 ON-OFF switch position indication on switch enclosure cover.

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00- Common Work Results for Electrical.

.2 Indicate name of load controlled on size 4 nameplate.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for disconnect switches - fused and non-fused installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Consultant and/or Owners Representative.

.2 Inform Consultant and/or Owners Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant and/or Owners Representative.

3.2 INSTALLATION

.1 Install disconnect switches complete with fuses if applicable.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 – Cleaning and Waste Management.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 – Cleaning and Waste Management.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 00 – Cleaning and Waste Management.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group (CSA):

.1 CSA C22.2 No.250.2:20 Lighting Systems.

.2 CSA C22.2 No.37:20, Decorative Lighting Products.

.3 CSA-E598-2-17-98 (R2017), Luminaires

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Provide complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by consultant.

.3 Photometric data to include: VCP Table where applicable and spacing criterion.

.3 Quality Assurance Submittals: Provide in accordance with Section 01 40 00 - Quality Requirements

.1 Manufacturer's Instructions: Submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures, etc.

1.3 QUALITY ASSURANCE

.1 Provide mock-ups in accordance with Section 01 40 00 - Quality Requirements

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, and handle materials in accordance with manufacturer’s written instructions

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Packaging Waste Management: In accordance with Section 01 74 10 – Cleaning and Waste Management.

.4 Divert unused metal materials from landfill to metal recycling facility.

.5 Disposal and recycling of fluorescent lamps as per local regulations.

.6 Disposal of old PCB filled ballasts.

Part 2 Products

2.1 FINISHES

.1 Light fixture finish and construction to meet ULC listing [s] and CSA certification [s] related to intended installation.

2.2 OPTICAL CONTROL DEVICES

.1 As indicated in luminaire schedule.

2.3 LUMINAIRES

.1 As indicated in luminaire schedule.

Part 3 Execution

3.1 INSTALLATION

.1 Locate and install luminaires as indicated.

.2 Provide adequate support to suit ceiling system.

.3 Co-ordinate general purpose room lighting fixture, joists and diffuser layout with mechanical contractor and general contractor. Submit co-ordination drawing to Engineer for approval.

.4 Refer to Architectural Reflected Ceiling Plans for exact location of luminaires.

.5 Provide lamps in all luminaires.

.6 Lamps shall be guaranteed for the rated lamp life.

3.2 WIRING

.1 Connect luminaires to lighting circuits:

.1 Install flexible or rigid conduit for luminaires as indicated.

.2 Size conductors for a maximum of 2% voltage drop.

.3 Connect to control circuits as per detail. Obtain programming sequence from owner.

3.3 LUMINAIRE SUPPORTS

.1 For luminaires mounted in suspended ceilings, support luminaires independently of ceiling using S-link chain.

.2 Support luminaires mounted in continuous rows once every 1.0 metre.

.3 Suspended luminaires to have continuous mounting channel

3.4 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted in continuous rows to form straight uninterrupted line.

.2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

3.5 CLEANING

.1 Remove all debris and tools form the site due to the carrying out of this contract. Leave the site in a neat and clean manner suitable to the Engineer.

.2 Clean in accordance with Section 01 74 00 – Cleaning and Waste Management.

.3 Waste Management: Perform in accordance with Section 01 74 00 – Cleaning and Waste Management.

3.6 Tests

.1 Test each individual luminaire and verify that all lamps are clean and operational.

.2 Verify that each ballast is functioning with-in manufactures operating criteria. Replace all noisy or faulty ballasts.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group (CSA):

.1 CSA C22.2 No.141-[10], Emergency Lighting Equipment

.2 CSA C860-[11(R2016)], Performance of Internally-Lighted Exit Signs

.2 National Fire Protection Association (NFPA):

.1 NFPA 101-[2024], Life Safety Code

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Submit WHMIS SDS - Safety Data Sheets.

.4 Quality Assurance Submittals: Submit the following in accordance with Section 01 40 00 - Quality Requirements

.1 Instructions: Submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures, etc.

Part 2 Products

2.1 STANDARD UNITS

.1 Exit Lights: To CSA C22.2 No.141 and CSA C860

.2 Housing: extruded, aluminium minimum 1.3mm(.51 in.) thick with satin white enamel finish.

.3 Face and back plates: extruded aluminium 2mm(.78 in.).

.4 Light source: light emitting diodes (LED) 25 year long life lamps.

.5 Power source: 120 VAC or 347 VAC and 12 VDC or 24 VDC to match existing.

.6 Running man pictograph and arrows shown on drawings.

.7 Power supply assembly to be low loss, low noise high power factor transformer type encapsulated ballast for 347 volt units.

.8 Power consumption: 1 watts.

.9 Face plate to remain captive for maintenance.

2.2 DESIGN (X1)

.1 Wall and end to wall as indicated.

.2 Single and double face with arrows indicating exit directions as indicated.

.3 Wireguard where indicated with "G" or "WG" beside unit.

.4 Lexan guard where indicated with "LG" beside units.

Part 3 Execution

3.1 INSTALLATION

.1 Install exit lights to manufacturer's recommendations, listing requirements, NFPA standard and local regulatory requirements

.2 Mount exit luminaire independent of T-bar ceiling. Caddy clips and wood bracing not acceptable.

.3 Connect fixtures to exit light circuits as indicated.

.4 Exit lighting wiring to be in separate conduit system.

.5 Connect emergency lamp sockets to emergency circuits from existing emergency lighting battery unit .

.6 Ensure that exit light circuit breaker is locked in 'on' position.

.7 To each exit outlet box as to what AC circuit and battery unit is fed from.

3.2 CLEANING

.1 Perform in accordance with Section 01 74 00 – Cleaning and Waste Management.

END OF SECTION