

APPENDIX G1 - SPECIFICATIONS

SPECIFICATIONS

PROJECT: 2206 TECUMSEH PUBLIC SCHOOL
ALTERATIONS 2026
MISSISSAUGA, ONTARIO

OWNER: PEEL DISTRICT SCHOOL BOARD

CONSULTANT: MG ARCHITECTS INC.
18 KUHL AVENUE
TORONTO, ONTARIO M9B 5X9

SUBCONSULTANTS:

STRUCTURAL: VX ENGINEERING INC.
2500 – 135 MARLEY AVENUE
TORONTO, ONTARIO M6B 4C6

MECHANICAL AND ELECTRICAL: RYBKA ELLARD WILLSON INC. 23
270 LESMILL ROAD, UNIT 410
TORONTO, ONTARIO M3B 3P6

CONSULTANT'S PROJECT NUMBER: 2206

DATE: MARCH, 2026

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1. DESIGNATED SUBSTANCES

- .1 A designated substances survey has been carried out by OHE Consultants who have issued the following:
 - .1 “Pre-Renovation Hazardous Building Materials Survey. Renovation Project Tecumseh Public School”, OHE project No. 31844, dated January 2026.
 - .2 Report is hereby offered in good faith for general information and guidance. The Consultant assumes no responsibility for completeness and accuracy of report.

2. EXISTING BUILDING INFORMATION

- .1 Existing building archived record drawings can be accessed through the link below:
<https://www.dropbox.com/sh/a9xiw26nxf5jppa/AABP570tPROI9kflZZ7QsKiCa?dl=0>
Records in file: *T03 TECUMSEH PARK E S LOC 258*

END

SECTION 01 19 00 - GENERAL REQUIREMENTS

1.1 GENERAL REQUIREMENTS

- .1 Division 1 requirements apply to all Sections of Work.

1.2 SUMMARY OF WORK

- .1 Provide all items, articles, materials, services and incidentals, whether or not expressly specified or shown on Drawings, to make finished work complete and fully operational, consistent with the intent of the Contract Documents.
- .2 Provide all work indicated in Contract Documents, regardless whether located within or outside Board's property lines.
- .3 The following work is not included in this Contract:
 - .1 Work designated N.I.C.

1.3 PRODUCTS SUPPLIED BY BOARD

- .1 Where products are supplied by Board for incorporation into the work do the following:
 - .1 Receive, unload and handle products at site; pay demurrage charges if unloading is delayed.
 - .2 Promptly inspect delivered products, and give written report to Board and Consultant on condition of all items received.
 - .3 Store and protect products until required for installation.
 - .4 Install, connect and finish products as required.
 - .5 Remove packaging material from site and clean products.
 - .6 Commission products as required.

1.4 DIVISION OF WORK

- .1 Work specified in the Specification has been divided into technical Sections for the purpose of ready reference. Division of work among Subcontractors and suppliers is solely the Contractor's responsibility and Consultant assumes no responsibility to act as an arbiter to establish subcontract limits between Sections or Divisions of work.

1.5 METRIC PROJECT

- .1 This project is based on The International System of Units (SI). Measurements are expressed in metric (SI) units and depending on the progress made in the various sectors of the industry are either hard or soft converted units.
- .2 All metric units specified shall be taken to be the minimum acceptable unless otherwise noted.
- .3 It is the Contractor's responsibility to check and verify with manufacturers and suppliers on the availability of materials and products in either metric or imperial sizes.
- .4 Where a material or product cannot be obtained in the metric size specified, provide the next larger imperial size available.
- .5 Where both metric and imperial sizes or dimensions are shown, the metric size or dimension shall govern.

1.6 SAFETY AND SECURITY

- .1 Be responsible for security of all areas affected by work of this Contract until taken over by Board.

SECTION 01 19 00 - GENERAL REQUIREMENTS

Take steps to prevent entry to the Work by unauthorized persons and guard against theft, fire and damage by any cause.

- .2 Provide suitable surveillance equipment and/or employ guard services, as required to adequately protect the Work.
- .3 Maintain fire protection for work. Store paints and volatile substances in a separate and controlled location and inspect frequently. Inspect temporary wiring, drop cords, extension cables for defective insulation or connections frequently. Remove combustible wastes frequently. Prohibit smoking anywhere on site, inside building and outside.
- .4 Do not cut, bore or sleeve through any loadbearing member, new or existing without Consultant's written authorization, unless specifically indicated on Drawings.

1.7 USE OF SITE

- .1 Accept full responsibility for assigned work areas from the time of Contract award until Substantial Performance of the Work.
- .2 Check means of access and egress, rights and interests which may be interfered with. Do not block lanes, roadways, entrances or exits. Direct construction traffic and locate access to site as directed by municipality.
- .3 Where encroachment beyond property limits is necessary make arrangement with respective property owners.

END

SECTION 01 31 13 - PROJECT COORDINATION

1.1 PRE-CONSTRUCTION MEETING

- .1 Immediately prior to construction, upon notification attend at location of Board's choice, pre-construction meeting, along with authoritative representatives of certain key subcontractors as specifically indicated in the conference notice.
- .2 Purpose of meeting is as follows:
 - .1 Review project communications procedures.
 - .2 Review contract administration requirements including submittals, payment and change order procedures.
 - .3 Identify all critical points on construction schedule for positive action.
 - .4 Identify any product availability problems and substitution requests.
 - .5 Establish site arrangements and temporary facilities.
 - .6 Review Consultant's inspection requirements.
 - .7 Review any points which, in Board's, Consultant's and Contractor's opinion, require clarification.
- .3 The Consultant shall organize and chair the pre-construction meeting. Consultant shall record minutes of pre-construction meeting and distribute a copy to each participant within ten days of meeting.

1.2 SITE MEETINGS

- .1 Prior to the commencement of the Work, the Contractor together with the Consultant shall mutually agree to a sequence for holding regular site meetings.
- .2 Organize and chair site meetings. Ensure that persons, whose presence is required, are present and that relative information is available to allow meetings to be conducted efficiently.
- .3 Once a month or more often if directed by Consultant include review with Consultant and Board of construction schedule and application for progress payment, during or immediately following site meeting.
- .4 Record minutes of each meeting and promptly distribute copies to be received by all participants not later than seven days after meeting has been held. Distribute minutes of meetings to all Consultants, whether in attendance or not.

1.3 SUPERVISION

- .1 Employ an experienced and qualified supervisor who shall be in complete charge of the Work from commencement to final completion of the Work and who shall be present at the site whenever work is being carried out. A working foreperson will not be acceptable. The supervisor shall not be changed after commencement of work without the Consultant's approval.
- .2 Supervise, direct, manage and control the work of all forces carrying out the Work, including subcontractors and suppliers. Carry out daily inspections to ensure compliance with the Contract Documents and the maintenance of quality standards. Ensure that the supervisory staff includes personnel competent in supervising all Sections of Work required.
- .3 Arrange for sufficient number of qualified assistants to the supervisor as required for the proper and efficient execution of the Work.

1.4 DOCUMENTS ON SITE

- .1 Contractor's field office shall at all times contain a complete set of Contract Documents (Drawings,

SECTION 01 31 13 - PROJECT COORDINATION

Schedules and Specifications) with all addenda, site instructions, change orders, reviewed shop drawings and samples, colour schedule, paint materials schedules, hardware list, progress reports and meeting minutes.

1.5 INTERFERENCE AND COORDINATION DRAWINGS

- .1 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the spaces provided.
- .2 Prepare drawings to indicate coordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus, and connections are coordinated.
- .3 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance are indicated on drawings.
- .4 Within 4 weeks of Contract award submit interference drawings to Consultant for review.

1.6 SLEEVING AND INSERT SETTING DRAWINGS

- .1 Prepare sleeving drawings for work of Divisions 21 to 28, showing size and location of all penetrations through load bearing elements. Submit sleeving drawings to Consultant for review not less than 15 days prior to construction of affected elements.
- .2 Prepare insert setting drawings for work to be cast into concrete and / or mortared into masonry elements. Submit insert setting drawings in the form of a transparency and 4 prints to Consultant for review not less than 15 days prior to construction of affected elements.

END

SECTION 01 32 00 - PROJECT PROGRESS DOCUMENTATION

1.1 CONSTRUCTION SCHEDULE

- .1 Within 14 days of Contract award, submit in electronic format acceptable to Consultant, Contractor's critical path construction schedule, using suitable computer scheduling software, such as "MS Project" or "Primavera".
- .2 Schedule proposed by the Contractor shall be based on the following assumptions:
 - .1 Critical path base line is considered by Contractor as reasonable and achievable.
 - .2 Schedule is based on resources which have been committed for this project by Contractor and will be readily available when needed.
 - .3 Schedule is based on normal range of weather conditions, as documented by official weather records.
 - .4 Float belongs to Project.
- .3 Set up format to permit plotting of actual construction progress against scheduled progress.
- .4 Schedule shall show:
 - .1 Commencement and completion dates of Contract.
 - .2 Commencement and completion dates of construction stages/phases, if any.
 - .3 Commencement and completion dates of each trade. Major trades shall be further broken down as directed by Consultant; generally follow Specification format.
 - .4 Order and delivery dates for major or critical equipment.
 - .5 Critical dates for shop drawing/sample submissions.
 - .6 Any other information relating to orderly progress of Contract, considered by Contractor or Consultant to be pertinent.
- .5 Submit copy of schedule showing actual progress, to Consultant once a month, concurrently with application for payment. Consultant, together with Contractor, shall review construction progress once a month during or immediately following regular site meeting, or more often as directed by Consultant.
- .6 Update construction schedule, whenever changes occur, in manner and at times acceptable to Consultant. Include with each update a written report of activity progress reflected in the revised critical path schedule, and the corrective actions which have been or are to be taken to maintain progress on the schedule in the future, anticipated delay, resource availability, schedule changes, and work to be completed in the next 2 month period.
- .7 Plot actual construction progress on schedule at least once a week.

1.2 CASH FLOW CHART

- .1 Within 7 days after award of Contract, submit, in form approved by Consultant, cash flow chart broken down on a monthly basis in an approved manner. Cash flow chart shall indicate anticipated Contractor's monthly progress billings from commencement of work until completion.
- .2 Update cash flow chart whenever changes occur to scheduling and in manner and at times satisfactory to the Consultant.

1.3 PROGRESS RECORD

- .1 Maintain on site, permanent written record of progress of work. Record shall be open to inspection by Consultant at all times and copy shall be furnished to Consultant upon request.

SECTION 01 32 00 - PROJECT PROGRESS DOCUMENTATION

- .2 This record shall show weather conditions, dates of commencement, progress and completion of various trades and items of work. Particulars pertaining to erection and removal of forms, pouring of concrete, installation of roofing and other critical or major components as well as number of employees of various trades and type and quantity of equipment employed daily, shall be noted.
- .3 Display a copy of the construction schedule in the site office from start of construction to completion. Superimpose actual progress of work on schedule at least once each week.

1.4 AS BUILT DRAWINGS

- .1 Obtain and keep on site at all times a complete and separate set of black line white prints.
- .2 Note clearly, neatly, accurately and promptly as the work progresses location of services, piping, conduits, ductwork embedded in concrete/masonry and underground services below building and outside of building.
- .3 Accurate location, depth, position, size and type of concealed and underground services, both inside and outside of building shall be included as part of these as-built drawings.
- .4 As-built drawings shall be available for review at each site meeting.
- .5 Refer to Section 01 77 00 for requirements on submission of as-built drawings.

1.5 PRODUCT DELIVERY CONTROL

- .1 It is the responsibility of the Contractor to ensure that the supplier or distributor of materials specified or alternatives accepted, which he intends to use, has materials on the site when required. The Contractor shall obtain confirmed delivery dates from the supplier.
- .2 Provide equipment delivery schedule, coordinated with construction and submittals' schedule, showing delivery dates for major and/or critical equipment.
- .3 The Contractor shall contact the Consultant immediately upon receipt of information indicating that any material or item, will not be available on time, in accordance with the original schedule, and similarly it shall be the responsibility of all subcontractors and suppliers to so inform the Contractor.
- .4 The Consultant reserves the right to receive from the Contractor at any time, upon request, copies of actual purchase or work orders of any material or products to be supplied for the work.
- .5 If materials and products have not been placed on order, the Consultant may instruct such items to be placed on order, if direct communication in writing from the manufacturer or prime suppliers is not available indicating that delivery of said material will be made in sufficient time for the orderly completion of the Work.
- .6 The Consultant's review of purchase orders or other related documentation shall in no way release the Contractor, or his subcontractors and suppliers from their responsibility for ensuring the timely ordering of all materials and items required, including the necessary expediting, to complete the work as scheduled in accordance with the Contract Documents.

END

SECTION 01 33 00 - SUBMITTALS

1.1 GENERAL

- .1 Unless specified or directed otherwise, make all submissions to the Consultant at his office.
- .2 Make all submissions required by the Contract Documents with reasonable promptness and in orderly sequence so as to cause no delay in the work.
- .3 Arrange and pay for delivery to and return from Consultant of all submittals.

1.2 RELATED REQUIREMENTS

- .1 Make the following submissions in accordance with requirements specified elsewhere:
 - .1 Applications for payment: General Conditions
 - .2 WSIB certificates of clearance: General Conditions
 - .3 Insurance certificates: General Conditions
 - .4 Bonds: General Conditions
 - .5 Interference drawings: Section 01 31 13
 - .6 Sleeving and insert drawings: Section 01 31 13
 - .7 Construction schedule: Section 01 32 00
 - .8 Cash flow chart: Section 01 32 00
 - .9 Equipment delivery schedule: Section 01 32 00
 - .10 Purchase order documentation: Section 01 32 00
 - .11 Waste audit and reduction plans: Section 01 41 00
 - .12 Maintenance and operations data: Section 01 77 00
 - .13 As-built drawings: Section 01 77 00
 - .14 Maintenance materials: Section 01 77 00

1.3 SCHEDULE OF VALUES

- .1 Submit schedule of values in accordance with requirements of General Conditions.
- .2 Follow specifications table of contents as basis for degree of breakdown required. Show breakdown for different construction phases/stages if required by Consultant.
- .3 Break down cost for large items of work as directed by Consultant.
- .4 Provide additional cost breakdown information if requested by Consultant.

1.4 SCHEDULE OF SUBMITTALS

- .1 Within 15 days of submission of construction schedule submit a schedule of submittals for shop drawings, samples, lists of materials and other documentation requiring Consultant's review.
- .2 For each item requiring submission and review show anticipated date of submission and critical date for return of reviewed submission.
- .3 Design sequence of submissions to reflect requirements of construction schedule.

SECTION 01 33 00 - SUBMITTALS

- .4 Allow up to 15 days for Consultant's review for each submission/resubmission. Stagger submissions as much as possible to permit adequate review time for each item submitted. If several submissions are made at the same time or within a short time of each other, indicate order of priority in which submissions should be reviewed.
- .5 Include sufficient time to permit corrections and resubmission, if necessary, without affecting construction schedule.

1.5 PRODUCT DATA

- .1 Submit product data sheets, required by Contract Documents, and others as may be reasonably required by Consultant.
- .2 Submit product data sheets in digital or printed hardcopy form and in accordance with the following requirements:
 - .1 Show detailed comprehensive information on products to be used.
 - .2 Clearly identify product/model number on data sheets containing multiple products.
 - .3 Supplement manufacturers/distributor's standard schematics, diagrams, brochures data sheets, catalogue sheers, charts and other descriptive data as required to give a clear understanding of the properties of the product and how product is to be incorporated into project.

1.6 SHOP DRAWINGS

- .1 Submit shop drawings required by Contract Documents, in accordance with requirements of General Conditions.
- .2 Prepare shop drawings in metric measurements only. Shop drawings containing imperial measurements will be rejected.
- .3 Provide shop drawings bearing seal and signature of professional engineer licensed to practice in Ontario where required. Shop drawings submitted without required seal and signature will be rejected and returned to Contractor without review.
- .4 Submit a digital copy of each shop drawing required, unless otherwise directed by the Consultant:
- .5 After review Consultant will return the marked up digital copies to the Contractor. Contractor shall obtain and distribute the necessary number of copies for each shop drawing.
- .6 Shop drawings which require the approval of a legally constituted authority having jurisdiction shall be submitted by Contractor to such authority for approval. Such shop drawings shall receive final approval of authority having jurisdiction before Consultant's final review.
- .7 No work requiring a shop drawing submission shall be commenced until the submission has received Consultant's final review. Do not use any shop drawing, erection drawing or setting drawing which does not bear the stamp and signature of the Consultant.
- .8 The Consultant's review is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean that the Consultant approves the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and this review shall not relieve the Contractor of his responsibility for meeting the requirements of the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of the work of all subtrades.

1.7 SAMPLES

SECTION 01 33 00 - SUBMITTALS

- .1 Submit samples required by Contract Documents and as directed by the Consultant.
- .2 Unless indicated otherwise submit samples in duplicate.
- .3 Where colour selection is required submit manufacturer's full colour range for specified product line.
- .4 Submit samples with identifying labels bearing material or component description, manufacturer's name and brand name, Contractor's name, project name, location in which material or component is to be used, and date.
- .5 Prepay any shipping charges involved for delivering samples to destination point and returning to point of origin if required.
- .6 No work requiring a sample submission shall be commenced until the submission has received Consultant's final review.

1.8 REQUESTS FOR INFORMATION (RFI'S)

- .1 Submit RFI's only after a thorough review has determined that the required information is not included in the Contract Documents.
- .2 Submit RFI's in a timely manner so as not to cause any delay and leaving sufficient review time for the Consultant.
- .3 The Consultant will identify each RFI with the time and date received and assign an anticipated review time of one to five working days depending on the complexity of the matter under review, applied consecutively.
- .4 The Consultant will review RFI's in the order received, unless, upon Contractor's request, the Consultant agrees to prioritize the review of a particular RFI, adjusting the review time accordingly.
- .5 The Consultant will advise the Contractor within the assigned review time with one of the following responses:
 - .1 Information requested is included in the Contract Documents.
 - .2 A site instruction will be issued.
 - .3 A change notice will be issued.
 - .4 A change directive will be issued.

END

SECTION 01 35 00 - SPECIAL PROJECT REQUIREMENTS

1.1 OPERATIONAL LIMITATIONS

- .1 Contractor's use of site will be limited to areas agreed before construction start.
- .2 At all times restrict access, parking, material deliveries, execution of work, operations and procedures to agreed locations and times and do not deviate from agreed procedures without prior approval by Consultant.
- .3 Periodically review proposed construction operations with the Board and Consultant and co-operate as required to ensure that the Board's interests and requirements are not unduly compromised.
- .4 Do not execute work adjacent and/or above occupied areas except where it can be demonstrated that adequate protective devices are in place.
- .5 Separate work and storage areas from Board occupied areas in accordance with requirements specified in Section 01 50 00 and as indicated below. Where work is executed in stages, rearrange hoardings as required to suit each phase.
 - .1 Exterior locations: chain link or wire mesh fence.
 - .2 Interior location: fire rated, sound and dustproof partition.
- .6 Work causing discomfort to school occupants due to noxious fumes/odours, including but not necessarily limited to the following shall be carried out outside regular school hours, as directed by the Board.
 - .1 Hot bituminous substances
 - .2 Liquid applied coatings
- .7 Diesel powered equipment shall not be used inside building.
- .8 Prevent spread of dust and noxious fumes, odours to occupied areas. Volatile substances shall not be used during regular school hours.
- .9 Prevent disruption of existing life safety systems in occupied areas including fire detection and alarm systems, fire protection systems, exits, emergency lighting. Comply with "Guidelines for Maintaining Fire Safety During Construction in Existing Buildings" issued by the Office of the Fire Marshal, dated January 2003, attached hereinafter.
- .10 Comply with requirements contained in "Site Safety Protocol for Occupied Buildings" by the Peel District School Board, attached hereinafter. In case of conflict between these requirements and other requirements contained in the Contract Documents, the more stringent requirements shall apply.
- .11 Workers are not permitted inside unassigned school areas except by prior arrangement and with the approval of school.
- .12 Where work is permitted to be carried out within unassigned spaces take the following action upon completion of each authorized work period:
 - .1 Restore disturbed surfaces by patching, covering, painting, finishing as directed by Consultant.
 - .2 Remove construction materials, equipment and tools.
- .13 Work area access during the period of school occupancy may be arranged through the arena entrance, subject to coordination with the user (City of Mississauga)
- .14 Work during the school operations, i.e. before the summer vacation, may be conducted after school hours and on the weekends. Separations of the work area from the existing facility, including required fire separations, must be maintained at all times.

SECTION 01 35 00 - SPECIAL PROJECT REQUIREMENTS

1.2 CUTTING NEW OPENINGS

- .1 Prior to cutting any new openings into/through existing reinforced concrete elements, conduct radar survey, or other type of non-destructive survey, of areas to be cut, to locate presence of reinforcing steel, conduits and other embedded items. Make adjustment in locations to be cut, to avoid embedded items. Surveys employing x-ray technique may only be carried out when building is unoccupied.
- .2 Provide minimum 72 hours' notice prior to scanning.
- .3 After scanning and before coring submit a written review and approval of proposed coring by a professional engineer licensed to practice in Ontario.

1.3 ALTERATIONS, MATERIALS AND WORKMANSHIP

- .1 Cut, alter, relocate, modify existing work as required to accommodate new work.
- .2 Materials used in patching, making good and refinishing of existing construction and/or components shall be of a standard equal to that specified for new construction and if not specified, equal to or exceeding that of original existing work.
- .3 Quality of workmanship employed in alterations work shall be equal to that specified for new work if not specified, equal to or exceeding original existing work.
- .4 Existing materials and equipment which are to be used in new work shall be repaired and refinished as necessary or additional new materials and components required shall be provided to facilitate reinstallation of such existing materials and equipment.
- .5 As part of the work of this Section, remove and relocate, or temporarily remove and reinstall, existing materials and equipment as required to complete work of the Contract.
- .6 Make good by restoring to original condition, existing construction, equipment, materials, finishes, features, not scheduled for alterations but damaged or disturbed due to work of this Contract.
- .7 Prepare existing surfaces scheduled to receive new finish by grinding, filling, overcoating, washing, etching, shot blasting or other chemical or mechanical means, as required to ensure satisfactory installation of new finish.
- .8 Unless otherwise detailed finish new surfaces flush with existing surfaces. Make junctions between existing and new work, or at replaced or remedial work visually undetectable. Make surfaces adjacent to one another of the same material, unit sizes, colour, and texture. If this is impossible, make a proposal of intended method of making good for approval, before proceeding.
- .9 Where existing work, penetrating floors and/or roofs, has been removed, patch floors and/or ceilings to match existing construction.

1.4 EXISTING SERVICES

- .1 Ensure that existing services (including but not limited to hot and cold water, drainage, power, heating, ventilation, cooling, life safety and security systems) required for occupied areas are not damaged or interrupted. Reconfigure, relocate, extend, modify existing services as required, to maintain services.
- .2 Should existing services be accidentally disrupted, make complete restoration immediately and ensure adequate protection to avoid future disruption.
- .3 Where existing building security system is breached due to Contractor's negligence, Contractor shall be responsible for any damage or theft of school property, regardless if area where damage or theft occurred is under Contractor's control or not.
- .4 Schedule required disruptions of services to occupied areas during school holidays, weekends or nights. Notify the Board minimum 48 hours prior to executing any work which would disrupt services to

SECTION 01 35 00 - SPECIAL PROJECT REQUIREMENTS

occupied areas and obtain permission to proceed. Restore systems to their proper operating condition at the end of each interruption.

1.5 DESIGNATED SUBSTANCES

- .1 Designated substances (as defined by Bill 208 of the Occupational Health and Safety Act), except those identified by the Board prior to submission of Tenders are not known to exist in Contractor's work area.
- .2 If, in the execution of the Work, any designated substances or PCB containing materials other than those previously identified, are encountered, cease work in area affected and inform Consultant immediately. Do not proceed with work in areas affected until receiving instructions from Consultant.

1.6 PROTECTION

- .1 Keep area of work safe and secure at all times, denying access to unauthorized personnel.
- .2 Protect existing work from damage. Make good any damage caused.
- .3 Ensure that no part of the existing structure is overloaded due to work executed under this Contract.
- .4 Take special measures when moving heavy loads or equipment. Protect floors, jambs and soffits of openings used as passageways or through which materials are moved. Use rubber tired conveyances only when moving materials and equipment inside building. Provide suitable coverings as required to protect existing work.
- .5 Provide adequate guards, barricades and other temporary protection to prevent injury to persons.
- .6 Protect existing building interiors from damage by weather, when executing work which affects integrity of exterior walls and roof. Schedule activities during dry periods and/or provide temporary weatherproof closures to protect openings made in exterior walls and roof. At no cost to the Board, replace interior finishes damaged by weather as a result of the Work of this Contract.
- .7 Prevent spread of dust and noxious fumes, odours to unassigned areas. Comply with Consultant's directions concerning noise and dust control. Wrap ends of inactive exhaust/return air ducts in assigned work areas air tight. At active ducts install temporary HEPA filters to prevent dust from entering ducts.

1.7 TEMPORARY USE OF EXISTING FACILITIES

- .1 Existing facilities such as water and electrical power may be utilized by Contractor for temporary use; make arrangements with the Board and follow Board's directions with regard to such use.
- .2 Provide power cords, hoses and other devices as required to convey power/water from points where it is available to points where it is required.

END

GUIDELINES FOR MAINTAINING FIRE SAFETY DURING CONSTRUCTION IN EXISTING BUILDINGS

The following typical conditions usually arise during construction and could present serious unsafe conditions in case of a fire emergency.

1. Closing of Exits

All exits, including stairways and exterior doors to the outside, serving the existing building must be maintained. Where an exit is blocked off or deleted due to construction activities, an acceptable alternative exit must be provided. Where it is absolutely necessary for access to be gained through the construction area to an exit, the access must be clearly defined and protected so that it is separated from the construction area by a reasonable smoke tight fire separation equivalent to ¾ hour fire-resistance rating.

2. Intersecting Corridors – Existing Corridors on Occupied Floor Areas Exposed to New Corridors Under Construction

Temporary fire separations of steel studs and gypsum board construction equivalent to ¾-hour fire-resistance rating must be erected. Where access is desired, the opening must be protected by a door of solid core wood or hollow steel construction equipped with self-closing and latching hardware. Should such temporary fire separations cut off or eliminate required access to exits, alternative access must be provided.

3. Fire Department Access

The location of a building addition and the construction activities must not obstruct the access roadways designated for fire department equipment. If it is necessary that existing access be obstructed or deleted, alternative access, acceptable to the fire department, must be pre-planned and provided prior to commencement of construction. Sentence 3.2.5.2. (6) of the Ontario Building Code provides the design criteria for required access routes.

4. Control of Combustible Materials

The stockpiling of construction materials adjacent to the existing building must be carefully controlled. Article 2.4.2.1. of the Fire Code prohibits such storage where the materials create a fire hazard to the existing building or its occupants. Materials stored and equipment used in portion of the building under construction could create a fire hazard; for instance, the storage of excessive amounts of foam plastic insulation or the placement of open flame portable heating appliances. The control of combustibles on a construction site is also regulated under the *Occupational Health and Safety Act*.

5. Exposure of Construction in Progress to Existing Occupied Areas

Existing exterior walls with windows of plain glazing when exposed to construction in progress must be protected by 5/8" gypsum board on suitable framing for the duration of the construction. Other openings in the existing exterior walls such as doors, louvers, etc. must be similarly protected or replaced with doors of solid core wood or hollow steel construction.

6. Openings Created Through Floors or Other Fire Separations

Openings in existing floor assemblies and vertical fire separations necessitated by installation of equipment systems or construction in general must be temporarily sealed with fire barrier materials such as mineral wool or other noncombustible insulation.

7. Modification and Extension to Existing Fire Alarm Systems

Maintaining the fire alarm system in operating condition during the construction of the addition will require careful planning especially when the extension to the fire alarm system is carried out in phases.

A technical representative from the fire alarm manufacturer should be assigned to the project to coordinate the different stages of the extension. Whenever a changeover time occurs, which is an outage time of a least a portion of the fire alarm system, the municipal fire department must be notified of the temporary shutdown and alternative measure must be devised.

8. Shutdown of Fire Protection Systems

Where temporary shutdown of sprinkler systems, standpipe systems or other fire protection systems is necessary due to alterations, repairs or extensions, the appropriate requirements in the Fire Code must be observed. See Article 1.1.1.2., Clause 2.8.2.1.(1)(g), Subsections 6.4.1 and 6.5.2.

9. Fire Safety Plan

Depending on the nature of the construction, it may become necessary to modify the fire emergency procedures required under the Fire Safety Plan, subsection 2,8.2 of the Fire Code. Such changes may be of a temporary nature to accommodate revised exits, modifications to the fire alarm system operation, etc. in which case, the procedures must be returned to the original format at the completion of the project. In some cases, permanent revisions to the emergency procedures are required when the construction is completed.

Materials and closures in the temporary fire separations mentioned in the able are suggested examples only. Other materials acceptable to this Office may, of course, be used. Should there be questions arising from any of the able situations, this Office should be informed and consulted to ensure that minimum life safety will be maintained. We would like to point out that partial occupancy of a building is regulated under Subsection 2.4.3. of the Building Code and comes under the authority of the Municipal Building Department.

January 2003

1.1 Description

- .1 This Section outlines the mandatory minimum Health and Safety protocols for all renovation, addition and new school construction Projects where all or a portion of the existing school building remains occupied and in use.
- .2 These Health and Safety protocols are mandatory minimum requirements, procedures and standards that the Peel District School Board insists are fully complied with by all parties involved with Peel District School Board Projects.

1.2 Related Sections

- .1 These specifications apply to all Divisions of this Project specification. It is the responsibility of the Contractor to apply these provisions wherever practical within specification limits to all products and services used on this Project.
- .2 The requirements of this Section supersede those of all other specification Sections and Drawings. Where conflicts exist in procedures, methods or materials, they shall immediately be brought to the attention of the Consultant and Board Project Manager. Where clarification is not immediately available, the Contractor shall assume the specifications contained in this Section are a minimum standard and the more stringent specification shall apply.
- .3 The Contractor must receive approval from Board Project Manager for any deviations from this specification Section.
- .4 The Contractor shall recognize that it is *he* who is the Constructor of the Project. The General Contractor shall also recognize that he is solely responsible for site safety at the Place of the Work and compliance with the requirements of this Section does not limit or remove his total responsibility for site safety as Constructor of the Project.

1.3 References

- .1 Applicable related regulations, standards and laws related to safety include but are not limited to:
 - .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
 - .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
 - .3 Province of Ontario
 1. Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. [1990 June 2002].

1.4 Compliance Specification

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- .1 Notwithstanding the requirements of this Section, the Contractor must comply with all applicable health, safety and environmental regulations and statutes.

1.5 Beyond Compliance Specification

- .1 These specifications apply in addition to all applicable health, safety and environmental compliance regulations. They are incorporated here to reflect the Board's intention to develop a specification which provides the safest practical procedures and policies for construction project sites that are occupied and in use by staff, students and visitors during the execution of the Construction Contract.
- .2 Beyond compliance specifications recognize that performance well beyond the minimum regulatory standard is often desirable, possible and affordable, often with no cost or low cost options. It also recognizes that application methods or protocols may be as important as the material specified. Therefore, these specifications cover both material and methods.
- .3 These provisions apply to both indoor and outdoor applications equally.

1.6 Application of Compliance Requirements

- .1 The articles set out herein are to be applied together as a set of related policies and procedures to achieve a comprehensive Health and Safety working protocol.
- .2 The Contractor shall execute all of the procedures and meet all of the requirements set out herein and apply these protocols from the outset of the Construction Phase.
- .3 These procedures or requirements are to be maintained for the duration of the Construction Phase. The Contractor shall not discontinue any of the individual procedures or requirements without the prior approval of the Board Project Manager.

1.7 Site Supervisor (Site Superintendent)

- .1 A full-time Site Supervisor (Site Superintendent) is required for each site at any site, regardless of the number of active workers on site.
- .2 Site Superintendent shall have as a minimum:
 - .1 Recent, previous experience with renovation or addition projects involving occupied buildings including (but not limited to) school construction, sites with students, tenants, employees, retail customers, pedestrian and vehicular traffic.
 - .2 Successful completion of a multi-session Supervisor's training course conducted by a recognised Construction Association in Ontario.
- .3 Site Superintendent must carry a cell phone at all times during construction with the ability to be reached directly during all work hours and the ability to have voicemail recorded during all non-work hours including weekends and holidays.

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- .4 Site Superintendent must have means of live phone or walkie-talkie communication with the site Flagman during all work hours.
 - .5 Site Superintendent shall not be changed throughout project unless confirmed and approved by the Board Project Manager.

1.8 Ontario Occupational Health & Safety Act and Regulations for Construction Projects

- .1 General Contractor to comply with the Ontario Occupational Health & Safety Act and Regulations for Construction Projects, latest edition– including all amendments.
- .2 Beyond compliance in item .1 above, regardless of the number of labourers active on the Project, the Contractor shall form a contractors’ Health & Safety Committee at the outset of construction. This Committee shall then follow the standard requirements for such a Committee as set out in the *Occupational Health & Safety Act and Regulations for Construction Projects*.

1.9 On-Site Communications

- .1 At the outset of the project the General Contractor shall provide to the Board Project Manager all relevant contact information for the Site Superintendent, GC Project Manager and key sub-contractors including names and cell phone numbers.
- .2 The General Contractor shall provide at least one “emergency contact” telephone number at which the Contractor’s representative can be reached directly during all work hours and have the ability to have voicemail recorded during all non-work hours including weekends and holidays. As outlined below, this may be designated to the Site Superintendent’s cell phone number.
- .3 Regardless of compliance method for the emergency contact telephone number stated above, the Site Superintendent must carry a cell phone at all times during construction with the ability to be reached directly during all work hours and the ability to have voicemail recorded during all non-work hours including weekends and holidays.
- .4 Site Superintendent must have means of live phone or walkie-talkie communication with the site Flagman during all work hours.
- .5 The Contractor is to ensure that the Board Project Manager is immediately apprised of any safety issues as each arises and the related request and/or resolution. The Board Project Manager is responsible for any decisions that have an effect on the contract execution.
- .6 Notwithstanding the reporting to the Project Manager noted above the Site Superintendent shall liaise with school principal or designate on all safety related matters as required on a daily basis.
- .7 In the event of a safety issue requiring contractual clarification or action (i.e. Change Notice, etc.), the contractor shall ensure that, where applicable, the action is followed up with appropriate documentation.

1.10 Full-Time On-Site Flagmen

- .1 A full-time, designated Flagman is required at all vehicular construction entrances when school is occupied (not required during summer vacation).
- .2 In the event there is more than one entrance to the hoarded/fenced construction area, there must be a separate Flagman for each entrance.
- .3 Flagman may not be same person as Site Superintendent or other construction worker.
- .4 Flagman shall not be changed throughout the Project unless confirmed and approved by the Board Project Manager.
- .5 Flagman must have means of phone communication with Site Superintendent (phone or walkie-talkie).
- .6 The Flagman shall not be designated for any other duties than to act as a Flagman for safety purposes as described herein.
- .7 The Flagman shall meet and escort any construction traffic from the site entrance into and out of the hoarded/fenced construction area (including through open site areas until entrances to hoarding).
- .8 The Flagman shall only open hoarded areas when construction traffic moves through and immediately re-close gates.
- .9 The Flagman shall control construction parking at the school site (including vehicles parking or traveling in unauthorized areas).
- .10 The location of the Flagman shall be set to ensure the safe guarding of staff, student, and pedestrian traffic.
- .11 If not designated on the Contract Documents, the location of the Flagman shall be confirmed with the Board Project Manager and Consultant at the outset of the project and before the placement of hoarding and fencing.
- .12 Where the Contractor deems it necessary, in order for the Flagman to carry out the required full-time duties, the cost of a temporary shelter shall be included in the Tender Price.
- .13 The Flagman shall be properly attired to carry out his duties, including the use of safety equipment (e.g. wear reflective vest, have appropriate traffic hand-held "Stop" sign and have a visible identification tag).

1.11 Site Safety Signage

- .1 Standardised Safety Signage is required at all construction entrances. Refer to detail drawings for types and requirements.
- .2 If not designated on the Contract Documents, the location of the Safety Signage shall be confirmed with the Board Project Manager and Consultant at the outset of the Project and before the placement of hoarding and fencing.
- .3 Safety Signage is to be posted at all street entrances to school site and at each entrance to hoarded/fenced construction area.

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- .4 Total surface area of signage is to avoid exceeding municipal standards that would require a separate signage permit.
 - .5 Access signage text shall include cell phone contact number for Site Superintendent.
 - .6 Signage posted at gates shall state restrictions on hours of entry and egress as described in the Contract Documents and under no circumstances shall construction traffic be allowed within 30 minutes prior to school start, during recess, lunch break, and 30 minutes after dismissal periods.

1.12 Access/Egress Controls

- .1 At the outset of the Contract, the General Contractor shall advise all suppliers and subcontractors of the protocols listed herein and of the requirement to contact the Site Superintendent by Cell phone prior to entering the site.
- .2 The drivers of all construction vehicles entering the site, including delivery vehicle drivers, are to contact site Superintendent by cell phone prior to entering site; the Site Superintendent shall, in turn, give notice to the Flagman to be aware of the traffic and authorize the Flagman to allow entry of that vehicle.
- .3 Vehicular Gates are only for entry and exit of for construction purposes such as construction personnel, Authorities performing inspections, Board representative, delivery personnel, and disposal pickup and ONLY under escort by the Flagman. As such vehicular gates must remain closed and locked at all times and only opened for access/egress under escort by the Flagman, then closed and locked again.
- .4 Gates are to be lockable swing gates for vehicles and man gates at all access points to the hoarded/fenced construction area.

1.13 Contractor Parking

- .1 Contractor parking shall be restricted to hoarded areas or designated parking areas only where pre-approved by Board Project Manager and Principal.
- .2 Contractor parking is restricted from all off-site street areas that interfere with site specific parent drop-off and parking areas.

1.14 Required Preconstruction Meetings

- .1 Meeting 1: Contractor shall receive approval from the Architect and the Board Project Manager for parking, vehicular movement, access/egress strategies at a Pre-construction meeting taking place in advance of mobilising on site.
- .2 Meeting 2: Once hoarding and fencing is erected BEFORE site construction is fully active and vehicles or equipment is mobilised on site, an initial site meeting shall take place at which time the layout of trailers and staging, deliveries, storage of materials, parking areas and vehicular movement to be reviewed and approved by the Board Project Manager.
- .3 See article 1.17- 'Site Meetings' following.

1.15 Construction Fencing and Hoarding

- .1 Construction hoarding requirements shall be a site based decision to be determined by the Architect and the Board Project Manager at the design stage and shown on Contract Documents.
- .2 No fencing or hoarding shall be less than a continuous 1800 mm high.
- .3 In portions of the site where chain link is approved, it shall be continuous 1800 mm high chain link fencing, wire-tied to staked iron 'tees' at max. 2400 mm on centre - OR - leased, modular 'quick fencing' if staked down and wire tied together.
- .4 All fenced and hoarded areas to be gated with lockable vehicular and man gates- minimum construction to be steel rail and chain link construction.
- .5 Plastic snow fencing is NOT permitted.
- .6 All hoarding and fencing shall be maintained in a stable condition, for duration of construction period as part of the base contract price and to include Superintendent's inspection at the beginning and end of each work day.
- .7 All Fire Routes to be outside all fenced and hoarded areas and maintained clear at all times.
- .8 'Covered way' protection shall be provided when accesses or pathways are in proximity to construction, in accordance with Ministry of Labour *Occupational Health & Safety Act* Regulations.

1.16 Peel District School Board Health, Wellness & Safety Department Representative

- .1 A representative of the Board's Health, Wellness & Safety Dept. ('Environment, Health and Safety Officer') may visit site at any anytime throughout the duration of the Contract to review the site, as it relates to the safety of the occupied areas of the site. Such site review shall neither constitute an inspection or approval for the Contractor.
- .2 Concerns or issues identified by the representative from the Board's Health, Wellness & Safety Dept. shall be communicated through the Board Project Manager and the school Principal for corrective action.
- .3 Contractor shall ensure full access to all site areas, at all times, for the Board's Health, Wellness & Safety Department Representative.

1.17 Site Meetings

- .1 Initial site meeting to take place after erecting fencing and hoarding but prior to the mobilisation of any vehicles, equipment or start of Work.
- .2 Contractor shall ensure that the Board Project Manager, School Principal and a representative of the Board's Health, Wellness & Safety Department and the School Principal attend the initial site meeting.

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- .3 The initial meeting shall review and approve a standardised agenda for all site meetings and a thorough review of the Site Safety Protocol.
 - .4 The standardised agenda shall include a Checklist and Report of Health and Safety items at the beginning of the agenda. This Checklist shall be included and each item reviewed at all site meetings for the duration of the project.
 - .5 The Checklist of Site Safety items shall include but not be limited to:
 - .1 Contractor's report of site safety record and report of recent site activities, precautions or actions.
 - .2 Review any visits to the site and actions required by Ministry of Labour or Board Health, Wellness & Safety representatives or other Authorities Having Jurisdiction.
 - .3 Contractor's Health & Safety policy manual posted in site trailer.
 - .4 Copy of Ministry of Labour *Occupational Health & Safety Act and Regulations for Construction Projects* in site trailer.
 - .5 Name of General Contractor H&S representative.
 - .6 Continuing compliance with Safety Signage.
 - .7 Hoarding & fencing layout and condition.
 - .8 Access and egress measures and any breaches of requirements.
 - .9 Confirmation of communications link between Site Superintendent & Flagman.
 - .10 Work that may produce any noxious odours and the containment measures, (*i.e.*: schedule, type, approvals required therefore).
 - .11 Copies of Material Safety Data sheets in site trailer.
 - .12 Complete meeting minutes including details of Safety Checklist shall be copied to Architect, Board Project Manager and Principal.
 - .6 Contractor to produce record of written Memorandum to all subtrades and suppliers detailing but not limited to: hours of delivery; site access procedures and restrictions; use of existing facilities.
 - .7 Contractor to prepare detailed and accurate written record of all meetings to be kept and issued to all parties.

1.18 Contractor's Health and Safety Committee Meetings

- .1 As required in item 1.8, the Contractor shall form a Health and Safety Committee, hold meetings and record minutes of meetings for the duration of the Contract.
- .2 Contractor to maintain a copy of Health & Safety Committee minutes on site for review by Ministry of Labour or Board representative(s).

END

SECTION 01 41 00 - REGULATORY REQUIREMENTS

1.1 PERMITS, LICENCES, FEES

- .1 Comply with requirements of General Conditions
- .2 Where permits, licences and inspection fees are required by authorities having jurisdiction for specific trade functions, they shall be obtained by particular subtrade responsible for that work.
- .3 Review building permit set with Consultant immediately following receipt of building permit and jointly determine whether or not changes to Contract are required.
- .4 Be responsible for ensuring that no work is undertaken which is conditional on permits, approvals, reviews, licences, fees, until all applicable conditions are met. No time extension will be allowed for delay in obtaining necessary permits.
- .5 Report to the Consultant in writing any condition which would prohibit granting of any permit or approval before work affecting such items is commenced.
- .6 Give notice of completion of project prior to occupancy, as required by applicable legislation.

1.2 BUILDING CODE, BY-LAWS, REGULATIONS

- .1 Carry out work in accordance with requirements of the Ontario Building Code, latest issue, including all amendments and revisions.
- .2 Comply with requirements, regulations and ordinances of other jurisdictional authorities.
- .3 Where it is necessary to carry out work outside property lines, such as sidewalks, paving or concrete curbs, comply with applicable municipal requirements.
- .4 Promptly submit written notice to Consultant, of observed variance of Contract Documents from requirements of Building Code and authorities having jurisdiction. Assume responsibility for work known to be contrary to such requirements and performed without notifying Consultant.

1.3 CONSTRUCTION SAFETY

- .1 Comply with requirements of General Conditions.
- .2 Be governed by pertinent safety requirements of Federal or Provincial Governments and of municipal bodies having authority, particularly the Ontario Construction Safety Act, and regulations of Ontario Ministry of Labour, and work in conjunction with proper safety associations operating under the authority of Ontario Workplace Safety and Insurance Act.
- .3 Do not, in the performance of the work, in any manner endanger the safety or unlawfully interfere with the convenience of the public.
- .4 Notify the Ontario Ministry of Labour of intended work of this Contract as required by the Occupational Health and Safety Act. One copy of the "Notice of Project" shall be handed to Consultant.
- .5 Comply with Construction Safety Requirements by Peel District School Board, attached hereinafter (2 pages). In case of conflict between these requirements and other requirements contained in the Contract Documents, the more stringent requirements shall apply.

1.4 FIRE PROTECTION

- .1 Refer to technical Sections of Specifications and Drawings for fire protection requirements.
- .2 Test methods used to determine fire hazard classification and fire endurance rating shall be as required by Ontario Building Code.
- .3 Upon request, furnish Consultant with evidence of compliance with project fire protection requirements.

SECTION 01 41 00 - REGULATORY REQUIREMENTS

- .4 Materials and components used to construct fire rated assemblies and materials requiring fire hazard classification shall be listed and labelled, or otherwise approved, by fire rating authority. Labelled materials and their packaging shall bear fire rating authorities label showing product classification.
- .5 Fire rated door assemblies shall include doors, frame, anchors and hardware and shall bear label of fire rating authority showing opening classification and rating.
- .6 Materials having a fire hazard classification shall be applied or installed in accordance with fire rating authority's printed instructions.
- .7 Fire rated assemblies shall be constructed in accordance with applicable fire test report information issued by fire rating authority. Deviation from fire test report will not be allowed.
- .8 Construct fire separations as continuous, uninterrupted elements except for permitted openings. Extend fire rated walls and partitions from floor to underside of structural deck above.
- .9 Fill and patch voids and gaps around openings and penetrations in and at perimeter of assemblies so as to maintain continuity and to produce a fire resistant smoke tight seal, acceptable to jurisdictional authorities and Consultant.

1.5 HAZARDOUS MATERIALS

- .1 Comply with provisions of the Occupational Health and Safety Act as amended to include WHMIS (Workplace Hazardous Materials Information System).
- .2 Ensure that Safety Data Sheets (SDS) are available on site prior to first delivery to site of any controlled material or substance, including but not necessarily limited to the following:
 - .1 Lead-free solder.
 - .2 Resilient flooring.
 - .3 Sealants/caulking materials.
 - .4 Painting and finish materials.
 - .5 Glues and adhesives.
 - .6 Any other products which may give off air borne particles during and/or after installation.
- .3 Maintain on site for duration of Contract a hazardous materials log containing all required SDS.
- .4 Log shall be open for inspection for Owner, Consultant and all personnel on site.
- .5 Ensure that workers are instructed in the purpose and content of SDS.
- .6 The following shall not be used in the work of this Contract:
 - .1 Asbestos and asbestos containing materials.
 - .2 Solder containing lead.
 - .3 Paint/coating materials containing lead and/or mercury.
- .7 Refer to Section 01 77 00 for requirements on Certificates of Compliance.

1.6 WASTE MANAGEMENT

- .1 Comply with regulatory requirements governing waste management.

SECTION 01 41 00 - REGULATORY REQUIREMENTS

- .2 Prepare and submit waste audit, waste reduction and source separation plans in accordance with applicable regulatory requirements.

END

CONSTRUCTION SAFETY

- .1 The Contractor and all his trades must observe and enforce construction safety measures required by Canadian Construction Safety Code, Workplace Safety & Insurance Board (formerly known as Worker's Compensation Board), and Municipal statutes. In particular, the Ontario Construction Safety Act, the regulations of the Ontario Department of Labour and Ontario Hydro Safety Requirements shall be strictly enforced. In the event of conflict between any provisions of above authorities the most stringent provisions will apply.
- .2 The Contractor is reminded, once again, that it is he who is responsible for Occupational Health and Safety on this Project. The items listed below are only guidelines of the Board's expectations in this regard and not to be construed to be comprehensive or total in nature.
- .3 The Board will take every reasonable precaution to prevent injury or illness to students, employees and the public, participating in Board activities, or performing their duties. This shall be accomplished by providing and maintaining a safe, health working environment by providing the education necessary to perform these activities or duties safely.
- .4 The Board is vitally interested in the health and safety of all contractors and their workers performing work for the Board. Cooperation and support of the Contractor in the protection of workers from injury or occupational disease is a major, continuing object of the Board. To achieve these goals, the Board, in concert with the Contractor, will endeavour to make every effort to ensure that the Contractor provides a work site which is a safe and healthy work environment. The Board insists that the Contractor and its workers are dedicated to the continuing objective of reducing risk and injury.
- .5 The Contractor covenants and agrees to comply with all statutory and other obligations, including, without limitation, the provisions of the Occupational Health and Safety Act (Ontario) and all Regulations thereto, and all amending and successor legislation, including without limitation, Bill 208 (the "Act") in connection with all work performed by either the Contractor, Subcontractors, or any Other Contractor on, or in connection with, the Project.
- .6 Without limiting the foregoing, for the purposes of this Contract, the Contractor agrees that he shall be the "constructor" of the Project within the meaning of the Act, and as such, shall assume all the obligations and responsibilities, and observe all construction safety requirements and procedures, and duties of inspection imposed by the Act on the "constructor", as therein defined, for all work and services performed by the Contractor, Subcontractors and Other Contractors on or in connection with the Project.
- .7 The Contractor further covenants and agrees that the Board and its existing and former officers, trustees, employees and agents, and their respective heirs, executors, administrators, successors and assigns (hereby collectively referred to as the "Board") shall be released from any obligations or liabilities otherwise imposed on the Board, or on any of them, pursuant to the Act in connection with the Project, and that the Contractor shall assume all liability and responsibility in connection with same.
- .8 The Contractor agrees to save harmless and indemnify the Board from any losses, damages, costs and expenses of any kind, or nature whatsoever, including all legal expenses, and all defence costs and related expert or consulting fees, incurred by the Board, or any of them, arising in connection with the failure, default, or inability of the Contractor of the Board, or any of them, to comply with any of the aforementioned statutory, or other legal requirements, or arising in connection with any breach by the Contractor of any of its covenants, agreements and obligations under this Contract.
- .9 The Contractor shall inform and instruct Other Contractors that they, while performing work on this project, are under the authority of the Contractor. Other Contractors are to discuss and co-ordinate with, and follow instructions from, the Contractor on all matters of site access, vehicles, deliveries, storage, temporary facilities, coordination with the work of other subcontractors, work methods, scheduling, labour conditions, construction safety, environmental protection, security and all other matters which relate to the safe and proper execution of construction work.

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- .10 The Contractor shall ensure that all supervisory personnel on job site are fully aware of the procedures and requirements outlined above and comply with all requirements specified.
 - .11 The Contractor is responsible to ensure that all machinery and/or equipment are/is safe and that the workers perform their tasks in compliance with established safe work practices or procedures. Workers must receive adequate training in their specific work tasks to protect their health and safety.
 - .12 The Contractor shall be responsible for all persons and companies performing work, including Other Contractors, on this project, at all times, up to and including, the date of Substantial Performance of the Work. Authority for coordination and instructions relating to all matters which relate to the safe and proper execution of construction work shall rest with the Contractor. The Contract Price must include the Contractor's fees for the coordination and supervision of the work of all Other Contractors.
 - .13 In addition to the responsibility of all contractors as outlined above, Subcontractors will be held accountable for the health and safety of workers under their supervision.
 - .14 Every worker must protect his/her own health and safety by working in compliance with the law and with safe work practices and procedures established by the authorities having jurisdiction.
 - .15 All sections of the Occupational Health and Safety Act for Industrial Establishments, latest edition, and the Occupational Health and Safety Act for Construction projects, latest edition, shall be enforced, by the Contractor, in their entirety, throughout the duration of the construction project.
 - .16 The Contractor shall provide the Consultant with the telephone number where the Contractor or his representative can be reached at any time, day or night, for the duration of the contract.
 - .17 Where an accident, explosion, or fire causes a person injury at the work place, and the worker is disabled from performing the usual task, the Contractor shall prepare a written notice and shall forward same to the Ministry of Labour within four days of the occurrence with a copy to the Board's Representative, who shall copy and inform the Board's Supervisor of Health and Safety and/or the Board's Joint Health and Safety Committee, containing such information and particulars as may be described.
 - .18 Where a person is killed or critically injured from any cause at the work place, the Contractor shall immediately call the Ministry of Labour. A written notice from the Contractor within forty-eight hours after the occurrence, containing such information and particulars as may be prescribed, with copies to the Consultant and the Board's representative.
 - .19 The Contractor is advised that the accident scene is under the jurisdiction of the Ministry of Labour and no wreckage, articles, etc. shall be interred with, disturbed, destroyed, altered or carried away at the scene, or connected with the occurrence, until the Ministry of Labour has given permission.

END

SECTION 01 42 13 - ABBREVIATIONS

1.1 ABBREVIATIONS

- .1 The abbreviations listed below, when used in the Contract Documents, shall have the meanings shown.
- .2 See Drawing Abbreviations and Room Finish Schedule for additional abbreviations.

ABBREVIATION MEANING

AA	ALUMINUM ASSOCIATION
AAMA	ARCHITECTURAL ALUMINUM MANUFACTURERS' ASSOCIATION
AASHO	AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS
ACI	AMERICAN CONCRETE INSTITUTE
AGA	AMERICAN GAS ASSOCIATION
AIA	AMERICAN INSTITUTE OF ARCHITECTS
AIMA	ACOUSTICAL & INSULATING MATERIALS ASSOCIATION
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AISI	AMERICAN IRON AND STEEL INSTITUTE
AMCA	AIR MOVING AND CONDITIONING ASSOCIATION INC.
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIRCONDITIONING ENGINEERS
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AWI	ARCHITECTURAL WOODWORK INSTITUTE (USA)
AWMAC	ARCHITECTURAL WOODWORK MANUFACTURERS ASSOCIATION OF CANADA
AWS	AMERICAN WELDING SOCIETY
CCA	CANADIAN CONSTRUCTION ASSOCIATION
CCRC	CANADIAN CODE FOR RESIDENTIAL CONSTRUCTION
CEC	CANADIAN ELECTRICAL CODE
CFUA	CANADIAN FIRE UNDERWRITERS ASSOCIATION
CGA	CANADIAN GAS ASSOCIATION
CGSB	CANADIAN GENERAL STANDARDS BOARD
CIQS	CANADIAN INSTITUTE OF QUANTITY SURVEYORS
CISC	CANADIAN INSTITUTE OF STEEL CONSTRUCTION
CITC	CANADIAN INSTITUTE OF TIMBER CONSTRUCTION
CLA	CANADIAN LUMBERMEN'S ASSOCIATION
CMHC	CANADA MORTGAGE & HOUSING CORPORATION
COFI	COUNCIL OF FOREST INDUSTRIES OF BRITISH COLUMBIA
CPCI	CANADIAN PRESTRESSED CONCRETE INSTITUTE
CRCA	CANADIAN ROOFING CONTRACTORS ASSOCIATION
CSA	CANADIAN STANDARDS ASSOCIATION
CSC	CONSTRUCTION SPECIFICATIONS CANADA
CSI	CONSTRUCTION SPECIFICATIONS INSTITUTE (USA)
CSPI	CORRUGATED STEEL PIPE INSTITUTE
CSSBI	CANADIAN SHEET STEEL BUILDING INSTITUTE
CUA	CANADIAN UNDERWRITERS' ASSOCIATION
CWB	CANADIAN WELDING BUREAU
CWC	CANADIAN WOOD COUNCIL
DND	DEPARTMENT OF NATIONAL DEFENCE, CANADA
FM	FACTORY MUTUAL ENGINEERING CORPORATION
FS	FEDERAL SPECIFICATION (USA)
IES	ILLUMINATING ENGINEERING SOCIETY
IGMAC	INSULATED GLASS MANUFACTURERS ASSOCIATION OF CANADA
L TIC	LAMINATED TIMBER INSTITUTE OF CANADA
MIA	MARBLE INSTITUTE OF AMERICA
MPI	MASTER PAINTERS INSTITUTE
MPMDD	MODIFIED PROCTOR MAXIMUM DRY DENSITY
NAAMM	NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (USA)
NBFU	NATIONAL BOARD OF FIRE UNDERWRITERS
NBC	NATIONAL BUILDING CODE OF CANADA
NBS	NATIONAL BUREAU OF STANDARDS (USDC)

SECTION 01 42 13 - ABBREVIATIONS

NEMA	NATIONAL ELECTRICAL MANUFACTURERS' ASSOCIATION
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NHLA	NATIONAL HARDWOOD LUMBER ASSOCIATION (USA)
NLGA	NATIONAL LUMBER GRADES AUTHORITY
NRC	NATIONAL RESEARCH COUNCIL
OBC	ONTARIO BUILDING CODE
OHSA	OCCUPATIONAL HEALTH AND SAFETY ACT
OPSS	ONTARIO PROVINCIAL STANDARD SPECIFICATIONS
PCA	PORTLAND CEMENT ASSOCIATION
PCI	PRESTRESSED CONCRETE INSTITUTE
RAIC	ROYAL ARCHITECTURAL INSTITUTE OF CANADA
SDI	STEEL DECK INSTITUTE
SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION
SPMDD	STANDARD PROCTOR MAXIMUM DRY DENSITY
SSPC	STEEL STRUCTURES PAINTING COUNCIL
TTMAC	TERRAZZO, TILE & MARBLE ASSOCIATION OF CANADA
ULC	UNDERWRITERS' LABORATORIES OF CANADA
ULI	UNDERWRITERS' LABORATORIES, INC. (USA)
USAS	UNITED STATES OF AMERICA STANDARDS INSTITUTE
WSIB	WORKPLACE SAFETY AND INSURANCE BOARD

END

SECTION 01 45 00 - QUALITY CONTROL

1.1 INDEPENDENT INSPECTION AND TESTING

- .1 Requirements specified herein apply to independent inspection and testing specified under technical Specification Sections, Divisions 2 to 33. Board will pay out of cash allowance for independent inspection and testing services.
- .2 Requirements specified herein do not apply to the following:
 - .1 Inspection and testing required by laws, ordinances, rules, regulations and orders of public authorities.
 - .2 Testing, adjustment and balancing of mechanical and electrical systems and equipment.
 - .3 Inspection and testing performed exclusively for Contractor`s convenience.
 - .4 Tests specified in Divisions 2 to 33 inclusive, to be included in Contract such as mill tests, certificates of compliance and testing to be carried out by Contractor under direction of Consultant.
- .3 Failure by independent inspection and testing agency to detect defective work or materials shall not in any way prevent later rejection, when such defect is discovered, nor shall it obligate Consultant for final acceptance.
- .4 Independent inspection and testing agency (hereinafter referred to as testing agency) is expected to do the following:
 - .1 Act on a professional and unprejudiced basis and carry out inspection and testing functions to establish compliance with requirements of Contract Documents.
 - .2 Check work as it progresses and prepare reports stating results of tests and conditions of work and state in each report whether specimens tested conform to requirements of Contract Documents, specifically noting deviations.
 - .3 Distribute reports via e-mail in pdf format to the following:
 - .1 Board
 - .2 Consultant
 - .3 Subconsultants affected
 - .4 Contractor
 - .5 Building Department (if required by Building Department)
- .5 Testing agency is not authorized to amend or release any requirements of Contract Documents, nor to approve or accept any portion of work.
- .6 Contractor shall do the following:
 - .1 Notify testing agency minimum 48 hours in advance of operations to allow for assignment of personnel and scheduling of tests without causing delay in work.
 - .2 Provide testing agency with access to work at all times.
 - .3 Supply material samples for testing.
 - .4 Supply casual labour and other incidental services required by testing agency.
 - .5 Provide facilities for site storage of samples.
 - .6 Make good work disturbed by testing agency.
- .7 When initial inspection and testing indicates non-compliance with Contract Documents, any subsequent reinspection and retesting occasioned by non-compliance shall be performed by same

SECTION 01 45 00 - QUALITY CONTROL

testing agency and cost thereof borne by Contractor.

1.2 MOCK UPS

- .1 Where required by Contract Documents construct mock-ups of work on site, in size and at location directed by Consultant.
- .2 Construct mock-ups prior to start of affected work. Allow sufficient time for Consultant's review. Work affected by mock-ups may not commence prior to acceptance of mock-up.
- .3 Construct mock ups to include all related specified materials and workmanship. Make revisions as directed by Consultant, in accordance with intent of Contract Documents, until mock-ups are acceptable.
- .4 Mock ups, reviewed and accepted by Consultant, shall become the standard of quality against which installed work will be measured.
- .5 Mock ups, by prior arrangement, may be incorporated into finished work if approved by Consultant.

1.3 TOLERANCES

- .1 Unless specific tolerances are required by a Section of the Specifications or a referenced standard, meet the following non-accumulative tolerances for installed work:
 - .1 "plumb" shall mean plumb within ± 3 mm in 3 m of true plumb.
 - .2 "level" shall mean level within ± 3 mm in 3 m of true level.
 - .3 "square" shall mean within ± 30 seconds of true 90° .
 - .4 "straight" shall mean within ± 3 mm in 3 m under a 3 m straightedge.

1.4 BUILDING ENVELOPE

- .1 Requirements specified herein apply to all elements of the exterior building envelope.
- .2 Continuity of air barrier/vapour retarder and insulation components is critical and must be maintained at all locations. Where different systems meet, ensure proper interface and continuity between adjacent components by implementing suitable construction sequences and by using compatible materials only.
- .3 Provide control joints in exterior building components of design and spacing which will permit expansion and contraction of components without causing distortion, failure of joint seals, undue stress, cracking, bowing or other defects detrimental to appearance and performance. Review design and location of control joints with Consultant prior to start of work and follow directions given by Consultant.
- .4 Anchor exterior cladding components to structure in manner suitable to accommodate structural deflection and creep. Design anchorage to withstand expected wind loads, positive and negative, in accordance with applicable regulations.
- .5 Ensure that air spaces within exterior building components are firestopped in accordance with applicable regulations.
- .6 Ensure that air spaces on the outside of vertical air barrier/vapour retarder (walls) are constructed with adequate drainage provisions to the exterior.

1.5 DRAINAGE

- .1 Lay out and construct work to ensure that positive drainage is provided to roof drains, floor drains, site drains and catch basins, as set in their final position, preventing undrained areas and ponding.

SECTION 01 45 00 - QUALITY CONTROL

- .2 Ensure that allowable construction tolerances and structural deflection do not cause ponding of water.
- .3 Report to Consultant in writing prior to executing work affected, in case adequate drainage cannot be provided.

END

SECTION 01 50 00 - TEMPORARY FACILITIES

1.1 GENERAL

- .1 Provide all temporary facilities and controls required for the proper execution of the work.
- .2 Provide and maintain temporary systems in accordance with applicable regulations and requirements. Arrange for, obtain and pay for any permits required.
- .3 Board will operate the existing building heating, cooling and ventilation systems throughout the construction period.
- .4 Refer to Section 01 35 00 for temporary use of existing water and power.

1.2 TEMPORARY ELECTRICITY & LIGHTING

- .1 Provide temporary electrical lighting and power system (either temporary power line by local hydro utility or diesel generators) for use by all Sections.
- .2 Arrange, obtain and pay for service, including meter, of sufficient size to allow use of required tools and equipment and to ensure adequate lighting levels for the proper execution of work.
- .3 Install and maintain temporary electrical systems in accordance with the Ontario Electrical Code and other authorities having jurisdiction.

1.3 TEMPORARY HEATING

- .1 Furnish equipment, labour and fuel to provide temporary heat as required for proper execution of work.
- .2 Heat enclosed building to minimum 15°C at all times until taken over by Owner. Provide intermittent heating up to 21°C as required for proper execution of work.
- .3 Use propane or natural gas heaters of a type where the flame is not exposed. Open flame heaters are not permitted.
- .4 Uniformly distribute heat to avoid hot and cold areas and to prevent excessive drying.

1.4 TEMPORARY VENTILATION

- .1 Provide minimum 1 air change per hour for enclosed areas receiving architectural finishes.
- .2 Prior to commencement of work where hazardous or volatile adhesives, coatings or substances are used, install adequate mechanical ventilation.
- .3 Do not allow excessive build-up of moisture inside building.

1.5 TEMPORARY COMMUNICATIONS

- .1 Provide site telephone service for duration of Contract until completion.
- .2 Provide and maintain equipment on site to send and receive e-mails and other types of communications as well as provide access to the internet for duration of Contract.

1.6 TEMPORARY WATER

- .1 Provide temporary water supply, for use by all Sections.
- .2 Water shall be clean and non-staining.

1.7 TEMPORARY SANITARY FACILITIES

- .1 Provide toilet facilities, including handwash facilities, for all personnel on site.

SECTION 01 50 00 - TEMPORARY FACILITIES

- .2 Keep facilities clean and sanitary and provided with required supplies at all times.
- .3 Except where temporary sanitary facilities are connected to municipal sewer system, periodically remove wastes from site.

1.8 TEMPORARY FIRST-AID FACILITIES

- .1 Provide site equipment and medical facilities necessary to supply first-aid service to injured personnel in accordance with regulations of the Workers' Compensation Act. Maintain facilities for duration of Contract.

1.9 TEMPORARY FIRE PROTECTION

- .1 Provide and maintain in proper working order at least four fire extinguishers on each floor, prominently placed, until completion of work.
- .2 Fire extinguishers shall be minimum 9 kg 4A 60BC type.
- .3 Remove fire extinguishers from site, upon completion of work or when directed by Consultant.
- .4 Where gas welding or cutting is to be done within 3 m or above combustible material, or above space that may be occupied by persons, interpose shields of noncombustible material. Tanks supplying gases for welding or cutting shall be placed at no greater distance from the work than is necessary and shall be securely fastened in an upright position. Such tanks shall be free from exposure to the sun or high temperature.

1.10 TEMPORARY USE OF NEW PERMANENT SERVICE & EQUIPMENT

- .1 Do not use any new permanent service or equipment without Owner's written approval.
- .2 Where permission is granted to use permanent services and equipment provide competent persons to operate services and equipment; inspect frequently and maintain facilities in proper operating condition at all times.
- .3 Permanent services and equipment shall be turned over to Owner in "as new" and perfect operating condition.
- .4 Use of permanent systems and equipment as temporary facilities shall not affect the warranty conditions and warranty period for such systems and equipment. Make due allowance to ensure that Owner will receive full benefits of equipment manufacturers warranty after project takeover.

1.11 CONSTRUCTION AIDS

- .1 Provide temporary stairs, ladders, ramps required for movement and placing of materials, equipment and personnel.
- .2 Provide mechanical hoisting equipment and fully qualified operators as required during construction.
- .3 Erect required scaffolding independent of walls, arranged to avoid interference with work of other Sections as much as possible.
- .4 Provide and maintain required shoring and bracing in accordance with Construction Safety Act and other applicable regulations.
- .5 Shoring and all false work over one tier in height shall be designed and shall bear the stamp of a registered professional engineer, having experience in this field.
- .6 The use of explosive power tools will not be permitted under any circumstances unless equipped with a device which positively prevents free flight of the stud.

SECTION 01 50 00 - TEMPORARY FACILITIES

1.12 BARRIERS

- .1 Protect public and workmen from injury.
- .2 Provide and maintain required hoardings, barricades, guardrails, and lights in accordance with applicable regulations.
- .3 Unless otherwise indicated, provide around assigned exterior storage areas 1.8 m high fencing, as follows:
 - .1 Steel pipe or tee posts driven into ground minimum 1 m at maximum 3 m o.c.
 - .2 50 mm hot dip galvanized chain link mesh wire tied to posts.
 - .3 Where required, for construction access, provide hinged, lockable chain link gates.
 - .4 Relocatable wire mesh fence, such as InstaFence, may be used in lieu of chain link fence.

1.13 TEMPORARY CONTROLS

- .1 Provide protective coverings to protect work against damage caused by weather, including but not necessarily limited to rain, snow, ice, wind, frost and excessive heat.
- .2 Provide wind breaks and sun shades to allow proper setting and curing of cementitious materials.
- .3 Protect building materials from freezing. Protect built components from freezing until fully cured.
- .4 Prevent sprayed materials from contaminating air beyond application area, by providing temporary enclosures.
- .5 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.
- .6 Prevent tracking of mud and dirt from site onto paved roads. Maintain stabilized vehicle egress point (mud mat), constructed of coarse granular material. Place additional granular material as required to maintain access / egress points in proper working order. Clean mud and dirt from paved roads at end of each day by shovelling or sweeping and subsequent washing. Dispose of mud and dirt in a controlled disposal area.

1.14 PEST CONTROL

- .1 Provide rodent control and other pest control programs during construction, in accordance with requirements of jurisdictional authorities.

1.15 TEMPORARY DRAINAGE

- .1 Provide and maintain adequate temporary pumping and drainage systems to keep excavations and structures free of water. Prevent flow of surface water into excavations. Locate sumps away from foundations. Prevent pumped water from carrying soil in suspension in sufficient quantity to cause settlement of adjacent earth. Provide sufficient standby equipment to ensure continuity of pumping systems.
- .2 Control drainage on site to prevent flooding, erosion and run-off onto adjacent properties as a result of construction operations.
- .3 Dispose of water containing silt in suspension in accordance with requirements of jurisdictional authorities.
- .4 Conform to sedimentation and erosion control requirements of the authority having jurisdiction. Maintain until completion of work or until directed by Consultant to be removed, sediment control devices at perimeter of site, catch basins, drainage courses and at other locations on site as directed.

1.16 SIGNS

SECTION 01 50 00 - TEMPORARY FACILITIES

- .1 Except as specified here do not erect any signs unless approved by the Consultant.
- .2 Erect signs relating to safety on the work, or mandatory regulation notices.
- .3 Prior to commencement of work wherein hazardous or volatile cements, coatings, or substances are used, barricade entire area and post adequate number of warning signs.

1.17 FIELD OFFICE AND SHEDS

- .1 Maintain, until completion of Contract, for Contractor's use, a temporary office as required for work, large enough to accommodate site administrative activities and site meetings, complete with light, heating and cooling equipment to maintain 21°C, ventilation, equipment for sending and receiving electronic messages and providing access to internet, including printer. Provide table and chairs for site meetings. Do not store materials, tools, equipment in meeting area; keep clean and tidy.
- .2 Provide temporary covers, sheds and platforms of weatherproof construction as may be required for protection and preservation of materials, small tools, equipment which may be susceptible to damage.

END

SECTION 01 60 00 - PRODUCT REQUIREMENTS

1.1 PRODUCT QUALITY

- .1 Products supplied for work shall be new and as far as possible and unless otherwise specified, of Canadian manufacture.
- .2 Materials used for temporary facilities are not required to be new, provided they are structurally sound and in suitable and safe operating condition.

1.2 STANDARDS AND TERMINOLOGY

- .1 Where a standard has been adopted by these Specifications, incorporate minimum requirements of such standard into the work. Where requirements of Specifications are more stringent than those of the standard, follow more stringent requirements.
- .2 Reference to standards, specifications, handbooks and manufacturer's catalogues refer to latest edition thereof and all amendments or revisions applicable at bid closing date, unless date suffix is included with document number.
- .3 Wherever words "acceptable", "approved", "satisfactory", "selected", "directed", "designated", "permitted", "inspected", "instructed", "required", "submit", or similar words or phrases are used in standards or elsewhere in Contract Documents, it shall be understood, that "by (to) the Consultant" follow, unless context provides otherwise.
- .4 Where the word "provide" is used in these Contract Documents, it shall be taken to mean "supply and install" unless specifically noted otherwise.

1.3 CERTIFICATION

- .1 Building materials, components and elements specified without the use of trade or proprietary names shall meet requirements specified.
- .2 If requested by Consultant, submit evidence of meeting requirements specified. Evidence shall consist of certification based on tests carried out by an independent testing agency.
- .3 Certification based on previous tests for same materials, components or elements is acceptable. Certification shall be in form of written test reports prepared by testing agency.

1.4 AVAILABILITY AND SUBSTITUTIONS

- .1 Products which are specified by their proprietary names or by part or catalogue number form the basis for Contract. No substitutes for these may be used without Consultant's approval in writing.
- .2 Where it is found that specified materials have become unavailable for incorporating into work, notify Consultant immediately of proposed substitution.
- .3 Proposed substitution shall be any top quality product considered by Consultant to be of equal quality and value to that specified, and suitable for purpose intended.
- .4 Products proposed as substitutions, and which are considered by Consultant to be suitable for purpose intended, but which are in his opinion of lesser value and quality than those specified shall only be accepted as substitution if reasonable credits are allowed for their use.
- .5 In order to substantiate equivalency of proposed materials, products or processes, submit samples, printed product descriptions, test data, installation instructions, standards, certification, sample, - guarantee/warranty forms, list of successful projects incorporating such proposals, and similar information requested by Consultant.
- .6 Whenever a substitute is proposed, any change to contract price as a result of acceptance of proposed product shall include any adjustments to adjacent structure or space in order to accept minor differences in size or weight between proposed items and corresponding specified items.

SECTION 01 60 00 - PRODUCT REQUIREMENTS

- .7 Prevent any substitution or request for substitution from delaying construction progress in any way.
- .8 Requests for substitution resulting from failure to place orders in time will not be entertained. Be responsible for ordering products in time to ensure their required delivery; bear all costs for failure to comply with these requirements.

1.5 PRODUCT HANDLING AND STORAGE

- .1 Suitably pack, crate and protect products during transportation to site to preserve their quality and fitness for the purpose intended.
- .2 Store products in original, undamaged condition with manufacturer's labels and seals intact until they are being incorporated into completed work.
- .3 Handle and store materials in accordance with manufacturer's and supplier's recommendations and so as to ensure preservation of their quality, appearance and fitness for work.
- .4 Arrange materials so as to facilitate prompt inspection, and remove faulty, damaged or rejected materials immediately from site.

1.6 PRODUCT DELIVERY SCHEDULE

- .1 It is the responsibility of the Contractor to ensure that the supplier or distributor of materials specified or alternatives accepted, which he intends to use, has materials on the site when required. The Contractor shall obtain confirmed delivery dates from the supplier.
- .2 The Contractor shall contact the Consultant immediately upon receipt of information indicating that any product, material, item, will not be available on time, in accordance with the original schedule, and similarly it shall be the responsibility of all subcontractors and suppliers to so inform the Contractor.
- .3 The Consultant reserves the right to receive from the Contractor at any time, upon request, copies of actual purchase or work orders of any material or products to be supplied for the work.
- .4 If materials and products have not been placed on order, the Consultant may instruct such items to be placed on order, unless direct communication in writing from the manufacturer or prime suppliers is available indicating that delivery will be made in sufficient time for the orderly completion of the Work.
- .5 The Consultant's review of purchase orders or other related documentation shall in no way release the Contractor, or his subcontractors and suppliers of their responsibility for ensuring the timely ordering of all materials and items required, including the necessary expediting, to complete the work as scheduled in accordance with the Contract Documents.

END

SECTION 01 70 00 - EXECUTION REQUIREMENTS

1.1 EXAMINATION

- .1 Examine the site, existing premises and surrounding areas and be fully informed as to the conditions and limitations under which the work has to be executed. Claims for additional costs will not be entertained with respect to conditions which could reasonably have been ascertained by an inspection prior to bid closing.
- .2 Prior to commencement of work, make careful examination of previously executed work, existing conditions, levels, dimensions and clearances. Promptly advise Consultant of unsatisfactory preparatory work and substrate conditions; commencement of work implies acceptance of conditions.

1.2 PROTECTION

1. Ensure that no damage is caused to existing structures, buildings, foundations, pavement, fences, curbs, grounds, plants, property, utilities, services, finishes during the progress of Work. Repair and make good any damage caused at no extra cost to Board to the complete satisfaction of the respective property owners and authorities having jurisdiction. Do not proceed with repairs or remedial work without written permission of the Consultant. Only trades specifically capable of performing the work will be allowed to make remedial or repair work.
- .2 Keep surfaces to receive finished flooring dry and free from oil and grease. Stockpiling of damp or wet building materials and use of mixing boxes or water buckets without protecting floors from moisture gain by approved means, is prohibited.
- .3 Keep municipal roads clean of mud and debris resulting from construction traffic.
- .4 Prevent soiling of pavement due to spillage, mixing of material or any other cause. Make good any damage caused.
- .5 Protect new work from damage with suitable protective coverings.
- .6 Protect work during periods of suspension, regardless of reason for suspension.

1.3 SERVICES AND UTILITY SYSTEMS

- .1 Consult with utility companies and other authorities having jurisdiction to ascertain the locations of existing services on or adjacent to site.
- .2 Information as to the location of existing services, if shown on the Drawings, does not relieve the Contractor of his responsibility to determine the exact number and location of existing services.
- .3 Report existing unknown services encountered during excavation to Consultant for instructions; cut back and cap or plug unused services. Be responsible for the protection of all active services encountered and for repair of such services if damaged.

1.4 SLEEVES, SUPPORTS, AND FASTENERS

- .1 Unless specified in other Sections, furnish, set and secure inserts, hangers, sleeves, fasteners, adhesives, anchors and other supports and fittings required for proper installation of work.
- .2 Use exposed metal fastenings and accessories of same texture, colour and finish as base metal on which they occur.
- .3 Select appropriate type of anchoring and fastening devices and in sufficient quantity and in such manner as to provide positive permanent anchorage of unit to be anchored in position. Keep exposed fasteners to a minimum, evenly spaced and neatly laid out.
- .4 Fasteners shall be of permanent type. Do not use wood plugs.
- .5 Fasteners which cause spalling or cracking of material to which anchorage is being made shall not be used.

SECTION 01 70 00 - EXECUTION REQUIREMENTS

1.5 CONCEALMENT

- .1 Conceal ductwork, piping, conduit and wiring located in finished areas, in ceiling spaces and furred construction unless specifically noted to be exposed.
- .2 If any doubt arises as to means of concealment, or intent of Contract Documents in this connection, request clarification from Consultant before proceeding with portion of work in question.

1.6 CUTTING AND PATCHING

- .1 Regardless of which Section of work is responsible for any portion of cutting and patching, in each case tradesmen qualified in work being cut and patched shall be employed to ensure that it is correctly done.
- .2 Any cost caused by omission or ill-timed work shall be borne by party responsible therefore.
- .3 Do not endanger any work by cutting, digging or otherwise altering, and do not cut nor alter any loadbearing element without written authorization by Consultant. Provide bracing, shoring and temporary supports as required to keep construction safely supported at all times.
- .4 Cut holes carefully and not larger than required after they are located by Sections requiring them, using suitable equipment and tools.
- .5 Patching and making good work shall be undetectable in finished work.

1.7 WORKMANSHIP

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

1.8 LINES AND LEVELS

- .1 Verify all elevations, lines, levels and dimensions as indicated and report errors, any conflicts, or inconsistencies to the Consultant before commencing work or as soon as discovered.
- .2 Accurately lay out work and establish lines and levels in accord with requirements of Contract Documents.
- .3 Set up, maintain and protect permanent reference points and provide general dimensions and elevations for all Sections of Work.

1.9 DIMENSIONS

- .1 Check and verify dimensions wherever referring to work. Dimensions, when pertaining to work of another Section, shall be verified with Section concerned. Details and measurements of work which is to fit or conform with work installed shall be taken at site.
- .2 Do not scale Drawings. If there is ambiguity, lack of information or inconsistency, immediately consult Consultant for directions. Be responsible for extra costs involved through the disregarding of this notice.
- .3 Walls, partitions and screens shall be considered as extending from floor to underside of structural

SECTION 01 70 00 - EXECUTION REQUIREMENTS

deck unless specifically indicated otherwise.

1.10 LOCATION OF FIXTURES

- .1 Location of fixtures, apparatus, equipment, fittings, outlets, conduits, pipes and ducts shown or specified, but not dimensioned, shall be considered approximate.
- .2 Request direction from Consultant to establish exact location. Any relocation caused by Contractor's failure to request direction from Consultant shall be done by Contractor at no extra cost. Where job conditions require reasonable changes in indicated locations and arrangements, make changes at no additional cost.
- .3 Conserve space and coordinate with work of other Sections to ensure that ducts, pipes, conduits and other items will fit into allocated wall and ceiling spaces, while ensuring adequate space for access and maintenance.
- .4 Where ducts, piping and conduits are permitted to be exposed they shall be neatly and uniformly laid out parallel to adjacent building lines and parallel to each other where they run in the same direction. Review exposed installations with Consultant prior to start of work. At no cost to Board make changes to exposed work as directed by the Consultant where such work is not installed in accordance with Consultant's prior review.
- .5 Except where locations are specifically noted on Drawings, install exposed mechanical and electrical fixtures including outlets, switches, thermostats, panels and other items, located on walls, in orderly and neatly laid out manner, lining up with each other and grouped together where possible. Review installation with Consultant prior to start of rough-in work. Relocate at no cost to Board any work which does not meet this requirement.

END

SECTION 01 74 00 - CLEANING AND WASTE MANAGEMENT

1.1 GENERAL

- .1 Be responsible for cleanliness of assigned work areas to satisfaction of Consultant. Maintain work areas in neat and orderly condition at all times.
- .2 Periodically, or when directed by the Consultant, remove from work areas rubbish and waste materials.
- .3 Burning or burying of rubbish and waste materials on site is not permitted.
- .4 Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- .5 Use cleaning material only on surfaces recommended by cleaning material manufacturer.

1.2 CLEANING DURING CONSTRUCTION

- .1 Remove debris, packaging and waste materials frequently.
- .2 Keep dust and dirt to an acceptable level, as directed.
- .3 Remove oily rags, waste and other hazardous substances from premises at close of each day, or more often if required.

1.3 FINAL CLEANING

- .1 Upon completion of work, or, where work is phased, upon completion of each phase, thoroughly clean all surfaces and components. Provide professional cleaning by a recognized, established cleaning company, to allow Owner to complete final cleaning and floor preparation / build-up.
- .2 Remove stains, dirt and smudges from finished surfaces.
- .3 Clean exposed finished surfaces in accordance with respective material manufacturer's recommendations.
- .4 Clean mechanical and electrical fixtures and other fittings of labels, wrappings, paper and other foreign material.
- .5 Replace heating, ventilation and air conditioning filters if units were operated during construction. Clean inside of ducts, blowers and coils.
- .6 Remove from work areas all waste and surplus materials from all areas, including roofs and ceiling spaces.
- .7 Steam clean existing masonry which becomes an interior exposed wall surface.

1.4 WASTE COLLECTION AND DISPOSAL

- .1 All waste materials and debris resulting from the work of this Contract shall belong to the Contractor and shall be removed from the site and legally disposed.
- .2 Periodically, or when directed by the Consultant remove waste material and debris.
- .3 Separate and salvage materials suitable for recycling from general waste stream and transport to recognized recycling facility. Comply with O.Reg 103/94.
- .4 Burying, burning, selling waste materials on site is prohibited.
- .5 Disposal of liquid wastes into waterways, sewers is prohibited.

END

SECTION 01 77 00 - PROJECT CLOSEOUT

1.1 REFERENCE STANDARD

- .1 Comply OAA/OGCA Document No. 100-2018 "Take-Over Procedures", except as modified in these Specifications.

1.2 OPERATING AND MAINTENANCE MANUALS

- .1 Provide hard copy operation and maintenance manuals with data contained in D-ring binders with soft vinyl covers. Binders shall have clear plastic pocket at back of spine identification containing label "Operation and Maintenance Manual" and project name and volume number, if applicable. Each manual shall contain a title sheet listing project name, date and volume number and names and addresses of Contractors and Subcontractors, Consultant and Subconsultants.
- .2 Provide operating and maintenance data, prepared on 8 1/2" X 11" sheets in printed or typewritten form.
- .3 Data shall be assembled in systematic order, generally following the specification format. Provide labelled, celluloid covered tabs fastened to hard paper dividers to identify different Sections.
- .4 Provide the following material as applicable to work of this Contract:
 - .1 List of contents. If more than one volume is required, provide a cross-reference contents page at front of each volume.
 - .2 Complete list of subcontractors and suppliers, showing name, address, telephone number, e-mail address, name of contact person and description of work done.
 - .3 Complete list of products used in the work showing product name, part number or code and manufacturer for each listing; follow specification format.
 - .4 Copy of finish hardware list, complete with all amendments and revisions.
 - .5 Schedule of paints and coatings. Include sufficient explanation to fully identify each surface with the applicable paint or coating used. Enclose copy of colour schedule.
 - .6 Maintenance instructions for all finished surfaces.
 - .7 Brochures, cuts of all equipment and fixtures.
 - .8 Operating and maintenance instructions for all equipment.
 - .9 Valve manual.
 - .10 Controls schematics.
 - .11 Extended warranties.
 - .12 Maintenance contracts.
 - .13 Other data required elsewhere in Contract Documents or deemed necessary by Consultant.
- .5 In addition to hardcopy manuals specified above also provide a USB storage device containing the entire manual in digital form, arranged in same order and format as the hardcopy manuals.

1.3 EXTENDED WARRANTIES

1. Definition: Warranty = guarantee.
2. Submission Requirements:

SECTION 01 77 00 - PROJECT CLOSEOUT

- .1 Submit extended warranties as part of "Operating and Maintenance Manuals".
- .2 Arrange extended warranties in systematic order matching Specification format. Include a table of contents listing warranties in same order.
- .3 Each warranty must show:
 - .1 Name and address of Project
 - .2 Name of Owner
 - .3 Section Number and Title
- .4 All extended warranties must be presented under subcontractor's letterhead, seal and signature and must bear similar wording to that specified in Contract Documents.
- .5 Submit manufacturers' Product warranties in accordance with GC 12.3.6.

1.4 AS-BUILT DRAWINGS/RECORD DRAWINGS.

- .1 Prior to final payment submit as-built drawings specified in Section 01 32 00.
- .2 Clearly and prominently mark each drawing "AS-BUILT DRAWING prepared by _____ (name of Contractor)".
- .3 Consultant will provide electronic record drawings, to be paid out of the cash allowance when directed by the Board Assist the Consultant by providing additional information and clarifications when requested.

1.5 MAINTENANCE MATERIALS

- .1 Deliver to the location directed by Consultant maintenance materials as required elsewhere in these Specifications. Obtain receipt for delivered materials and submit copy of receipt to Consultant.
- .2 Package materials so that they are protected from damage and loss of essential properties.
- .3 Label packaged materials for proper identification of contents and project name.

1.6 OPERATING AND MAINTENANCE INSTRUCTIONS

- .1 Prior to requesting Substantial Performance, at a time acceptable to Board and Consultant, but not before operating and maintenance data has been reviewed and accepted by Consultant, instruct designated Owner's representatives in the operation and maintenance of all systems and equipment.
- .2 Arrange training sessions for each type of operating system and equipment. Sessions shall be conducted by qualified instructors and shall be of sufficient duration and depth to adequately instruct participants.
- .3 Throughout the training sessions make reference to reviewed operation and maintenance manuals to familiarize participants with the data provided.
- .4 Prepare an attendance record for each training session, to be signed by each participant upon conclusion of session. Show date and time of session, subject of session and name, title and organization of each participant. Submit a copy of each record to Consultant.
- .5 Subcontractor whose work is subject of training session and Contractor shall be represented during training session by qualified personnel.
- .6 Make digitally recorded video of each training session and provide Owner with a properly labelled copy in format directed by Consultant.

1.7 CERTIFICATES OF COMPLIANCE

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- .1 Submit Certificates of Compliance, prior to the application for Substantial Performance for each of the following items:
 - .1 An affidavit relative to the use of lead free solder for all domestic water lines, regardless of location.
 - .2 Products for which Material Safety Data Sheets have been submitted and accepted.
 - .3 Other Work/Products identified in the Contract Documents as requiring a Certificate of Compliance.
 - .4 Each Certificate of Compliance shall indicate names and addresses of the project, the Board, the date of issue, product description including name, number, manufacturer, with a statement verifying that the Work/Product installed meets specified requirements and, if applicable, complies with the submitted and accepted Material Safety Data Sheets.
 - .5 Each Certificate of Compliance shall be issued on the subcontractor's letterhead, properly executed, under whose work the respective Work/Product has been provided.
 - .6 Each Certificate of Compliance shall be endorsed by the Contractor with his authorized stamp/ signature. Ensure that submissions are made to allow sufficient time for review without delaying progress of scheduled completion.
 - .7 The Completion Security Account will not be paid to the Contractor without submission of all required affidavits and requested material and safety data sheets

1.8 INSPECTION AND ACCEPTANCE OF WORK

- .1 Prior to requesting Substantial Performance submit the following:
 - .1 3 copies (hardcopy) and a USB storage device with digital data of operating and maintenance manuals (manuals must be submitted minimum 6 weeks prior to requesting Substantial Performance).
 - .2 Inspection and acceptance certificates required from regulatory agencies.
- .2 Advise the Consultant in writing, when work has been substantially completed. If Consultant agrees that this stage has been reached, prepare a complete list of deficiencies and submit this list to Consultant.
- .3 On receipt of the above deficiency list in a satisfactory form, the Consultant, accompanied by Subconsultants, the Contractor and the Board, if deemed desirable, will carry out an inspection of the Project.
- .4 Add to the deficiency list, in accordance with Consultant's directions, any additional deficiencies which are identified during inspection and reissue updated deficiency list.
- .5 Upon completion, inspection and acceptance of work, Owner will take over and occupy completed work. Refer to Supplementary Conditions for procedures relating to certification of Substantial Performance and release of holdback. Comply with requirements of the Construction Act regarding liens and statutory holdback. In case of discrepancies between requirements of the Construction Act and requirements included elsewhere in the Contract Documents, the Construction Act shall govern.

1.9 FINAL SUBMISSION

- .1 Prior to claiming Final Payment do the following:
 - .1 Submit as-built drawings.
 - .2 Submit one complete set of reviewed shop drawings, folded to 8-1/2" x 11" size, contained in

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heavy duty manila envelopes, numbered and labelled. Follow specification format with no more than one Section per envelope.

- .3 Submit maintenance materials.
- .4 Submit a final accounting of all approved changes to the Contract Price, including adjustments to cash allowances.

1.10 BUILDING THERMOGRAPHIC SCANN

- .1 Upon completion of work, at any time during the one year warranty period, Board may arrange and pay for an independent agency to carry out a thermographic scan of the building to determine the acceptability of the thermal performance of the exterior building envelope.
- .2 Contractor shall cooperate with Consultant and testing agency to determine causes of poor performance, if any are detected.
- .3 Contractor shall carry out remedial work as required to bring the quality of any rejected portion of the building envelope to an acceptable condition. Contractor shall pay for costs of any follow-up thermographic scans required to determine acceptability of remedial work. This procedure shall be repeated until all parts of the building envelope have been accepted.

1.11 WARRANTY INSPECTION

- .1 The Contractor shall organize a warranty inspection to take place two weeks prior to the expiration of the standard one-year warranty. The Consultant, subconsultants, the Contractor, subcontractors and the Board's representatives shall attend.

END

SECTION 01 91 00 - COMMISSIONING

1.1 COMMISSIONING

- .1 The Board may appoint and pay for a commissioning agent who shall be responsible for coordinating the witnessing of the installation of rough-ins of the Mechanical, Electrical and Controls systems and equipment, the testing, start-up and the Contractors commissioning process.
- .2 The Contractor shall cooperate fully with the commissioning agent to schedule the Work to be witnessed. The Contractor shall assist the Board's staff and be responsible for coordinating all trades involved in the commissioning process.
- .3 The commissioning agent shall schedule commissioning meetings at a time interval to meet the construction schedule and issue reports. The Contractor shall attend these meetings, it should be assumed that up to two meetings a week may be required at some parts of construction. The results of the tests and the schedule of same, shall be reviewed at these meetings.
- .4 The commissioning agent shall provide supervisory services for start-up and contract commissioning which shall include, but not be limited to, the following:
 - .1 Deliver to the Contractor a testing manual which shall contain the forms to be completed by the Contractor during the testing process.
 - .2 Verify that all tests have been completed and witnessed.
 - .3 Conduct system performance tests after the Consultants have conducted their review.
 - .4 Coordinate the Contractor's and manufacturers' training and video tape sessions.
 - .5 Review system operational manuals, documentation and all system data provided by the Contractor.
 - .6 Conduct seasonal performance tests during the warranty period.
- .5 The Contractor shall refer to start-up and contract commissioning as described in Divisions 20 to 28 of the Specifications, to be carried out under the supervision of the commissioning agent.
- .6 The Contractor shall also note the requirement in Divisions 20 to 28 of the Specifications, which identify the setting aside of funds to cover the cost of the commissioning work, to be released only upon completion of the commissioning part of the contract.
- .7 The Contractor shall keep the commissioning agent informed of problems as they may occur, and the commissioning agent shall be involved, with the Consultants, in the problem solving process.
- .8 The Contractor shall ensure that training and instruction of Board staff be coordinated with the commissioning agent who may video tape the classroom and site sessions. The Contractor shall also coordinate site inspections with the commissioning agent, the Consultants and mechanical/electrical subcontractors for warranty work and first year performance visits for review of systems operation.

END

SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Temporary screens, partitions, closures and other protective devices: Sections 01 35 13 and 01 50 00
- .2 Asbestos abatement: Section 02 82 13
- .3 Disconnecting and capping of mechanical and electrical services: Divisions 20 to 28

1.3 REGULATORY REQUIREMENTS

- .1 Obtain and pay for necessary permits for work of this Section. Give required notices.
- .2 Comply with applicable requirements of CSA S350-M1980 "Code of Practice for Safety in Demolition of Structures" and jurisdictional authorities.

1.4 PROTECTION

- .1 Prevent movement, settlement, or damage of adjacent parts of building to remain. Provide shoring and bracing required. Make good any damage caused.
- .2 Take steps to positively prevent uncontrolled falling of demolished materials.
- .3 Ensure that no part of existing structure is overloaded due to work carried out under this Section.
- .4 Prevent debris from blocking drainage systems.
- .5 Ensure that temporary guards, hoardings are provided in accordance with applicable safety regulations.

1.5 EXAMINATION

- .1 Visit the site and the existing building so as to fully understand all existing conditions and extent of work required. No increase in cost or extension of performance time will be considered for failure to know conditions.
- .2 Examine structural, mechanical and electrical drawings and specifications to determine specific requirements relating to that work.
- .3 Existing building archived record drawings can be accessed through the link below:
<https://www.dropbox.com/sh/a9xiw26nxf5jppa/AABP570tPROI9kflZZ7QsKiCa?dl=0>
Records in file: *T03 TECUMSEH PARK E S LOC 258*

PART 2 - PRODUCTS Not Applicable

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Ensure that affected building areas are unoccupied and discontinued in use and that required screens, partitions are in place prior to start of demolition work.
- .2 Verify that existing services in areas affected by demolition work are disconnected, capped or removed,

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prior to start of work.

- .3 Erect and maintain protective devices to control spread of dust and to provide weather protection. Refer to Sections 01 35 13 and 01 50 00.

3.2 SALVAGE

- .1 Prior to start of general demolition carefully remove and temporarily store in protected location until required for reuse, components identified accordingly.
- .2 Prior to start of general demolition carefully remove and turn over to Owner at designated location on site, components identified accordingly.
- .3 Salvage existing carpet tile and temporarily store them until required for reinstallation at locations shown (Refer to Section 09 68 13).

3.3 DEMOLITION

- .1 Demolish existing work as indicated and as required to accommodate new work. Demolition in excess of that which is required shall be rectified by restoring, rebuilding work to its original condition at no extra cost.
- .2 Demolish and remove existing work as required to accommodate new work indicated.
- .3 Demolish work in a safe and systematic manner, from top to bottom.
- .4 Do not throw or drop demolished materials from heights. Use chutes, conveyors, or hoisting equipment to lower materials.
- .5 Demolish in a manner to minimize dusting. Keep dusty materials wetted but prevent flooding or contaminated run-off.
- .6 Demolish masonry and concrete elements in small sections. Carefully remove and lower structural framing and other heavy and large objects.
- .7 At all times, leave work in safe condition, so that no part is in danger of uncontrolled toppling or falling.

3.4 DISPOSAL AND CLEAN-UP

- .1 All materials, rubbish and debris resulting from demolition work shall become the Contractor's property and shall be removed from site and legally disposed of unless specifically indicated otherwise.
- .2 Do not allow demolished materials to accumulate on site. Promptly, as work progresses, remove and legally dispose of materials away from site.
- .3 Selling burning and burying of materials on site is not permitted.
- .4 Leave site in clean condition with all required guards in place.

END

Section 02 82 13 Site Work - Asbestos Abatement

PART 1 – GENERAL

1.1 **General Conditions and Related Work**

- 1.1.1 This section forms a part of the Bid Document and should be read in conjunction with all other Sections and Divisions in order to comply with the requirements of the General Conditions of the Project.
- 1.1.2 It is the intent that work performed as outlined in this section will result in removal and disposal of all identified asbestos-containing materials, existing asbestos-contaminated materials, and materials that become contaminated by asbestos as a result of the work specified by this Section. The referenced materials include, but are not limited to asbestos-containing Mechanical System Insulation (MSI)
- 1.1.3 Dispose of all waste as specified in applicable sections of the specifications document.
- 1.1.4 The Environmental Consultant may perform area and personal air sampling to verify effectiveness of dust suppression methods and adequacy of the respirators used by the Contractor. Contractor's personnel shall co-operate with the Environmental Consultant in collecting air samples.
- 1.1.5 This project and all work associated with it is regulated by The Occupational Health and Safety Act and other applicable regulations as follows:
- Ontario Regulation 278/05 (as amended) "Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations" (O. Reg. 278/05);
 - Ontario Regulation 213/91 (as amended) "Construction Projects" (O. Reg. 213/91); and
 - Ontario Regulation 347/90 (as amended) "General – Waste Management" (O. Reg. 347/90).
- 1.1.6 Protection of the building or components of the building is required.
- 1.1.7 Provide all equipment, material, services, supervision and labour required or specified to complete the scope of work of this project as described in the Project and Specifications Documents.
- 1.1.8 The Contractor shall be insured and possess all necessary requirements to perform Type 1, Type 2 and Type 3 Asbestos Abatement work in Ontario as stated in Ontario Regulation 278/05.

1.2 **Description of Work**

- 1.2.1 Before submitting a bid, confirm the scope of work of the project by visiting the site and reading the entire Bid documents. The information and any drawings presented should not be used as the only basis for submitting a bid.
- 1.2.2 **Work Area 1 – MSI Removal in Room 409:** This work shall be carried out following Type 2 Glove Bag Operation procedures as detailed in O. Reg. 278/05 (Section 02 82 13, Sub-section 3.3), as follows:
- 1.2.2.1 Pre-clean the work area including floor, walls, conduits, wires, cables, duct openings, and all other equipment and items present in the work area using vacuum units equipped with HEPA filters and wet wiping.
- 1.2.2.2 Isolate the work area from the rest of the building by constructing weighted flaps at all entrance(s) to the work area using overlapping polyethylene (poly) sheeting to create an airlock and post warning signs.
- 1.2.2.3 Pre-clean and remove all moveable objects within the work area.

- 1.2.2.4 Shut off, lock out all ventilation, and seal all vents, ductwork, doors, or other openings into the work area, with the application of rip-proof poly sheeting and properly seal.
- 1.2.2.5 Maintain the fire alarm and other life/safety systems in operation. Immediately advise the Consultant in case the systems are damaged during the execution of the work.
- 1.2.2.6 Protect the floor in the work area using rip proof poly sheeting.
- 1.2.2.7 Set up glove bags around the pipe systems with asbestos-containing MSI in the work area.
- 1.2.2.8 Remove and dispose of all the asbestos-containing MSI on the pipe fittings present in the work area within glove bags, as required to accommodate the upgrade project.
- 1.2.2.9 All waste generated in the work areas shall be double bagged using asbestos labelled yellow bags and disposed as asbestos waste.
- 1.2.2.10 The material present in the project area contains Chrysotile Asbestos. Full-face negative pressure respirators equipped with P-100 filter cartridges shall be worn as a minimum. The Environmental Consultant may perform area, personal and clearance air monitoring to verify effectiveness of dust suppression methods and adequacy of the respirators used by the Contractor. Contractor's personnel shall co-operate with the Inspector in collecting air samples.
- 1.2.3 **Work Area 2 –Primer Removal or Drilling in 1964 Building Construction:** This work shall be carried out following Type 1 or Type 2 Operation procedures as detailed in O. Reg. 278/05 (Section 02 82 13, Sub-sections 3.1 and 3.2), as follows:
- 1.2.3.1 **For Type 1 Operation:**
- 1.2.3.1.1 Pre-clean the work area including floors, walls, conduits, wires, cables, duct openings, and all other equipment and items present in the work area using vacuum units equipped with HEPA filters and wetting techniques.
- 1.2.3.1.2 Pre-clean and remove all moveable objects within the work area.
- 1.2.3.1.3 The Contractor shall be responsible for providing their own temporary lighting using ground fault panels. It is the Contractor's responsibility to provide electricity as needed for the duration of the abatement activities. The level of lighting shall be acceptable to the Consultant.
- 1.2.3.1.4 Shut off, lock out all ventilation, and seal all vents, ductwork, doors, or other openings into the work area, with the application of rip-proof poly sheeting and properly seal.
- 1.2.3.1.5 Maintain the fire alarm and other life/safety systems in operation. Immediately advise the Consultant in case the systems are damaged during the execution of the work.
- 1.2.3.1.6 Isolate the work area from the rest of the building by constructing weighted flaps at all entrance(s) to the work area using overlapping poly sheeting to create an airlock and a warning sign.
- 1.2.3.1.7 Remove and dispose of asbestos-containing brick wall mortar, as required to accommodate the upgrade project. The removal shall be performed using non-powered tools, while wetting down the material.
- 1.2.3.1.8 All asbestos-containing and asbestos-contaminated waste generated in the work area shall be double-bagged using asbestos labelled yellow bags and disposed as asbestos waste.
- 1.2.3.1.9 All surfaces shall be cleaned utilizing HEPA vacuuming, wet wiping and wire brushing techniques.
- 1.2.3.1.10 The material present in the project area contains Chrysotile asbestos. Half-face negative pressure respirators equipped with P-100 filter cartridges shall be worn as a minimum. The Environmental Consultant may perform area and personal air monitoring to verify effectiveness of dust suppression methods and adequacy of the respirators used by the Contractor. Contractor's personnel shall co-operate with the Consultant in collecting air samples.
- 1.2.3.2 **For Type 2 Operation:**
- 1.2.3.2.1 Isolate the work area from the rest of the building by constructing weighted flaps at all entrance(s) to the work area using overlapping poly sheeting to create an airlock.

- 1.2.3.2.2 Post a warning sign at the entrance to the work area.
- 1.2.3.2.3 Pre-clean the entire work area including floors, walls and all other equipment and items present in the work area using vacuum units equipped with HEPA filters and wet wiping.
- 1.2.3.2.4 Pre-clean and protect all equipment and items not scheduled for removal, including but not limited to, sensors, pneumatic controls and other equipment and components. Ensure all surfaces which are to be protected are sealed air-tight and water-tight using rip-proof poly sheets and duct tape. Re-instate such items to an as found condition if they were removed to facilitate removal operations.
- 1.2.3.2.5 Shut off, lock out, all ventilation, and seal all vents, ductwork, doors, or other openings into the work area, with the application of one (1) layer of rip-proof poly sheeting, as required.
- 1.2.3.2.6 Maintain the fire alarm and other life/safety systems in operation. Immediately advise the Consultant in case the systems are damaged during the execution of the work.
- 1.2.3.2.7 The Contractor is responsible for bypassing fire alarms and other life/safety systems in operation. The Contractor is to coordinate with building facility personnel while planning this phase of work. The Contractor shall be responsible for hiring and paying for the appropriate licensed sub-contractors to perform this work.
- 1.2.3.2.8 Drilling into the walls with the asbestos-containing brick wall mortar, as required to accommodate the upgrade project shall be carried out using power tools equipped with a dust collection system with a HEPA vacuum attachment.
- 1.2.3.2.9 Use of compressed air is not permitted.
- 1.2.3.2.10 Once exposed, all surfaces shall be cleaned utilizing HEPA vacuuming, wet wiping and wire brushing techniques.
- 1.2.3.2.11 All the waste generated in the work area shall be double bagged using asbestos labelled yellow bags and disposed as asbestos waste.
- 1.2.3.2.12 The material specified for removal contains Chrysotile asbestos. Half-face negative pressure respirators equipped with P100 filters shall be worn as a minimum. The Environmental Consultant may perform area and personal air monitoring to verify effectiveness of dust suppression methods and adequacy of the respirators used by the Contractor. The Contractor's personnel shall co-operate with the Environmental Consultant in collecting air samples (As Required).
- 1.2.4 Restart all the systems present in the work areas which were shut down to accommodate the abatement project. Ensure that the systems are operating in a manner that is similar to their operations prior to the abatement project.
- 1.2.5 Return the work areas to as found conditions.

1.3 **Definitions**

- 1.3.1 Abatement: Procedures to control fibre release from asbestos containing building materials. Includes encapsulation, enclosure, and removal.
- 1.3.2 Amended Water: Water containing a wetting agent or surfactant that is added for the purpose of reducing water surface tension to allow proper wetting of asbestos material.
- 1.3.3 Asbestos: The term includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite, and any of these that have been chemically treated and/or altered.
- 1.3.4 Airlock: A system for ingress or egress without permitting air movement between a contaminated area and an uncontaminated area, consisting of two curtained doorways at least 6 feet apart.
- 1.3.5 Area Monitoring: Sampling of asbestos fibre concentrations within the asbestos control area and outside the asbestos control area which is representative of the airborne concentrations of asbestos fibers which may reach the breathing zone.

- 1.3.6 Asbestos Work/Control Area: An area where asbestos removal operations are performed which is isolated by physical boundaries to prevent the spread of asbestos dust, fibers, or debris.
- 1.3.7 Air Monitoring: The process of measuring the asbestos fibre content of a specific volume of air in a stated period of time.
- 1.3.8 Asbestos Containing Material (ACM): Any material analyzed and found to contain 0.5 percent or more asbestos either alone or mixed with other fibrous or nonfibrous materials.
- 1.3.9 Asbestos Fibers: For this specification, asbestos fibers are those fibers 5 microns or longer having an aspect ratio of at least 3:1.
- 1.3.10 Authorized Person: The building Owner or his representative, persons of any regulatory or other agency having jurisdiction over the project and the asbestos abatement Environmental Consultant or his representative.
- 1.3.11 Barrier: Any surface that closes up the work area to prevent the movement of fibres.
- 1.3.12 Curtained Doorway: A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms, constructed by placing two overlapping sheets of rip-proof plastic over an existing or temporarily framed doorway, securing each along the top of the doorway, securing the vertical edge of one along one vertical side of the doorway, and securing the vertical edge of the other sheet along the opposite vertical side of the doorway. The free bottom edge of the plastic sheets shall be weighted to ensure proper closure. The plastic sheets shall overlap by no less than 1.5 meters.
- 1.3.13 Critical Barrier: One or more layers of plastic sealed over all openings into a regulated area or any other similarly placed physical barrier sufficient to prevent airborne asbestos in a regulated area from migrating to an adjacent area.
- 1.3.14 Contractor/Supervisor: An individual who supervises asbestos abatement work and has the proper qualifications and training as specified in this document.
- 1.3.15 Disposal: Procedures necessary to transport and deposit the asbestos contaminated material stripped and removed from the building, piping, and equipment in an approved waste disposal site in compliance with the applicable environmental regulations.
- 1.3.16 Demolition: The razing, removing or wrecking of any building component, assembly or system together with any associated handling operations.
- 1.3.17 Decontamination Area: An enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.
- 1.3.18 Dispersed Oil Particulate (DOP) Test: A test method that uses Dispersed Oil Particulate aerosol to challenge a HEPA filter-equipped negative pressure unit to determine its integrity and effectiveness to filter out asbestos fibres.
- 1.3.19 Emery 3004 – a compound (a poly-alpha olefin) that may be substituted for DOP in HEPA filter testing.
- 1.3.20 Encapsulant: A liquid material which can be applied to asbestos containing material and which controls the possible release of asbestos fibers from the material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant). A third type of encapsulant (removal encapsulant) is a penetrating encapsulant and is designed to be applied during the removal of asbestos-containing materials to minimize the release of fibres.
- 1.3.21 Disposal Bag: A 0.15 mm 6 mil thick, leak-tight plastic bag, pre-labeled as containing asbestos waste and used for transporting asbestos waste from containment to disposal site.
- 1.3.22 Disturbance: Activities that disrupt the matrix of ACM, crumble or pulverize ACM, or generate visible debris from ACM.

- 1.3.23 Encapsulation: Procedures necessary to coat all asbestos-containing materials with an encapsulant to control the possible release of asbestos fibers into the ambient air.
- 1.3.24 Enclosure: All herein specified procedures necessary to complete enclosure of all asbestos containing material behind airtight, impermeable, permanent barriers.
- 1.3.25 Equipment Room: A contaminated area or room which is part of the worker decontamination enclosure system, with storage for contaminated clothing and equipment.
- 1.3.26 Friable Asbestos Material: Material that when dry can be crumbled, pulverized or powdered by hand pressure and includes material that is crumbled, pulverized or powdered.
- 1.3.27 Filtration System for Water: A multistage system for filtering water from the decontamination shower and wastewater. The system is usually manufactured with two filters: a primary filter and a secondary filter. The primary filter collects and retains particles that are 20 microns or larger and the secondary filter removes particles that are 5 microns or larger.
- 1.3.28 Glove Bag System: A portable asbestos abatement system designed for the isolation of an object from which materials containing asbestos are to be removed.
- 1.3.29 HEPA Filter Equipment: High efficiency particulate air filtered vacuuming equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall be capable of trapping and retaining at least 99.97 percent of 0.3 micrometer diameter particles.
- 1.3.30 Negative Pressure Fan System: An air purifying fan system located within or outside the isolated work area, which draws air out of the work area through a HEPA filter and discharges this air directly to the exterior of the building, thus keeping the static air pressure in the work area lower than in adjacent areas and preventing infiltration of contaminated air from work area to adjacent areas. This system shall be equipped with an alarm to warn of system breakdown, shall maintain a minimum pressure differential of 0.02" water gauge relative to adjacent areas outside of work areas and shall be equipped with an instrument to continuously monitor and automatically record pressure differences.
- 1.3.31 Non-friable Asbestos Material: Material that contains asbestos in which the fibers have been locked in by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not release fibers during any appropriate use, handling, demolition, storage, transportation, processing, or disposal.
- 1.3.32 Negative Pressure Respirator: A respirator in which the air inside the respiratory inlet covering is negative during inhalation in relation to the air pressure of the outside atmosphere and positive during exhalation in relation to the air pressure of the outside atmosphere.
- 1.3.33 Powered Air Purifying Respirator (PAPR): A full-face mask into which filtered air is pumped at approximately 100 – 150 litres per minute (4 – 6 cubic feet per minute). The PAPR consists of a full-face mask, a battery pack, an air pump, high efficiency filter and hoses.
- 1.3.34 Personal Monitoring: Sampling of asbestos fibre concentrations within the breathing zone (within 12 inches of the mouth) of an employee.
- 1.3.35 Personnel: Supervisors, Contractor employees, subcontractor employees.
- 1.3.36 Positive Pressure Respirator: A respirator that maintains a positive pressure inside the facepiece during inhalation and exhalation in relation to the atmospheric pressure.
- 1.3.37 Shower Room: A room between the clean room and the equipment room in the worker decontamination enclosure system, with hot and cold or warm running water and arranged for complete showering during decontamination. The shower room comprises an airlock between contaminated and clean areas.
- 1.3.38 Supplied-air respirator – an accepted respirator and air-supply hose with a hood/helmet, a tight fitting facepiece that is supplied with compressed breathing air from a compressed breathing air system.
- 1.3.39 Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

- 1.3.40 Tape-Sealed Polyethylene Sheets: Rip-proof polyethylene sheets or polyethylene sheets of type and thickness as specified, sealed with tape along the edges, around objects, over cuts and in other locations as required to provide a continuous polyethylene membrane to protect underlying surfaces from water damage and damage by sealant and to prevent the escape of asbestos fibres through the sheeting into a clean area.
- 1.3.41 Wet Cleaning: The process of eliminating asbestos from building surfaces and objects by using cloths, mops, or other cleaning tools dampened with water.
- 1.3.42 Work Decontamination Enclosure System: A decontamination system for workers, consisting of a clean room, a shower room, and an equipment room. One entrance to the clean room shall be outside of the contaminated area. One entrance to the equipment room shall be connected directly to the contaminated area.
- 1.3.43 Work: Includes all labour, supervision, materials and equipment required for the complete execution of the project as specified in the project.

1.4 Work Schedule

- 1.4.1 It is the responsibility of the contractor to provide the necessary manpower and work shifts to meet the schedule as specified below:
- 1.4.2 The Owner and the project management team shall determine the schedule and the start date for the project.
- 1.4.3 The Contractor shall, at no extra cost to the owner, be responsible for the completion of work required or scheduled to be performed on weekends, holidays and after regular hours and shall be carried out as required to meet the schedule specified.
- 1.4.4 In all situations where the Contractor fails to meet the specified schedule, the Contractor shall pay all costs of inspection and air monitoring by the Environmental Consultant.

1.5 Submittals

- 1.5.1 All submittals must be received by the Client or their representative before the work is allowed to commence.
- 1.5.2 The Contractor shall submit the following:
- 1.5.2.1 Proof that the Contractor has made arrangement for the transport and disposal of asbestos waste. The proof shall be satisfactory to the Environmental Consultant.
- 1.5.2.2 Name of the landfill.
- 1.5.2.3 A copy of the weight scale or waste manifest/bill of lading (once received).
- 1.5.2.4 Proof satisfactory to the Environmental Consultant that each Supervisor scheduled to work on the project has successfully completed an approved asbestos abatement course and can provide an up to date training certificate issued by an experienced entity.
- 1.5.2.5 References that each and every supervisor had supervised a minimum of 7 other asbestos removal projects of similar size and scope. One supervisor shall remain on site while asbestos removal or cleanup is being carried out.
- 1.5.2.6 Copies of Insurance certificates and Workplace Safety and Insurance Board status.
- 1.5.2.7 Proposed work schedule.
- 1.5.2.8 Work force expected to be present on site daily.
- 1.5.2.9 Proposed number of shifts.

- 1.5.2.10 Layouts of proposed platforms and hoardings for the Environmental Consultant's review and approval.
- 1.5.2.11 Proof that all workers have received Workplace Hazardous Material Information System (WHMIS) training.
- 1.5.2.12 A WHMIS information package containing documentation addressing test results, flammability and fire data and Material Safety Data Sheets (MSDSs) for products, chemicals and materials used on site during the course of the asbestos abatement project.
- 1.5.2.13 Proof satisfactory to the Environmental Consultant that each worker scheduled to work on the project has successfully completed an approved asbestos abatement course and can provide an up to date training certificate issued by an experienced entity.
- 1.5.2.14 Proof satisfactory to the Environmental Consultant that each worker scheduled to work on the project has been fit tested for the appropriate respirator to be used (if any).
- 1.5.2.15 Code of practice for respiratory protection.

1.6 Quality Assurance

- 1.6.1 Ensure that work progresses according to schedule.
- 1.6.2 Ensure that work complies with all the requirements of the applicable regulations, guidelines and manuals.
- 1.6.3 Ensure that no water runoff or airborne asbestos material contaminates areas outside the asbestos removal work area enclosures. The Environmental Consultant has been given authorization by the Owner to stop any work where contamination of areas outside enclosures are suspected. The Contractor shall be responsible for all costs to rectify the problem.
- 1.6.4 Use only skilled and qualified workers for all trades required to work on this project.
- 1.6.5 Only the asbestos abatement Contractor, and never the Environmental Consultant, is responsible for the following:
- 1.6.6 Safety programs and precautions required by applicable regulations for the work being performed.
- 1.6.7 Control over the acts and omissions of the Contractor's workers, agents, subcontractors and other employees of the Contractor required to perform work on the project.
- 1.6.8 Control over construction techniques, methods, means or procedures.

1.7 Regulations

- 1.7.1 The Contractor shall comply with all local, provincial and federal requirements relating to asbestos and other work being carried out.
- 1.7.2 In case of conflict among the above mentioned requirements or with these specifications, the more stringent requirements shall apply.
- 1.7.3 Perform work following the requirements of the various regulations in effect at the time the work is being carried out.
- 1.7.4 The regulations shall include, but are not limited to:
 - 1.7.4.1 Ontario Regulation 490/09 (as amended) "Designated Substances" (O. Reg. 490/09);
 - 1.7.4.2 Ontario Regulation 278/05 (as amended) "Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations" (O. Reg. 278/05);
 - 1.7.4.3 Ontario Regulation 213/91 (as amended) "Construction Projects" (O. Reg. 213/91); and
 - 1.7.4.4 Ontario Regulation 347/90 (as amended) "General – Waste Management" (O. Reg. 347/90); and

1.7.5 WHMIS Regulations.

1.8 Supervision

1.8.1 The Contractor shall provide a trained and qualified shift supervisor for each and every shift during which asbestos removal and clean-up is being carried out. The Owner reserves the right to stop all work if this requirement is not complied with, at no additional charge to the Owner.

1.8.2 The shift supervisor shall have the authority to make decisions and take actions with respect to production, manpower and equipment.

1.8.3 Obtain approval from the Owner or his representative before replacing supervisory personnel.

1.8.4 At the request of the Owner or his representative, the Contractor shall, without asking for explanation, replace supervisory personnel with 2 days from receiving the Owner's written request.

1.9 Notifications

1.9.1 The Contractor shall be responsible for immediately notifying the following, orally and in writing, prior to any work on this project commencing:

1.9.2 Ontario Ministry of Labour, Construction Health and Safety branch closest to the location of the project.

1.9.3 The land fill site which agreed to accept the waste as per the requirements of regulation 558/00.

1.9.4 The Fire Marshall, in cases where the execution of the work will result in blocking building exists or when turning off, removing or temporarily altering fire alarms.

1.10 Proscriptions

1.10.1 The use of motorized lift equipment in the work area is not allowed.

1.10.2 The use of compressed air for removal or clean-up of asbestos dust and debris from any surface is not allowed.

1.10.3 Smoking, eating, drinking or chewing is not allowed in the work area.

1.10.4 Unauthorized persons or persons not using proper personal protective equipment shall not be allowed to enter the work area.

1.10.5 No entry into the work area shall be permitted to any person who has facial hair growth that prevents the establishment of a proper seal between the respirator and the skin.

1.10.6 The use of torches, propane-fired heaters and other open flames shall not be permitted in the asbestos removal work area.

1.11 Equipment and Material Protection and Replacement

1.11.1 Before starting the removal operations, the Contractor shall perform a survey to document existing damage in all areas where asbestos removal will be carried out or in areas where transportation of waste will take place.

1.11.2 The Contractor shall be responsible for protecting all equipment and materials within, and in the vicinity of, the work area.

1.11.3 The Contractor shall be responsible for replacing all equipment and materials that become damaged as a result of the work being carried out by the Contractor at no additional cost to the owner.

1.12 Worker and Visitor Protection

- 1.12.1 Instruct all personnel (workers and visitors) in all aspects of work procedures and protective equipment before allowing entry into the asbestos abatement work areas.
- 1.12.2 An experienced person (as defined by the Occupational Health and Safety Act) shall provide all the training and instructions.
- 1.12.3 Instructions and training shall include, but shall not be limited to, the following:
- 1.12.4 Entry and exit from asbestos abatement work areas.
- 1.12.5 Work practices and personal hygiene.
- 1.12.6 The use, cleaning and care of respirators and protective clothing.
- 1.12.7 Protective measures and work procedures.
- 1.12.8 Asbestos work area entry and exit procedures shall be posted in the clean room of the decontamination unit.
- 1.12.9 Respiratory Protection:
- 1.12.10 All personnel required to wear respirators shall be fit tested either by a qualitative or quantitative fit testing method administered by a qualified entity.
- 1.12.11 Each worker or visitor required to enter an asbestos abatement work area shall be provided with a personally issued respirator that is:
- 1.12.12 Appropriate for the work that is being carried out.
- 1.12.13 Acceptable to the Ministry of Labour, Occupational Health and Safety Division.
- 1.12.14 The worker shall be responsible for wearing a respirator that is issued by the Contractor.
- 1.12.15 The following criteria, as outlined in Table 1 of O. Reg. 278/05, shall be followed when selecting an appropriate respirator:

Table 1: Respirators (O. Reg. 278/05)

Column 1	Column 2
Work Category	Required respirator
Type 1 Operations	
Worker requests that the employer provide a respirator to be used by the worker, as described in paragraph 12 of section 14	Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter
Type 2 Operations	
Work described in paragraph 1 of subsection 12 (3)	One of the following: <ul style="list-style-type: none"> - Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filter - Powered air purifying respirator equipped with a tight-fitting facepiece (half or full-facepiece) and a high efficiency filter or N-100, P-100 or R-100 particulate filter - Negative pressure (demand) supplied air respirator equipped with a full-facepiece - Continuous flow supplied air respirator equipped with a tight fitting facepiece (half or full-facepiece)
Work described in paragraphs 2 to 7 and 9 to 11 of subsection 12 (3)	Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter
Type 3 Operations	
Breaking, cutting, drilling, abrading, grinding, Material is not wetted	One of the following:

<p>sanding or vibrating non-friable material containing asbestos by means of power tools, if the tool is attached to a dust collecting device equipped with a HEPA filter as described in paragraph 8 of subsection 12 (3)</p>		<ul style="list-style-type: none"> - Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filter - Powered air purifying respirator equipped with a tight-fitting facepiece (half or full-facepiece) and a high efficiency filter or N-100, P-100 or R-100 particulate filter - Negative pressure (demand) supplied air respirator equipped with a full-facepiece - Continuous flow supplied air respirator equipped with a tight fitting facepiece (half or full-facepiece)
<p>Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable material containing</p>	<p>Material is wetted to control spread of fibre Material is not wetted</p>	<p>Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter Pressure demand supplied air respirator equipped with a half mask</p>

Table 1: Respirators (continued)

Column 1		Column 2
Work Category		Required respirator
Type 3 Operations		
asbestos by means of power tools, if the tool is not attached to a dust collecting device equipped with a HEPA filter as described in paragraph 5 of subsection 12 (4)	Material is wetted to control spread of fibre	<p>One of the following:</p> <ul style="list-style-type: none"> - Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filter - Powered air purifying respirator equipped with a tight-fitting facepiece (half or full-facepiece) and a high efficiency filter or N-100, P-100 or R-100 particulate filter - Negative pressure (demand) supplied air respirator equipped with a full-facepiece
		<ul style="list-style-type: none"> - Continuous flow supplied air respirator equipped with a tight fitting facepiece (half or full-facepiece)
Work with friable material containing asbestos, as described in paragraphs 1 to 4 and 6 of subsection 12 (4)	Material is not wetted	Pressure demand supplied air respirator equipped with a full facepiece
Work with friable material, as described in paragraphs 1 to 4 and 6 of subsection 12 (4), that contains a type of asbestos other than chrysotile	Material was applied or installed by spraying, and is	Pressure demand supplied air respirator equipped with a half mask
Work with friable material, as described in paragraphs 1 to 4 and 6 of subsection 12 (4), that contains only chrysotile asbestos	wetted to control spread of fibre	<p>One of the following:</p> <ul style="list-style-type: none"> - Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filter - Powered air purifying respirator equipped with a tight-fitting facepiece (half or full-facepiece) and a high efficiency filter or N-100, P-100 or R-100 particulate filter - Negative pressure (demand) supplied air respirator equipped with a full-facepiece - Continuous flow supplied air respirator equipped with a tight fitting facepiece (half or full-facepiece)
Work with friable material containing asbestos, as described in paragraphs 1 to 4 and 6 of subsection 12 (4)	Material was not applied or installed by spraying, and is wetted to control spread of fibre	<p>One of the following:</p> <ul style="list-style-type: none"> - Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filter - Powered air purifying respirator equipped with a tight-fitting facepiece (half or full-facepiece) and a high efficiency filter or N-100, P-100 or R-100 particulate filter - Negative pressure (demand) supplied air respirator equipped with a full-facepiece - Continuous flow supplied air respirator equipped with a tight fitting facepiece (half or full-facepiece)

- 1.12.16 Respiratory protection systems shall be certified by the National Institute for Occupational Safety and Health (NIOSH) or any other testing agency that is acceptable to the Ministry of Labour.
- 1.12.17 Respirator shall be stored in a clean location such as the clean room of the decontamination unit. This room can also be used for charging PAPR batteries.
- 1.12.18 The procedures specified by the equipment manufacturer shall be followed while using and maintaining the respirators.
- 1.12.19 Respirators shall be cleaned and inspected at the end of each shift. All damaged and deteriorated parts found during the inspection shall be replaced before the respirator is used again.
- 1.12.20 Appropriate combination cartridges shall be used if substances other than asbestos are to be handled inside the asbestos removal work area.
- 1.12.21 Used filters shall be tested and replaced as specified by the manufacturer or as specified below. The more stringent testing and replacement protocol shall be followed.
- 1.12.22 Cartridges for negative pressure respirators should be replaced every 16 hours of actual usage
- 1.12.23 Cartridges for PAPRs should be replaced every 8 hours.
- 1.12.24 Cartridges shall be treated as asbestos waste and shall be disposed of accordingly after usage inside an asbestos removal work area.
- 1.12.25 Protective Clothing:
- 1.12.26 The Contractor shall provide every worker and authorized visitor with full body disposable coveralls.
- 1.12.27 All personnel shall wear the protective coveralls before they are allowed to enter into the asbestos removal work area.
- 1.12.28 Coveralls shall be equipped with head covering (hood), foot covering and tight fitting cuffs at the neck, ankles and wrists.
- 1.12.29 The disposable coveralls shall be made up of materials that does not readily permit the penetration of asbestos fibers.
- 1.12.30 Disposable coveralls shall be immediately repaired (using duct tape) or replaced once torn.
- 1.12.31 Coveralls shall be disposed of as asbestos waste once they are worn inside an asbestos abatement area.
- 1.12.32 Workers are allowed to wear reusable protective clothing provided that the clothing is left in the equipment room until the end of the asbestos abatement project. The clothing shall then be disposed of as asbestos waste.
- 1.12.33 Safety shoes, hard hats and additional body protection equipment shall be used as necessary to meet the requirements of applicable safety regulations.

1.13 Inspections

- 1.13.1 The asbestos abatement Environmental Consultant will be present on site to carry out quality control inspections for the entire duration of the project. The inspections will be performed inside and outside the work areas.
- 1.13.2 The purpose of the inspections is to ensure that the work is being carried out following the requirements and procedures outlined in the specifications documents and applicable regulations.
- 1.13.3 The Environmental Consultant will issue written instructions to the asbestos abatement Contractor throughout the duration of the project. The instructions will authorize the Contractor to proceed to next phase of work. The general phases of work will consist of the following: Pre-cleaning, set-up and preparation of the work area, removal of specified materials, clean-up of work area and tear down of containment.

- 1.13.4 The Contractor shall not proceed to the next phase of work without obtaining authorization from the Environmental Consultant.
- 1.13.5 The Environmental Consultant has been given authorization by the Owner to order a shutdown of work in case contamination of areas adjacent to controlled work areas has occurred.
- 1.13.6 In all non-controlled areas where it is determined by the Environmental Consultant (through visual inspection or air monitoring) that contamination has leaked, the Contractor shall be responsible to the complete isolation and cleaning of such areas under the direction of the Environmental Consultant and at no extra charge to the Owner.
- 1.13.7 The Environmental Consultant has been given authorization by the Owner to ensure that the Contractor adheres to specified procedures and materials and to inspect for completion and final cleanliness. Any additional work (including labour and material charges) specified by the Environmental Consultant to achieve completion of work to the level specified shall be carried out by the Contractor at no additional charge to the Owner.
- 1.13.8 The Contractor shall ensure that all equipment and materials to be used on the project are acceptable to the Environmental Consultant. Unacceptable materials and equipment shall be replaced by the Contractor at no additional charge to the Owner.
- 1.13.9 The Contractor shall be responsible for all additional inspection charges which are carried out as a result of a failure by the Contractor to meet set criteria relating to schedule, health and safety and quality.
- 1.14 Air Monitoring**
- 1.14.1 Air samples may be collected by the Environmental Consultant (on behalf of the owner) from the start of work until the completion of the tear down operations, both inside and/or outside the controlled work areas.
- 1.14.2 The objective of air monitoring is to detect defects in the containment of controlled areas and to ensure that any contamination of building spaces beyond the controlled areas is discovered and rectified immediately.
- 1.14.3 Any contamination of areas outside the limits of the controlled work areas (as determined by air monitoring) shall be contained and shall be thoroughly cleaned to the Environmental Consultant's satisfaction. The Contractor shall be responsible for all additional charges associated with such work.
- 1.14.4 Air monitoring will be carried out following procedures specified in the latest edition of the National Institute for Occupational Safety and Health (NIOSH) method 7400A. The samples will be analyzed by the Phase Contrast Microscopy (PCM) technique as specified in NIOSH method 7400A. A Fibrous Aerosol Monitor (FAM) may also be used.
- 1.14.5 The Contractor shall cooperate with the Environmental Consultant during air monitoring and shall:
- 1.14.6 Provide workers to wear the sampling equipment for up to the duration of an entire shift.
- 1.14.7 Ensure that the workers exercise care and avoid damaging the Environmental Consultant's equipment.
- 1.14.8 Ensure that the samples and equipment are not tampered with.
- 1.14.9 The Contractor shall be responsible for charges associated with re-sampling due to tampering with the air samples.
- 1.14.10 The Contractor shall be responsible for repair or replacement charges of testing equipment that become damaged due to the actions of the Contractor forces.
- 1.14.11 The maximum allowable concentration of airborne fibres outside an asbestos work area is 0.05 fibres per cubic centimetre (fibre/cc).
- 1.14.12 PCM or FAM results equal to or greater than the specified level will indicate asbestos contamination of these perimeter areas.

- 1.14.13 The contaminated areas shall be isolated, contained and cleaned to the satisfaction of the Environmental Consultant.
- 1.14.14 The maximum allowable concentration of airborne fibres inside an asbestos work area is 2.5 fibres/cc.
- 1.14.15 Clearance air samples may be collected inside the work area after it is visually inspected by the Environmental Consultant, authorization is given to spray a lock-down agent and the lock-down agent is allowed to completely dry.
- 1.14.16 Air samples will be analyzed by the PCM method. The area inside a full enclosure will be considered clean and clear for public occupancy only if the fibre levels are less than 0.01 fibres/cc.
- 1.14.17 In case the fibre levels are equal to or greater than 0.01 fibres/cc, the Contractor shall be responsible for re-cleaning the asbestos work area and re-applying the lock-down agent. This process will have to be repeated until the fibre levels are below the specified limit.
- 1.14.18 The Contractor shall be responsible for all charges associated with additional air monitoring which can only be carried out by the Environmental Consultant.
- 1.14.19 Clearance air sampling inside a full enclosure will be carried out using aggressive sampling procedures as specified in O. Reg. 278/05, S.18(6).
- 1.14.20 Exhaust from forced air equipment (such as a 1 horsepower leaf blower) is directed towards ledges, ceilings, floors, walls and other surfaces in the room before the sampling pumps are started.
- 1.14.21 Forced air equipment will be operated for a period of 5 minutes for every 1,000 square feet of floor space.
- 1.14.22 The 20" fan(s) is then located in the middle of the room, placed on slower speed and directed towards the ceiling.
- 1.14.23 One 20" fan will be employed for every 10,000 cubic feet of room space.
- 1.15 Waste Transport and Disposal**
- 1.15.1 All asbestos-containing and asbestos-contaminated materials shall be disposed of as prescribed by O. Reg. 347/90
- 1.15.2 All wash water generated from decontamination activities shall be treated as asbestos waste and shall be disposed of accordingly.
- 1.15.3 All non-asbestos containing waste generated during demolition activities inside an asbestos work area shall be treated as asbestos waste.
- 1.15.4 Non-porous materials that can be washed and properly cleaned can be disposed of as clean waste.
- 1.15.5 All sharp asbestos-contaminated materials (such as hangers, T-bars, wood, etc.) that could rip or damage a 6mil polyethylene waste disposal bag shall be disposed of in a sealed solid asbestos waste container.
- 1.15.6 The waste must be stored and transported in an enclosed, lockable waste bin.
- 1.15.7 Every vehicle used for the transportation of asbestos waste shall display a Class 9 Label.

- 1.15.8 Both sides of the vehicle used for the transportation of asbestos waste and every waste bag and container shall display the word CAUTION in letters not less than 10 cm in height and the words:
- CONTAINS ASBESTOS FIBRES**
- Avoid Creating Dust
- Asbestos May Be Harmful to Your Health
- Wear Approved Protective Equipment
- 1.15.9 The transport vehicle must be properly equipped to deal with asbestos waste spills. Equipment shall include, but not limited to, respiratory protective equipment, disposable protective clothing, 6 mil polyethylene bags, shovel and broom and wetting agent.
- 1.15.10 For chrysotile asbestos, the words Asbestos, White, Product Identification Number 2590 must be displayed on every waste container.
- 1.15.11 For asbestos waste of unknown material or an asbestos type other than chrysotile, the words Asbestos, Blue, Product Identification Number 2212 must be displayed on every waste container.
- 1.15.12 The Contractor shall submit to the Environmental Consultant a copy of the shipping document and weight receipt for every shipment of asbestos waste.

PART 2 - FACILITIES AND PRODUCTS

2.1 **Equipment**

- 2.1.1 Provide equipment that is suitable for intended use as specified by the proper standards. All equipment used on the project shall be clean and in good state of repair.
- 2.1.2 Airless Sprayer: Equipment used for the application of amended water to saturate asbestos-containing materials before removal.
- 2.1.3 Electrical Components and Equipment: supplied by the Contractor for performance of work on this project shall meet the requirements of the Canadian Standards Association (CSA) for use as installed.
- 2.1.4 Electrical Power Cords: Use single length power cords. If single length will not reach work area, use waterproof connectors to connect separate lengths. Use heavy duty cords in high traffic areas or in areas where abrasion of cords is expected. Only grounded electrical cords will be allowed.
- 2.1.5 Ground Fault Panel: use an electrical panel that is installed by a licensed electrician and is equipped with the following:
- 2.1.5.1 Ground fault circuit interrupts (breaker type) of sufficient capacity to supply all lights and equipment to be used in the work area.
- 2.1.5.2 Breakers shall have 5mA ground fault protection.
- 2.1.5.3 Main switch disconnect, test buttons and reset switches and circuit breaker lights.
- 2.1.5.4 Proper enclosure to prevent the penetration of moisture, dust and debris.
- 2.1.6 Temporary Lighting: Provide illumination as required in all work areas to perform the work safely and adequately. Illumination can be achieved by the use incandescent or fluorescent lamps. All lamps shall be protected by grounded guard cages or tempered glass enclosures.
- 2.1.7 Fine Atomizing Spray Nozzle: an airless sprayer nozzle that is designed to deliver no less than 1 gallon per minute of fine spray of water or lock-down agent.
- 2.1.8 Flexible Ducting: Tubing used for the exhaust of negative air units. The tubing is made up of plastic with metal reinforcement and is of a diameter that is equal to the exhaust port of a negative air unit.
- 2.1.9 Garden Sprayer: a metal or plastic pressure-can hand pump equipped with a hose and a metal wand. The pump is used to spray a fine mist of liquid on surfaces in a work area.
- 2.1.10 Glove Bag: The glove bag shall meet the following requirements if it will be used more than once:
- 2.1.10.1 Shall be a Safety-T-Strip trade product with a configuration suitable to fit the work at hand.
- 2.1.10.2 Shall have an internal ziplock feature for sealing the waste at the bottom of the bag.
- 2.1.10.3 Shall be secured around the material being removed using the securing device supplied with the bag. The securing device consists of a 1 inch reusable nylon straps with a metal tightening buckle for sealing the ends of the bag.
- 2.1.10.4 Shall be made of polyvinyl chloride (10 mil) minimum thickness with integral gloves and valve ports.
- 2.1.10.5 Shall be equipped with reversible double pull zipper with protective flaps to facilitate installation and progressive movement on pipes.
- 2.1.10.6 If it will not be used more than once, the glove bag shall meet the following requirements:
- 2.1.10.6.1 Shall be made of polyvinyl chloride or equivalent plastic bag with a minimum thickness of 6 mil.
- 2.1.10.6.2 Shall be equipped with two gloves projecting inward and valves for attaching a vacuum hose or a metal wand.

- 2.1.10.6.3 Shall have a pouch for storing tools and enough space to accommodate the storage of removed materials and to allow for proper sealing of the bag. The bag shall also be labelled with warning signs to identify the content of the bag.
- 2.1.11 HEPA Filtered Negative Air Unit: A portable air handling system which is used to create negative air pressure differential by the extracting the air directly from the work area and discharging it to the exterior of the area. The unit shall be equipped as follows: Fan, HEPA filter, pre-filters, pressure differential gauge, cabinet, high/low switch, on/off switch.
- 2.1.11.1 The fan shall have a capacity of 1500 cubic feet per minute. The fan shall be considered to have 80% of the rated of air flow unless tested and certified by a company specializing in such measurements and subject to the approval of the Environmental Consultant.
- 2.1.11.2 Each unit shall have a HEPA filter installed as a final filter in the unit. A tight seal shall be established between the filter and the filter housing through the use of a rubber gasket. Each filter shall be clearly marked with the serial number, direction of air flow, efficiency, air flow rating, name of manufacturer and resistance and shall bear UL586 label.
- 2.1.11.3 Each unit shall have an on/off switched located on the exterior of the cabinet. The unit shall also be equipped with overload protection and components such as cabinet, fan, motor, etc. shall be grounded.
- 2.1.11.4 Each unit shall have a pressure differential gauge to monitor the filter loading and to indicate when the filters needs to be changed. The unit shall also have a time meter to indicate the total accumulated hours of operation.
- 2.1.11.5 Each unit shall have the following warning and safety devices: a means for preventing the unit from operating without a HEPA filter; auto shutoff system to stop the fan in case of HEPA filter failure such as rupture of the filter or blockage of air flow through the filter.
- 2.1.11.6 Provide units with pre and intermediate filters installed at the intake of the unit and secured in place with clamps or special filter housings. Two pre-filters are required: the first pre-filter shall be of the low efficiency type and shall be 98% efficient for particles 100 microns and larger; the second pre-filter shall be of the medium efficiency type and shall be 95% efficient for particles down to 5 microns.
- 2.1.11.7 The cabinet of the unit shall be constructed of durable material able to withstand rough handling during removal work. The cabinet shall have wheels and shall be designed to allow access to the inside of the unit from the intake side for maintenance and replacement of filters. The unit shall be factory sealed to prevent the escape of dust and debris during transport and use.
- 2.1.12 HEPA Vacuum: A vacuum unit equipped with HEPA filter and designed so that all discharged air passes through the filter. Shall be equipped with all attachments, tools and fittings to facilitate the performance of the work.
- 2.1.13 Pressure Differential Monitoring Unit: An instrument designed to measure the difference in pressure between the interior and exterior of a work area. As a minimum, the instrument shall consist of the following: a continuous recoding wheel chart or tape; a gauge with a range from 0 to 0.1 inches water; sensor tubing and wall clamps; wall mounting devices, low limit and high limit audible alarm; and auto reset.
- 2.1.14 Power Washer: A piece of equipment capable of delivering an airless stream of liquid (water) at a pressure between 1200 and 2500 psi. Typically used for cleaning of work area surfaces and equipment and for saturating materials scheduled for removal before work start to reduce the creation of dust.
- 2.1.15 Scaffolding: Select, erect and use scaffolding in a manner that is in compliance with all applicable occupational health and safety regulations.
- 2.1.15.1 Types of scaffolding allowed consist of suspension or standing types such as cantilever, metal tube and coupler, pole or outrigger or tubular welded frame.
- 2.1.15.2 Provide non-skid surfaces and/or foot boards on all scaffolds where foot traffic is anticipated.

- 2.1.15.3 Provide an abrasive non-slip surfaces on rungs of metal ladders.
- 2.1.16 Water Service Components and Equipment: supplied by the Contractor for performance of work on this project shall be temperature and pressure rated for operation of the temperature and pressure encountered.
- 2.1.16.1 Hot water heater to be used for supplying water to the shower shall be:
- 2.1.16.1.1 ULC rated electric hot water heater.
- 2.1.16.1.2 Appropriately sized for the project.
- 2.1.16.1.3 Powered from the ground fault panel.
- 2.1.16.1.4 Equipped with a relief valve that is piped to a drip pan secured to the water heater.
- 2.1.16.2 Supply water to each working area and decontamination unit using pipes having a pressure rating greater than the pressure of the water distribution system. Provide fittings as necessary to allow connecting to existing systems and other temporary facilities.
- 2.1.16.3 The shower provided for the decontamination facility shall be of the walk through type. The shower pan shall be a waterproof, one piece pan constructed from stainless or galvanized steel with welded seams, copper or lead with soldered seams or fibreglass reinforced with wood. The shower head shall be adjustable for spray size and intensity. The shower shall be supplied with separate hot and cold water. The control for water temperature, flow and shut off shall be located inside the shower.
- 2.1.16.4 Multi-stage cascade filter units shall be provided on drain lines from any water source carrying asbestos-contaminated water from the work area including the shower. The units shall be provided with a primary and a secondary disposal filter elements. The primary filter shall allow the passage of particles that are 20 microns and smaller. The secondary shall allow the passage of particles that are 5 microns and smaller. The units shall be connected so that the water passes the primary filter first and the discharge of the primary filter passes through the secondary filter.
- 2.2 Materials**
- 2.2.1 Materials destined for use on this project shall be undamaged, shall comply with the requirements of the project and specifications and shall be unused at the time of installation unless otherwise indicated.
- 2.2.2 Asbestos Waste Container: An impermeable container that is dust-tight and impervious to asbestos waste. Shall be made of new material only and shall be labelled as required by applicable regulations with a pre-printed cautionary asbestos warning label. The container shall (depending on the nature of the waste material) be comprised of the following:
- 2.2.2.1 A 6 mil thick leak-tight polyethylene bag labelled as required and placed inside another 6 mil sealed polyethylene bag (in case the waste does not contain any sharp objects).
- 2.2.2.2 A 6 mil sealed polyethylene bag positioned inside or outside a heavy duty leak tight solid sealed container of sufficient strength to prevent perforation of the container during handling (in case the waste contains sharp objects).
- 2.2.3 Caulking: Acrylic polymer sealant (non-asbestos-containing) that is non-staining.
- 2.2.4 Drop Sheets: Sheets made up of polyethylene of size and type appropriate to the work. To be placed under an area where work is being carried out.
- 2.2.5 Encapsulant: Type 1 penetrating Class A water based encapsulant conforming to CGSB 1-GP-205M and approved by the Fire Marshall and having a flame spread and smoke development ratings both less than fifty.
- 2.2.6 Felts: 1/16" thick and 36" to 72" wide non-coated, standard cellulose building felt.

- 2.2.7 Rip-Proof (Fibre Re-enforced) Polyethylene Sheeting: 8 mil fibre re-enforced fabric (bonded on both sides with polyethylene sheeting) made up from 5 mil weave and 2 layers of 1.5 mil poly laminate. Provide new material only in maximum size sheets (to fit work) to minimize joints.
- 2.2.8 Fire Extinguisher: Provide type “ABC” dry chemical fire extinguishers of a combination of extinguishers suitable for the type of exposure in each case.
- 2.2.9 First Aid Supplies: Provide and maintain first aid supplies on the project site as required by applicable regulations and construction industry recommendations.
- 2.2.10 Flame Resistant Polyethylene Sheeting: a layer of polyethylene sheeting that conforms to the requirements of the NFPA Standard 701, Small Scale Fire Test for Flame-Resistant Textiles and Films. Provide new material only in 6 mil thickness and in maximum size sheets (to fit work) to minimize joints.
- 2.2.11 Foam: Polyurethane expanding foam of low density.
- 2.2.12 Lock Down Sealant: a clear, non-staining, water dispersible type, slow drying sealant that is used for the purpose of trapping residual dust. The sealer shall remain sticky on the surface for an 8 hour period as a minimum. The product shall have flame spread and smoke development ratings of less than 50 for both. The sealant shall be compatible with replacement insulation or fireproofing and shall be capable of withstanding service temperature of substrate.
- 2.2.13 Polyethylene Sheeting: A 6 mil minimum (unless otherwise specified) thickness polyethylene film in maximum sheet size to minimize seems and black, frosted or clear as required to meet specifications.
- 2.2.14 Protective Coveralls: Full body coveralls complete with hoods and shoe coverings, made up of a material which does not permit penetration of asbestos fibres and is disposable.
- 2.2.15 Spray Cement: Specifically formulated spray adhesive in spray cans devised to stick to polyethylene sheets.
- 2.2.16 Tape: 2” to 3” widths reinforced tape (cloth or fibreglass reinforced) appropriate for sealing polyethylene sheets under dry and wet conditions.
- 2.2.17 Wetting Agent: A mixture of water and a surfactant used for wetting asbestos-containing materials before removal to minimize the release of fibres during disturbance of the material.

2.3 Platforms

- 2.3.1 Work in certain areas of the project will require the use of platforms. Unless otherwise specified, work platforms for this project shall be erected as follows:
- 2.3.1.1 Set up a support structure of metal, wood or equivalent scaffolding above which the work platform will be positioned.
- 2.3.1.1.1 Place one layer of rip proof polyethylene sheeting over scaffold board.
- 2.3.1.1.2 Place one layer of plywood sheets over the rip proof poly and fasten in place using nails.
- 2.3.1.1.3 Ensure that the plywood is of sufficient thickness and is capable of supporting the weight of all personnel and equipment expected to be present on the platform. Comply with the requirements of applicable Occupational Health and Safety Acts and Regulations.
- 2.3.1.1.4 Prevent water leakage from the platform by taping and caulking the seams between the plywood sheets and by instating a minimum of two layers of rip proof poly over the plywood sheets.
- 2.3.1.1.5 Isolate the platform from the occupied areas through the use of plywood walls.
- 2.3.1.2 The bases of the support structure shall be adequately sized and rated to protect the floors. The Contractor shall be responsible for rectifying any damages caused by the support structure and the platform.
- 2.3.1.3 Ensure that the support structure is set up in a manner that will not interfere with activities that are regularly carried out in the space.

- 2.3.1.4 Ensure that the existing lighting levels are maintained under the platform by using temporary fluorescent light fixtures.
- 2.3.1.5 Install air tight and water tight escape hatches for every 500 square feet of platform. The hatches shall be designed to allow for quick egress from the work area in case of an emergency and shall be supplied with emergency lighting.

2.4 **Decontamination Enclosure Systems**

- 2.4.1 Decontamination enclosure systems shall be constructed before any other work commences. The decontamination systems shall include one system for workers decontamination and another system for equipment and waste decontamination.
- 2.4.2 Enclosure System for Worker Decontamination: This enclosure system shall consist of a clean room, a shower room and an equipment and access room.
- 2.4.2.1 Clean Room: A clean room shall be constructed between the clean occupied areas and the shower room. The clean room shall have:
- 2.4.2.1.1 A storage space for clean personal protective equipment.
- 2.4.2.1.2 Hangers, hooks and secures lockers for workers use and for safe storage of personal belongings.
- 2.4.2.1.3 A mirror to aid workers in fittings respiratory equipment before entry into the contaminated areas.
- 2.4.2.1.4 Airlocks on the shower side and the clean occupied area side.
- 2.4.2.1.5 A lockable wood door on the occupied area side to prevent unauthorized entry into the work areas.
- 2.4.2.1.6 An area of 100 square feet (minimum) or shall be based on a criteria of 10 square feet per worker, whichever is greater.
- 2.4.2.2 Shower Room: A shower room shall be constructed between the clean room and the equipment and access room. The shower room shall have:
- 2.4.2.2.1 A shower unit of the walk through type for every 8 workers.
- 2.4.2.2.2 Airlocks on the clean room side and the equipment and access room side.
- 2.4.2.2.3 Clean towels, soap and shampoo supplied by the Contractor for use by the workers.
- 2.4.2.2.4 A constant supply of hot and cold running water with individual controls within the shower units to regulate water temperature and flow rate.
- 2.4.2.2.5 Individual hot and cold shut-off valves with access from the clean room of the decontamination enclosure.
- 2.4.2.2.6 Containers for disposing of used respirator filters and hooks for hanging respirators located on the clean side of the shower.
- 2.4.2.2.7 Watertight piping and sealed drip pans.
- 2.4.2.2.8 Sump pumps for removing shower wastewater. Pump the wastewater through the filter systems specified before discharging into sanitary sewer drains.
- 2.4.2.2.9 Power switches and outlets that are ground fault protected. Sump pumps power switches shall be located on both sides of the shower unit.
- 2.4.2.3 Equipment and Access Room: An equipment and access room shall be constructed between the shower room and the contaminated work areas. The equipment and access room shall have:
- 2.4.2.3.1 Airlocks on the shower side and the contaminated area side.
- 2.4.2.3.2 An area of not less than 100 square feet to allow one worker enough space to undress comfortably.
- 2.4.2.3.3 Facilities for storing personal protective equipment and clothing which will be used again inside the contaminated areas.
- 2.4.3 Enclosure System for Equipment and Waste Decontamination: This enclosure system shall consist of a transfer room, a holding room and a cleaning room.
- 2.4.3.1 Transfer Room: A transfer room shall be constructed between the clean occupied areas and the holding room. The room shall have a lockable wood door on the occupied area side to prevent unauthorized entry into the work areas. It shall have airlocks on the clean occupied area side and

the holding room side. The size of the transfer room should be large enough to facilitate double bagging of waste bags or to house the largest piece of equipment used.

- 2.4.3.2 Holding Room: A holding room shall be constructed between the transfer room and cleaning room. The room shall have airlocks on the transfer room side and the cleaning room side. The size of the transfer room should be large enough to facilitate double bagging of waste bags or to house the largest piece of equipment used inside the asbestos work areas.
- 2.4.3.3 Cleaning Room: A cleaning room shall be constructed between the holding room and the contaminated area. The room shall have airlocks on the holding room side and the contaminated area side. The size of the cleaning room should be large enough to facilitate washing and cleaning of waste bags, containers and equipment and for double bagging of waste bags.
- 2.4.3.4 This enclosure system shall not be used by workers exiting the contaminated area as a replacement for the workers decontamination enclosure system.
- 2.4.4 Construction of Decontamination Enclosure Systems: Enclosures shall be constructed using suitable framing to fit the area. Alternatively, existing rooms can be used subject to the approval of the Environmental Consultant.
- 2.4.4.1 Use 2"x4" studs at 16" o/c to the construct the walls and ceilings frames. The interior side of the frame shall be covered by one layer of rip proof polyethylene sheeting.
- 2.4.4.2 Cover the exterior side of the frame located inside the contaminated area with plywood sheets. All plywood sheets joints shall be sealed with duct tape. Cover the plywood sheets with two independently sealed layers of rip proof polyethylene sheeting. Cover the exterior side of the frame which are not located inside the contaminated area or in an occupied area with 1 layer of rip proof polyethylene sheets. The exterior side of the frame located in an occupied area shall be covered with painted drywall sheets installed over one layer of rip proof polyethylene sheeting.
- 2.4.4.3 The floor of the decontamination enclosure system shall be protected with two independently sealed layers of rip proof poly sheets. The poly sheets used on the floor shall overlap with the poly sheets installed on the walls.
- 2.4.4.4 Separate the various rooms of the decontamination enclosure systems by curtained doorways constructed using two flap doors which are of the same dimensions as the openings. The flaps shall be made up of two layers of rip proof polyethylene sheets. Fasten the two sheets together and reinforce all edges with duct tape. The top and one side of each flap shall be secured to the enclosure frame. Attach a weight to the bottom of each of the flaps. Mark the opening between the two flaps using pieces of duct tape configured in the shape of a directional arrow.

PART 3 - EXECUTION

3.1 *Type 1 Removal Operation*

- 3.1.1 Initial Preparation and Isolation of Work Areas: Unless otherwise specified, work carried out as part of this phase shall proceed as follows:
- 3.1.1.1 Carry out a survey of the work areas to compile an inventory of existing damages and provide a copy to the Environmental Consultant.
- 3.1.1.2 The Contractor is responsible for moving materials and objects which are present in the work areas.
- 3.1.1.3 Prevent the spread of dust from the work area using measures appropriate to the work to be done.
- 3.1.1.3.1 Shut off, lock out and seal all ventilation duct vents with the application of one layer of 6 mil (0.15mm) thick clear polyethylene sheet sealed with tape.
- 3.1.1.3.2 Use FR polyethylene drop sheets over all flooring in work areas where dust and contamination cannot otherwise be thoroughly cleaned. This does not apply if work involves the removal of asbestos-containing floor tiles.
- 3.1.1.3.3 Use one layer of 6 mil (0.15 mm) thick clear polyethylene sheets to cover walls.
- 3.1.1.3.4 Separate parts of the building required to remain in use from the work area by polyethylene drop sheets at the perimeter of the work area.
- 3.1.1.3.5 Separate the work area with clearly visible warning signs advising of the hazards of asbestos dust and that entry is restricted to authorized trained personnel wearing personal protective equipment.
- 3.1.1.3.6 Erect scaffolding or platforms where necessary to perform the removal work. All platforms that exceed 25 feet in height will require the submission of a shop drawing stamped by a professional engineer for approval by the inspector within a minimum of 5 days prior to commencing the work. Guard rails shall be provided around all platforms or scaffolding where practicable. Cover the floor area of the scaffold or platform with one layer of FR polyethylene. Extend the floor of scaffolding or platform under an item being removed to act as a receptacle. Polyethylene sheeting shall be suitably braced and/or restrained so that billowing or failure of the polyethylene sheeting or taped joints does not occur.
- 3.1.2 Entry and Exit Procedures from Asbestos Removal Work Areas: the following general procedures shall be adhered to when entering into and exiting from asbestos abatement work areas:
- 3.1.2.1 Work Area Entry Procedures:
- 3.1.2.1.1 Every worker and visitor planning to enter the work area should remove all street clothing and should store them in a designated clean change room.
- 3.1.2.1.2 The person shall then put on disposal coverall with head covering, respirators with clean filters and foot covering and shall proceed to the work area.
- 3.1.2.2 Work Area Exit Procedures:
- 3.1.2.2.1 Each worker shall decontaminate their protective clothing, boots and respirator by first HEPA vacuuming and then by damp wiping using soap and water.
- 3.1.2.2.2 The removed disposable coveralls shall be disposed of as asbestos waste in a 0.15 mm (6 mil) labelled waste bag. Respirator filter inlets shall be sealed in tape or disposed of as asbestos waste.
- 3.1.3 Asbestos Removal Procedures
- 3.1.3.1 Asbestos Removal shall not commence until:
- 3.1.3.1.1 The work area is effectively separated from clean areas of the building.
- 3.1.3.1.2 Warning signs are posted outside the removal work areas.
- 3.1.3.1.3 All surfaces which are not possible to clean are sealed with polyethylene sheeting and tape.

- 3.1.3.1.4 Arrangements have been made for waste disposal, landfill site operator has been contacted and storage bin is on site.
- 3.1.3.1.5 Tools equipment and materials are on hand and in the work area.
- 3.1.3.1.6 Facilities for the washing of hands and face are available for workers leaving the work area.
- 3.1.3.2 Before beginning work remove visible dust from surfaces in the work area where dust is likely to be disturbed during the course of the work. Use HEPA vacuum, or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate. Do not use compressed air to clean up or remove dust from any surface.
- 3.1.3.3 Wet materials containing asbestos to be cut, ground, abraded, drilled, or otherwise disturbed with amended water. Use garden type low velocity fine mist sprayer. Perform work in a manner to reduce dust creation to lowest levels practicable. Spray asbestos material repeatedly during the work process to minimize asbestos fibre release.
- 3.1.3.4 Additional cement board removal procedures.
 - 3.1.3.4.1 Cement board shall be removed intact where possible.
 - 3.1.3.4.2 When not possible to remove intact, the board shall be cut with hand saws where necessary and dust shall be collected with a HEPA vacuum cleaner nozzle held under the cut area.
 - 3.1.3.4.3 Drop sheets shall be used no more than 0.5 metres below the cutting location and shall be constructed in such a manner that any dust not removed by the HEPA vacuum is collected.
- 3.1.3.5 Remove material in sections as intact as possible.
- 3.1.3.6 Frequently during the work and immediately after completion of the work, clean up dust and waste containing asbestos using a HEPA vacuum or by damp wiping.
- 3.1.4 Final Clean
 - 3.1.4.1 When removal is complete, clean the entire work area by HEPA vacuuming and wet wiping.
 - 3.1.4.2 The work area shall be deemed clean by the Inspector when there is no visible residue, dirt, film, stain, or discolouration resulting from either asbestos removal or cleaning activities.
 - 3.1.4.3 After completion of the initial cleaning and after the Inspector has passed the visual inspection, spray sealant on all surfaces in the work area, including, but not limited to:
 - 3.1.4.3.1 where asbestos material has been removed.
 - 3.1.4.3.2 polyethylene sheeting used on walls, floors and ceilings.
 - 3.1.4.4 Sealant should be sprayed using a garden reservoir type low velocity fine mist sprayer. The sprayer cannot be used if the nozzle is partially obstructed, or if a uniform fine mist spray cannot be obtained.
 - 3.1.4.5 After the area is declared clean and written approval to proceed has been received from the Inspector:
 - 3.1.4.5.1 Dismantle boundaries and isolating barriers as asbestos waste. Drop sheets shall be wetted and folded to contain dust and then placed in waste bags.
 - 3.1.4.5.2 Immediately before their removal from the work area, and disposal, clean each filled labelled waste bag using damp cloths or HEPA vacuum and place in second clean clear polyethylene waste bag.
 - 3.1.4.5.3 Dispose of waste as per procedures specified in subsection 1.15 Waste Transport and Disposal.
 - 3.1.4.6 Repair or replace objects damaged in the course of the work. Re-establish objects moved to temporary locations in the course of the work, in their proper positions. Re-secure mounted objects removed in the course of the work in their former positions.

3.2 Type 2 Removal Operation: For Work In Enclosures

- 3.2.1 Initial Preparation and Isolation of Work Areas: Unless otherwise specified, work carried out as part of this phase shall proceed as follows:
- 3.2.1.1 Carry out a survey of the work areas to compile an inventory of existing damages and provide a copy to the Environmental Consultant.
- 3.2.1.2 The Contractor is responsible for moving materials which are present in the work.
- 3.2.1.3 Prevent the spread of dust from the work area using measures appropriate to the work to be done.
- 3.2.1.3.1 Shut off, lock out and seal all ventilation duct vents with the application of one layer of 6 mil (0.15 mm) thick clear polyethylene sheet sealed with tape.
- 3.2.1.3.2 Clean all moveable objects within proposed work area using a HEPA vacuum.
- 3.2.1.3.3 Clean fixed casework, plant, and equipment within proposed work area, using a HEPA vacuum and cover with polyethylene sheeting sealed with tape.
- 3.2.1.3.4 Clean proposed work areas using, where practicable, HEPA vacuum cleaning equipment. Do not use methods that raise dust, such as dry sweeping, or vacuuming using other than HEPA filter-equipped vacuums.
- 3.2.1.3.5 Cover and seal airtight light fixtures, duct openings and other suspended ceiling objects using clear 6 mil polyethylene sheeting and tape.
- 3.2.1.3.6 Erect scaffolding or platforms necessary to perform the removal work. All platforms that exceed 25 feet in height will require the submission of a shop drawing stamped by a professional engineer for approval by the inspector within a minimum of 5 days prior to commencing the work. Guard rails shall be provided around all platforms or scaffolding where practicable.
- 3.2.1.3.7 Cover floor area of scaffold or platform with one layer of FR polyethylene.
- 3.2.1.3.8 Extend scaffolding or platform under the item being removed to prevent material from falling.
- 3.2.1.3.9 Separate parts of the building required to remain in use from the work area by polyethylene drop sheets at the perimeter of the work area.
- 3.2.1.3.10 Set up an airtight enclosure around the work area where the work on friable asbestos-containing material is to be carried out. Enclosure should be set up using 1 layer of FR polyethylene sheeting to cover the floors, and 1 layer of 6 mil (0.15 mm) thick clear polyethylene sheeting to cover the walls. Two layers of FR polyethylene sheeting should be used to cover carpeted floors. Polyethylene on the walls should be made to overlap with the polyethylene on the floor a minimum of 300 mm.
- 3.2.1.3.11 Polyethylene sheeting shall be suitably braced and/or restrained so that excessive billowing or failure of the polyethylene sheeting or taped joints does not occur as a result of the negative pressure differential created by the vacuums.
- 3.2.1.3.12 Erect a temporary structure made of wooden studs to support polyethylene sheeting where necessary.
- 3.2.1.3.13 Insert a hose of a HEPA filter equipped vacuum into the enclosure to provide negative air pressure inside the enclosure.
- 3.2.1.3.14 Entrance to the enclosure should be covered with two pieces of overlapping polyethylene sheeting.
- 3.2.1.3.15 Separate the work area with clearly visible warning signs advising of the hazards of asbestos dust and that entry is restricted to authorized trained personnel wearing personal protective equipment.
- 3.2.2 Entry and Exit Procedures from Asbestos Removal Work Areas: the following general procedures shall be adhered to when entering into and exiting from asbestos abatement work areas:
- 3.2.2.1 Work Area Entry Procedures:
- 3.2.2.1.1 Every worker and visitor planning to enter the work area should remove all street clothing and should store them in a designated clean change room.

- 3.2.2.1.2 The person shall then put on disposal coverall with head covering, respirators with clean filters and foot covering and shall proceed to the work area through the flaps covering the entrance to the enclosure.
- 3.2.2.2 Work Area Exit Procedures:
- 3.2.2.2.1 Each worker shall decontaminate their protective clothing, boots and respirator by first HEPA vacuuming and then by damp wiping using soap and water.
- 3.2.2.2.2 The removed disposable coveralls shall be disposed of as asbestos waste in a 0.15 mm (6 mil) labelled waste bag. Respirator filter inlets shall be sealed in tape or disposed of as asbestos waste.
- 3.2.3 Asbestos Removal Procedures
- 3.2.3.1 Asbestos Removal shall not commence until:
- 3.2.3.1.1 The work area is effectively separated from clean areas of the building.
- 3.2.3.1.2 Warning signs are posted outside the removal work areas.
- 3.2.3.1.3 All surfaces which are not possible to clean are sealed with polyethylene sheeting and tape.
- 3.2.3.1.4 Arrangements have been made for waste disposal, landfill site operator has been contacted and storage bin is on site.
- 3.2.3.1.5 Tools equipment and materials are on hand and in the work area.
- 3.2.3.1.6 Facilities for the washing of hands and face are available for workers leaving the work area.
- 3.2.3.2 Before beginning the work remove visible dust from surfaces in the work area. Use HEPA vacuum, or damp cloths where damp cleaning is considered more appropriate. Do not use compressed air to clean up or remove dust from any surface.
- 3.2.3.3 Wet materials containing asbestos to be removed, disturbed, or sealed with amended water. Garden reservoir type low velocity fine mist sprayer may be used. Perform work in a manner to reduce dust creation to lowest levels practicable. Spray asbestos material repeatedly during the work process to minimize asbestos fibre dispersion.
- 3.2.3.4 Removed material has to be placed directly in waste bags. Wherever possible, asbestos-containing material should be removed in sections as intact as possible.
- 3.2.3.5 Areas that used to be covered with the asbestos-containing material should be cleaned after the material is removed, using brushes, steel wool, or any other tools suitable.
- 3.2.3.6 Frequently during the work and immediately after completion of the work, clean up dust and waste containing asbestos using a HEPA vacuum or by damp wiping.
- 3.2.3.7 All labelled waste bags should be placed in clean clear 6 mil poly bags before they are taken out of the enclosure.
- 3.2.4 Final Clean
- 3.2.4.1 When removal is complete, clean the entire work area by HEPA vacuuming and wet wiping.
- 3.2.4.2 All tools and equipment used in the removal process such as hook knives, extension cords, scrapers, wire brushes, garden sprayers etc., should be washed and cleaned and placed in 6 mil polyethylene bags.
- 3.2.4.3 The work area shall be deemed clean by the Inspector when there is no visible residue, dirt, film, stain, or discolouration resulting from either asbestos removal or cleaning activities.
- 3.2.4.4 After completion of the initial cleaning and after the Inspector has passed the visual inspection, spray sealant on all surfaces in the work area, including, but not limited to:
- 3.2.4.4.1 where asbestos material has been removed.
- 3.2.4.4.2 polyethylene sheeting used on walls, floors and ceilings.

- 3.2.4.5 Sealant should be sprayed using a garden reservoir type low velocity fine mist sprayer. The sprayer cannot be used if the nozzle is partially obstructed, or if a uniform fine mist spray cannot be obtained.
- 3.2.4.6 Enclosure should be left standing until all the sealant has dried or, if required, until an air sample is taken inside the enclosure, and the fibre concentration level is below 0.05f/cc.
- 3.2.4.7 After the area is declared clean and written approval to proceed has been received from the Inspector:
 - 3.2.4.7.1 Dismantle boundaries and isolating barriers and treat as asbestos waste. Drop sheets shall be wetted and folded to contain dust and then placed in waste bags.
 - 3.2.4.7.2 Immediately before their removal from the work area, and disposal, clean each filled labelled waste bag using damp cloths or HEPA vacuum and place in second clean clear polyethylene waste bag.
 - 3.2.4.7.3 Dispose of waste as per procedures specified in subsection 1.15 Waste Transport and Disposal.
- 3.2.4.8 Repair or replace objects damaged in the course of the work. Re-establish objects moved to temporary locations in the course of the work, in their proper positions. Re-secure mounted objects removed in the course of the work in their former positions.

3.3 *Type 2 Removal Operation: For Work Using Glove Bags*

- 3.3.1 Initial Preparation and Isolation of Work Areas: Unless otherwise specified, work carried out as part of this phase shall proceed as follows:
 - 3.3.1.1 Carry out a survey of the work areas to compile an inventory of existing damages and provide a copy to the Environmental Consultant.
 - 3.3.1.2 Prevent the spread of dust from the work area using measures appropriate to the work to be done.
 - 3.3.1.2.1 Shut off, lock out and seal all ventilation duct vents with the application of one layer of 6 mil (0.15 mm) thick clear polyethylene sheet sealed with tape.
 - 3.3.1.2.2 Use FR polyethylene drop sheets over flooring such as carpeting that absorbs dust and over all flooring in work area where dust and contamination cannot otherwise be safely contained.
 - 3.3.1.2.3 Separate parts of the building required to remain in use from the work area by polyethylene drop sheets around the perimeter of the work area.
 - 3.3.1.2.4 Separate the work area with clearly visible warning signs advising of the hazards of asbestos dust and that entry is restricted to authorized trained personnel wearing personal protective equipment.
- 3.3.2 Worker Protection Procedures
 - 3.3.2.1 Before proceeding to the work area:
 - 3.3.2.1.1 Each worker shall don respirator and disposable coveralls, including head covering and suitable foot wear. Removal of street clothes in a designated clean room before wearing the disposable coveralls is recommended.
 - 3.3.2.2 Before leaving the work area:
 - 3.3.2.2.1 Each worker shall decontaminate their protective clothing, boots and respirator by first HEPA vacuuming and then by damp wiping using soap and water.
 - 3.3.2.2.2 The removed disposable coveralls shall be disposed of as asbestos waste in a 6 mil (0.15 mm) labelled waste bag.
 - 3.3.2.2.3 The worker shall proceed to clean their hands and arms. The waste water should be collected and filtered using a filter that passes particles 5 microns in size and smaller, before it is discharged into the municipal sewer system.
- 3.3.3 Asbestos Removal Procedures
 - 3.3.3.1 Asbestos Removal shall not commence until:

- 3.3.3.1.1 The work area is effectively separated from clean areas of the building by polyethylene drop sheets and the placing of rope barriers at the boundary of the designated work area. The boundaries of the work area shall be a minimum of 10 feet from the location of the insulation being removed.
- 3.3.3.1.2 Warning signs are posted outside the removal work areas.
- 3.3.3.1.3 All surfaces which are not possible to clean are sealed with polyethylene sheeting and tape.
- 3.3.3.1.4 Arrangements have been made for waste disposal, landfill site has been contacted and storage bin is on site.
- 3.3.3.1.5 Tools equipment and materials are on hand and in the work area.
- 3.3.3.1.6 Facilities for the washing of hands and face are available for workers leaving the work area.
- 3.3.3.2 Before beginning work remove visible dust from surfaces in the work area where dust is likely to be disturbed during the course of the work. Use HEPA vacuum, or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate. Do not use compressed air to clean up or remove dust from any surface.
- 3.3.3.3 Remove all obstructions from around pipe. Where access is required above plaster ceilings, provide sufficient openings to gain access.
- 3.3.3.4 Friable material containing asbestos to be removed or disturbed shall be thoroughly surface wetted before and during work unless wetting creates a hazard or causes damage. Use garden type low velocity fine mist sprayer. Sprayers that are partially clogged, or that does not produce uniformly fine mist will not be accepted. Perform work in a manner to reduce dust creation to lowest levels practicable.
- 3.3.3.5 Inspect all glove bags for defects before using. A defective bag shall not be used.
- 3.3.3.6 Ensure that the following tools are used:
 - 3.3.3.6.1 Knife shall have a retractable blade.
 - 3.3.3.6.2 Saw shall be a flexible wire type.
 - 3.3.3.6.3 Brushes shall not have metal bristles.
- 3.3.3.7 After written authorization has been received from the Inspector to proceed perform the removal using the following procedures.
 - 3.3.3.7.1 Place tools necessary to remove insulation, in tool pouch. Wrap the bag around pipe and close zippers. Seal bag to pipe with restraining nylon straps. Welds and folds of glove bag are to remain intact without modification to manufacturers design.
 - 3.3.3.7.2 Place hands in gloves and use necessary tools to remove insulation. Cut or remove exterior insulation covering where applicable to expose asbestos pipe covering. Wet exposed pipe or duct covering with sufficient mixture to suppress any dust. Arrange insulation in bag to obtain full capacity of bag.
 - 3.3.3.7.3 Insert nozzle of spray pump prefilled and primed with water and surfactant into bag through valve and wash down pipe and interior of bag thoroughly, use cloth or sponge to aid in washing process. Wet surface of insulation in lower section of bag.
 - 3.3.3.7.4 Waste material in bags intended for use at more than one location and which are equipped with internal zippers to seal off waste, shall have the upper section of bag thoroughly cleaned then shall be sealed off in lower sections of bag before bag is removed from pipe. Reinstall bag in new location before opening zip lock.
 - 3.3.3.7.5 If bag (**Only if bag is a Safe-T-Strip**) is to be moved along pipe, loosen straps, move bag, re seal to pipe using double pull zipper to pass hangers. Repeat stripping operation.
 - 3.3.3.7.6 To remove bag after completion of stripping wash top section and tools thoroughly. Seal off waste in lower section of bag using zipper. Pull polyethylene waste container over glove bag before removing from pipe. Release one strap and remove freshly washed tools. Place tools in water.

Remove second strap and zipper. Fold over into appropriately labelled waste disposal bags and seal.

3.3.3.7.7 Prior to removal of bag ensure that pipe is free of all residue. Remove all residue using wet cloths as necessary. Ensure that surfaces are free of sludge which after drying could release asbestos dust into atmosphere. Seal exposed surfaces of pipe and ends of insulation with slow drying sealer to seal in any residual fibres.

3.3.3.7.8 Upon completion of work, cover exposed ends of remaining pipe insulation with polyethylene tape.

3.3.3.7.9 If the glove bag is ripped, cut or opened in any way, work that may disturb friable material shall cease immediately. If the rip, cut or opening is small and easy to repair then the glove bag shall be repaired forthwith with tape. Work may continue once the repairs are complete. If the rip, cut or opening is not small and cannot be easily repaired, place the glove bag forthwith in a suitable asbestos waste container. Any spilled material containing asbestos shall be cleaned up and removed by using a vacuum equipped with a HEPA filter.

3.3.3.8 All work will be subject to visual inspection and air monitoring. Any contamination of surrounding areas indicated by visual inspection or air monitoring will require the complete enclosure and clean-up of affected areas.

3.3.4 Cleanup:

3.3.4.1 Frequently during the work and immediately after completion of the work clean up dust and waste containing asbestos using a HEPA vacuum or by damp mopping.

3.3.4.2 Place dust and waste containing asbestos in sealed dust tight waste bags. Drop sheets and disposable protective clothing shall be treated as asbestos waste and shall be wetted and folded inward to contain dust and then placed in waste bags.

3.3.4.3 Glove bags, disposal bags, dropsheets, cloth rags and any porous materials are to be considered as asbestos waste and handled according to disposal subsection.

3.3.4.4 Immediately before their removal from the work area, and disposal, clean each filled waste bag using damp cloths or HEPA vacuum and place in second clean waste bag.

3.3.4.5 Seal and remove double bagged waste from site. Dispose of in accordance with procedures specified in section 1.15.

3.3.4.6 Perform final thorough cleanup of work areas and adjacent areas affected by the work using HEPA vacuums.

3.4 **Type 3 Removal Operation**

3.4.1 Initial Preparation and Isolation of Work Areas: Unless otherwise specified, work carried out as part of this phase shall proceed as follows:

3.4.1.1 Carry out a survey of the work areas to compile an inventory of existing damages and provide a copy to the Environmental Consultant.

3.4.1.2 The Contractor is responsible for moving materials and objects which are present in the work areas.

3.4.1.3 Separate the asbestos removal work areas from other areas in the building required to remain in use by erecting floor to ceiling hoarding walls constructed of wood stud frames, plywood sheets and polyethylene sheeting (where specified). All joints formed between plywood sheets and between plywood sheets and other objects and building components shall be sealed air tight using a surface film forming type sealer and duct tape. Seal both edges of hoarding walls with caulking around fixtures and at walls and floors.

3.4.1.4 All surfaces, equipment and objects located in the work areas and not scheduled for removal shall be pre-cleaned by HEPA vacuuming or wet wiping and shall be protected by one layer of rip proof poly sheeting unless otherwise specified. Dry sweeping or vacuuming with units not equipped with HEPA filters shall not be allowed.

- 3.4.1.5 All equipment, objects and articles scheduled for removal shall be taken out of the work area only if its removal will not disturb any asbestos-containing materials.
- 3.4.1.6 Ensure that smoke detectors, fire alarms, heat detectors and other life safety equipment remain active and operating as installed.
- 3.4.1.7 All specified clean demolition work can be carried out before the Type 3 enclosure is set up on condition that the demolition work does not disturb any asbestos-containing materials.
- 3.4.1.8 Construct the decontamination enclosure systems for workers and for equipment and materials as specified.
- 3.4.1.9 Build tunnels and platforms in all locations in the work areas as specified and seal properly.
- 3.4.1.10 Independently seal off all openings leading to the work area using polyethylene sheeting and duct tape. Such openings include, but are not limited to, windows, doorways, corridors, skylights, diffusers, grills and air ducts. Also seal all floor openings independently before covering the entire floor with polyethylene sheeting. Ensure that the individual seals are air tight and water tight.
- 3.4.1.11 Cover floors with one layer of fibre reinforced polyethylene sheeting and seal with duct tape. Poly on the floor shall extend a minimum of 30 cm up all vertical surfaces located in the work area.
- 3.4.1.12 Cover walls with one layer of fibre reinforced polyethylene sheeting (unless specified otherwise). Overlap floor poly with wall poly by a minimum of 30 cm at each layer. The layers of wall poly shall always overlap the layers of the floor poly.
- 3.4.1.13 Ensure that adjoining sheets of poly used on walls and floors overlap by at least 30 cm.
- 3.4.1.14 Ensure that poly sheets are properly supported to avoid excessive billowing and failure of the enclosure as a result of applying negative pressure differential. Brace the poly in case of excessive billowing using 1"x2" straps.
- 3.4.1.15 Use flame resistant polyethylene sheeting near heat sources.
- 3.4.1.16 Create negative pressure in the work area using HEPA-filtered negative air unit distributed evenly (horizontally and vertically) within the work area. Supply any necessary platforms as required to elevate the negative air unit.
- 3.4.1.17 Provide enough negative air units to be able to exchange the air volume of the work area at least once every 20 minutes (three air changes per hour) and to maintain a minimum of 0.02" water gauge differential.
- 3.4.1.18 The pressure differential shall be continuously monitored using an automatic recorder as specified. Place the monitor outside the contaminated work area. A backup negative air unit shall be set up and ready for operation in case one of the original units fail.
- 3.4.1.19 Operate the negative air units from the start of the preparation and isolation phase until completion of the final clean-up work and air testing.
- 3.4.1.20 Ensure that the necessary make up air is supplied to the work area through flaps installed in the perimeter seal.
- 3.4.1.21 Replace pre-filters and HEPA filters as necessary to maintain the proper flow rate and to ensure that the unit continues to function properly.
- 3.4.1.22 Contaminated air from the work area shall be exhausted directly to the outside through sealed ducts. Where necessary, remove existing windows and replace with a plywood panel. Secure panel in place and make weather tight using caulking. Install appropriately sized openings for exhaust (typically 12"). Replace windows upon completion of work.
- 3.4.1.23 All negative air units which are set up to discharge inside the building shall be leak tested in place using the DOP method.

- 3.4.1.24 The Contractor is allowed to connect to the owner's existing water supply for use in the asbestos work areas and in the temporary shower and decontamination facilities. The Contractor shall be responsible for making all the connections using vacuum breakers and other backflow preventers.
- 3.4.1.25 The Contractor shall use copper pipes and fittings and high pressure hoses when making connections to the main water supply. The Contractor shall also install a main shut-off valve on the clean side of the decontamination enclosure. All connections shall be made downstream from the main shut-off valve. Ensure that the pressure in the temporary water distribution system is relieved if the system is to be left unattended. Ensure that no leaks are present around hose pipe connections. Minimize the possibility of water damage through spills or leaks by providing drip pans of suitable size and by ensuring that the drip pans are drained regularly.
- 3.4.1.26 Ensure that all water from the drainage facilities installed on the shower and other decontamination enclosures is passed through filtration systems as specified.
- 3.4.1.27 Test all temporary piping installed during this project and ensure that they are watertight. All temporary pipe installation shall remain water tight for the duration of the project. Pipes shall be installed parallel to walls and shall be temporarily secured to existing structures. Ensure that all piping is removed upon completion of work. Avoid damaging or altering the owner's existing water equipment and piping.
- 3.4.1.28 All electrical work shall be performed by a licensed electrician in compliance with all applicable regulations. Isolate, disconnect and lockout all power supplying or passing through the work area. Ensure that power supply to the remaining areas of the building is not disrupted during work in asbestos contaminated areas.
- 3.4.1.29 Unless specified, the use of the existing power and lighting circuits shall not be allowed. Use temporary electrical panels to provide power and lighting to the decontamination facilities and the work area. One electrical panel shall be provided for every 5000 square feet of contained asbestos work areas. Electrical panels shall be equipped and sized to handle all electrical equipment required for the completion of the project. The Contractor shall also be required to provide other additional electrical equipment such as temporary lighting, circuit breakers, panels, transformers and switch gears. The contractor is responsible for determining the location of the main panel in the building for their connections. The panels used by the contractor shall be compatible with the electrical systems in the building.
- 3.4.1.30 The contractor shall be responsible for establishing and maintaining fire and emergency exits from the work area that are acceptable to the Provincial Fire Marshall and other authorities having jurisdiction. The emergency exits shall be sealed in a manner that will not hinder the use of the doors during an evacuation and shall be clearly marked by using proper exit signs.
- 3.4.1.31 Battery powered emergency lighting shall be installed by the Contractor to provide general lighting throughout the work area in case of loss of power supply to the ground fault panel and to ensure that the emergency exits and the exit routes remain lit during the power failure.
- 3.4.1.32 Ensure that fire extinguishers are installed throughout the asbestos work area at each of the emergency exits and on both sides of the decontamination facilities. All fire extinguishers installed inside the work area shall be protected by clear polyethylene sheets and shall be easily accessible in case of an emergency.
- 3.4.1.33 The Contractor shall place warning signs at all access points leading to the contained work area. The signs shall be posted at the curtained doorways and shall read:

CAUTION
ASBESTOS HAZARD AREA
NO UNAUTHORIZED ENTRY
WEAR ASSIGNED PROTECTIVE EQUIPMENT
BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM

- 3.4.1.34 Once the initial clean preparation and isolation of the work area is completed, the Contractor shall request an inspection from the Environmental Consultant before proceeding to next phase. Notify the Environmental Consultant 24 hours before the inspection is needed.
- 3.4.1.35 Once authorization is obtained from the Environmental Consultant, proceed to setting up critical seals that might become accessible once removal operations commence.
- 3.4.1.36 Shut off and lock out the HVAC system serving the subject work area. Ensure that all work requiring the complete shutdown of the HVAC system is carried out during the time when the building is not occupied.
- 3.4.1.37 Set up the upper seal using two layers of rip proof poly sheets. One end of the poly sheets shall be tapped to the underside of the deck. The other end shall be fastened to the top of the lower work area perimeter seal. Ensure that the upper seal is airtight by sealing all opening around objects present in the ceiling space. Use smoke tubes to test the integrity of the seals after restarting the HVAC system for the rest of the building.
- 3.4.1.38 Unless otherwise specified, all electrical systems scheduled to remain inside the work area during asbestos removal activities shall be sealed using duct tape and poly sheets. Examples of such systems include speakers, wiring, smoke and heat detectors, alarm equipment, communication systems, PA systems, junction boxes, etc.
- 3.4.1.39 Once all the preparation work is complete, the contractor shall ensure that the work area is maintained neat and organized. All the enclosures shall be inspected by the supervisor before and after the completion of each work shift to ensure that the hoarding walls, polyethylene barriers and enclosures are intact. Any damaged discovered during the inspection shall be repaired immediately. Maintain an inspection log book on site to document when (date and time) the inspection was carried out and by who (name and signature of the person). Summarize any problems encountered during the inspection.
- 3.4.1.40 Ensure that the negative air units and the associated ducting and exhaust openings are regularly inspected during the work shift. The pressure differential monitoring unit shall be also inspected regularly during the work shift to ensure that the specified negative pressure inside the work area is maintained.
- 3.4.2 Entry and Exit Procedures from Asbestos Removal Work Areas: the following general procedures shall be adhered to when entering into and exiting from asbestos abatement work areas:
- 3.4.2.1 Work Area Entry Procedures:
- 3.4.2.1.1 Every worker and visitor planning to enter the work area shall remove all street clothing including undergarments and shall store them in the clean change room.
- 3.4.2.1.2 All uncontaminated articles such as clothing, footwear, towels, personal effects, etc. shall be store in the clean room of the decontamination facility.
- 3.4.2.1.3 The person shall then put on disposal coverall with head covering, respirators with clean filters and foot covering and shall proceed to the work areas through the shower and then the equipment and access room.
- 3.4.2.2 Work Area Exit Procedures:
- 3.4.2.2.1 Using HEPA vacuuming or wet wiping, remove all gross contamination from personal protective equipment (disposable coveralls, boots, hard hats, safety glasses, exterior of respirator, etc.) in the work area and then proceed to the equipment and access room.
- 3.4.2.2.2 In the equipment and access room, remove all protective clothing except the respirator and proceed to the shower. All disposal contaminated clothing shall be placed in asbestos disposal bags. Reusable items shall be stored neatly in the equipment and access room for use during the next shift.
- 3.4.2.2.3 Proceed naked to the shower while still wearing the respirator. While showering, clean the outside of the respirator with soap and water. Seal the openings in the filter as per the manufacturer's instruction or using duct tape. Alternatively, the filters can be disposed of as asbestos waste.

Continue showering by thoroughly wetting and washing the body and the head. Wet and clean the inside of the respirator. Filters shall not be allowed in the clean room if not properly sealed.

3.4.2.2.4 Upon completion of showering and drying off, proceed to the clean room and dress in street clothing.

3.4.3 Asbestos Removal Procedures

3.4.3.1 Asbestos removal work shall not commence until the following requirements have been met:

3.4.3.2 All work areas have been and contained as specified, decontamination enclosure systems have been set up and occupied areas of the building have been properly isolated.

3.4.3.2.1 All required notifications have been made and a notice of project have been posted in a visible area.

3.4.3.2.2 Warnings signs have been displayed at all potential access points into the work area.

3.4.3.2.3 All arrangements have been made with the waste disposal facility.

3.4.3.2.4 All equipment, materials and tools needed inside the work area are available and in working condition.

3.4.3.2.5 Appropriate negative pressure differential have been established inside the work area with proper allowance for makeup air.

3.4.3.2.6 All building security arrangements have been made.

3.4.3.2.7 Written authorization has been obtained from the Environmental Consultant to commence asbestos removal work.

3.4.3.3 Using an airless sprayer, spray the asbestos-containing material with water mixed with a wetting agent. Apply enough amended water to ensure that the material is wet all way through to the substrate. Avoid dripping. Etch the surface of the material being wetted in cases were the water does not penetrate the outer layer of the material.

3.4.3.4 Remove the wet asbestos-containing materials in layers and/or small sections while maintaining exposed surfaces of insulation in a wet condition. Spray the material regularly throughout the removal work to maintain saturation and to minimize the generation and dispersion of dust. Ensure that the wet material does not dry out.

3.4.3.5 Ensure that the removed material and other waste generated during the removal process is collected and bagged immediately. Place the material in yellow labelled bags. Ensure that the waste water is also collected regularly. Avoid pooling of water. Dispose of the waste water in labelled 6 mil polyethylene bags (or other suitable rigid containers) or pump it straight into the sanitary sewer after passing it through the specified two stage filters. Refer to Section 3.3.4 for specific procedures for handling of materials and waste.

3.4.3.6 Mist the air during the removal process using an airless sprayer capable of producing a fine mist and amended water to keep the airborne fibres levels as low as possible. Monitor the air inside the work area during removal. Airborne fibre levels in excess of 2.5 fibres/cc requires the utilization of more airless sprayers.

3.4.3.7 Remove deck mounted objects and other obstructions as necessary to facilitate the removal of the asbestos-containing materials. Ensure that the removal work includes all asbestos-contaminated materials specified for removal.

3.4.3.8 After completion of gross asbestos removal work, perform a more thorough cleaning of all surfaces that used to be covered by asbestos to remove all visible residue and fibrous materials. Cleaning shall be carried out using wire brushing (stiff bristle brushes such as nylon or fibre bristles not metal), wet sponging and vacuuming. Ensure that the surfaces remain wet during the performance of this work.

3.4.3.9 Notify the Environmental Consultant in cases where asbestos-containing materials is encountered which cannot be properly removed without demolishing building structural members or removing major service elements. The Environmental Consultant will advise the Contractor in writing regarding

the next course of action. If sealing the material in place is the recommended course of action, apply a penetrating sealer onto the material and ensure that it penetrates all the way to the substrate.

3.4.3.10 Continue with the wet thorough cleaning activities and include other surfaces in the work area including, but not limited to, decontamination facilities, polyethylene sheeting, walls and floor surfaces, equipment, containers, piping, ducts, conduits and poly surfaces used in the equipment and access room and the equipment decontamination facilities. Pre-filters used on the negative air units shall be removed and shall be disposed of as asbestos waste.

3.4.3.11 Request a visual clearance inspection by the Environmental Consultant once all the cleaning activities are completed. The level of cleanliness shall be acceptable to the Environmental Consultant before a written authorization is issued to apply the lock-down material.

3.4.4 Procedures for Handling of Materials and Waste

3.4.4.1 Seal all filled asbestos waste containers and clean the exterior of the containers and other items by wet sponging. Move the containers from the filling area to a temporary storage area located within the enclosure and close to the equipment waste decontamination facility.

3.4.4.2 Move the item to the container cleaning room, clean by wet sponges and pass it through the curtained doorway to a second worker stationed in the holding room. The second worker shall be fully protected (similar to the removal workers) and can only leave by going through the work area and exiting through the worker decontamination facility (after taking a shower). The second worker shall then clean or double bag and seal the item and shall pass it through the curtained doorway to a third worker stationed in the transfer room. The third worker enters the transfer room from the clean side and does not need to use personal protective equipment. The third worker is then responsible for transferring the item to the disposal bin or to the Contractor's temporary storage room or truck.

3.4.4.3 All waste generated within the asbestos work area shall be treated as asbestos-contaminated waste and shall be disposed of accordingly. Non-porous materials which can be properly washed and cleaned can be disposed of as normal waste after cleaning.

3.4.4.4 The contractor shall use a combination of a rigid container with 6 mil poly bag to transport and dispose of waste containing sharp materials which could rip two 6 mil poly bag.

3.4.4.5 Transportation of waste and materials through occupied areas of the building shall be limited to a time when the building is not occupied. The Contractor shall use covered carts to transport the waste inside the building. Predetermined transport routes shall be approved by the Environmental Consultant. Workers transporting the waste shall be equipped with spill kits and full personal protective equipment and shall be trained to contain and clean any spilled asbestos-containing materials resulting from a failure in the waste containers.

3.4.4.6 Ensure that waste transport routes, loading areas and garbage bin storage areas are kept clean at all times. Garbage bins shall be of the fully enclosed type and shall be locked at all times when not in use. Garbage bins shall be placed only in locations specified and approved by the Owner or his representative.

3.4.4.7 Schedule garbage bin pick up and drop off times in consultation with the Environmental Consultant and ensure that the scheduled times do not interfere with the operations of the building Owner of his tenants.

3.4.4.8 Transport and dispose of asbestos waste as specified in Section 1.15

3.4.5 Procedures for Locking-Down of Work Area

3.4.5.1 Upon completion of clean-up operations and after receiving written authorization from the Environmental Consultant to proceed, apply a lock-down agent acceptable to the Environmental Consultant on all surfaces in the work area such as areas where asbestos materials has been removed, pipes, ducts and other exposed objects present in the work area, polyethylene sheeting and other exposed walls, ceilings and floors, etc. Ensure that the sprayed material covers all surfaces. Apply twice as much lock-agent on areas that used to be covered by asbestos-containing materials.

- 3.4.5.2 Ensure that proper respiratory protective equipment is used during the application of the lock-down agent since, depending on the nature of the sealer used, potentially hazardous materials could be generated during the application process.
- 3.4.5.3 Restrict access to the work area for a period of 24 hours after completion of the lock-down application to allow for the dust to settle and for the lock-down agent to dry off. Clearance air samples will then be collected inside the work area.
- 3.4.5.4 The work area shall be considered acceptable for public occupancy only if the airborne fibre levels inside the work area are less than 0.01 fibres/cc. Levels above 0.01 fibres/cc requires that the entire area be re-cleaned and another coat of lock-down agent be applied by the Contractor on all surfaces in the work area. Re-sampling will be carried out and the entire process shall be repeated until the fibres levels are less than 0.01 fibres/cc.
- 3.4.5.5 The Contractor shall be responsible for all charges associated with re-cleaning work and other associated requirements as specified.
- 3.4.6 Procedures for Work Area Teardown and Dismantling
- 3.4.6.1 Proceed with the teardown of the work area only after obtaining written authorization from the Environmental Consultant. Ensure that Type 3 procedures remain in effect during this phase of work. The worker and equipment and material decontamination units shall remain fully operational. The negative air units shall continue to operate throughout the duration of the teardown work.
- 3.4.6.2 Start by removing polyethylene sheeting by carefully folding it away from the walls to the centre of the work area making sure that any loose debris is trapped within the poly. Also remove all enclosures, duct tape, caulking, polyurethane foam and other materials used in setting up the enclosure. Ensure that one layer of polyethylene sheeting is kept in place in situations where re-application of fireproofing is required. Polyethylene and other materials used in setting up enclosures shall be disposed of as asbestos-contaminated waste.
- 3.4.6.3 Clean all vacuum units, fittings, hoses and other small tools used during the removal work inside the work area, seal in 6 mil poly bags and remove from the work area through the equipment and materials decontamination unit. Wash down and clean other equipment used during the work and remove from the work area.
- 3.4.6.4 Clean up the asbestos work area including all surfaces and all decontamination enclosures. Remove negative air units pre-filters and dispose of as asbestos waste. Seal the exterior of the unit on all sides with poly and remove from the work area.
- 3.4.6.5 Remove all waste bags containing polyethylene sheets and other materials used to set up the enclosures and dispose of as specified.
- 3.4.6.6 Remove all hoarding walls separating the work area from occupied areas except in locations where the walls are set up adjacent to other areas that still contain asbestos. Obtain approval of Environmental Consultant before dismantling hoarding walls.
- 3.4.6.7 Dismantle the remainder of the enclosure including scaffolding, platforms, decontamination facilities, tunnels, etc. Final clean the work area using HEPA vacuuming and wet wiping. Clean and remove all ground fault panels and temporary lighting.
- 3.4.7 Procedures for Re-Establishment of Objects and Systems
- 3.4.7.1 Re-establish mechanical and HVAC systems and install new clean air filters where previously removed. Re-establish all electrical system and return to as found condition unless otherwise specified.
- 3.4.7.2 Repair, replace and make good on all damages not identified during the per-removal survey.
- 3.4.7.3 Unless otherwise specified, all items and objects removed during the various phases of the work shall be returned to their original position and shall be properly mounted and secured.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- .1 All formwork for cast-in-place concrete including falsework.
- .2 Reshoring of concrete slabs and beams.
- .3 Shoring existing construction to carry concrete construction loads.
- .4 Pullout Testing.
- .5 Waterstops.
- .6 Dovetail anchor slots.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- .1 Concrete Reinforcement, Section 03 20 00
- .2 Cast-in-Place Concrete, Section 03 30 00
- .3 Precast Structural Concrete, Section 03 40 10

1.3 REFERENCES

- .1 CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
- .2 CSA-A23.2, Methods of Test and Standard Practices for Concrete.
- .3 CSA O121, Douglas Fir Plywood.
- .4 CAN/CSA-O141, Softwood Lumber.
- .5 CSA S269.1, Falsework for Construction Purposes.
- .6 CAN/CSA-S269.3, Concrete Formwork.
- .7 ASTM C900, Standard Test Method for Pullout Strength of Hardened Concrete.
- .8 ASTM D412-98a, Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
- .9 ASTM D624-00e1, Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
- .10 ASTM D746, Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.

1.4 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 30 00 - Submittals.
- .2 Submit to the Consultant for review before the start of Work, 4 white prints of shop drawings. Leave room on drawings for the stamps of the Consultant and the Structural Engineer. Check and sign before submission. Only 2 copies will be returned to General Contractor.
- .3 For multi-storey construction, ensure that sufficient reshoring is provided to prevent overloading of the structure while constructing the work above.
- .4 Provide seal and signature of qualified professional engineer registered in Ontario on each shop drawing.
- .5 Structural design of formwork, falsework and reshoring will not be reviewed by the Consultant.

1.5 TOLERANCES

- .1 Conform to CSA A23.1 unless more stringent tolerances are specified for interfacing materials, in which case the more stringent tolerances apply.

PART 2 - MATERIAL

2.1 MATERIALS

- .1 Falsework materials: to CSA S269.1.
- .2 Formwork materials: to CAN/CSA S269.3 and as follows
 - .1 For concrete without special architectural features, use plywood and wood formwork materials to CSA O121 and CAN/CSA O141.
 - .2 For architectural concrete use high density overlay plywood to CSA O121. Not required if concrete is to be sandblasted.
 - .3 Circular forms for architectural concrete and no spiral pattern:
 - .1 Redline Poli-Permaform with poli-liner by Perma Tubes Ltd.
 - .2 Burke Smooth Tube with PVC liner by Aluma International
 - .4 Circular forms when not architectural concrete: spirally wound laminated fiber forms internally treated with release material.
 - .5 Square fiber forms:
 - .1 Sonotube Square Fiber Forms by Sonoco Ltd. with square fiberboard insert locked with polystyrene inside round form.
- .3 Form ties:
 - .1 For concrete not designated architectural, use removable or snap ties, fixed or adjustable length, free of devices leaving holes larger than 25mm dia. in concrete surface.

SECTION 03 10 00 - CONCRETE FORMWORK

- .2 For architectural concrete, use galvanized ties complete with temporary plastic cones and permanent light grey concrete plugs recessed 6mm.
- .3 Form ties to be metal designed to act as ties and spreaders and having a minimum working strength of 13 kN (3000 pounds).
- .4 Snap ties to snap cleanly at least 25mm from concrete surface without damage to the concrete.
- .5 Cone ties to be internal disconnecting types that snap cleanly at least 38mm from concrete surface without damage to the concrete.
- .4 Form liner: High density overlay plywood to CSA O121 or other special materials to achieve the required concrete finish.
- .5 Form release agent: Chemically active release agents containing compounds that react with free lime in concrete resulting in water insoluble soaps.
- .6 Form stripping oil: Colourless mineral oil, free of kerosene, with viscosity between 15 to 24mm²/s (70 and 110 s Saybolt Universal) at 40°C, flashpoint minimum 150°C, open cup.
- .7 Grooves, reglets and chamfers: White pine selected for straightness and accurately dressed to size.
- .8 Void Form: Cellular cardboard with minimum compressive strength of 62 kPa (9 psi) designed to carry weight of wet concrete and loads associated with placing concrete and also designed to disintegrate and create an air space below the fully hardened concrete.

2.2 ACCESSORIES

- .1 PVC Waterstops:
 - .1 CPD PVC Waterstop by CPD
 - .2 Sealtight PVC Waterstop by W.R. Meadows of Canada
Use 100mm wide in construction joints and 225mm wide with 31mm O.D. centre bulb in expansion joints.
- .2 Bentonite Waterstops:
 - .1 Waterstop RX 101 by CETCO (distributor: DRE Industries)
- .3 Dovetail anchor slots: minimum 0.6 mm thick galvanized steel with insulation filled slots.
- .4 Weep hole tubes: plastic.

PART 3 - EXECUTION

3.1 CONSTRUCTION REVIEW

- .1 Review of construction by Consultant is to ascertain general conformity with contract documents. It does not relieve the Contractor of his contractual responsibilities. The

review is based on representative samples of the work and does not relieve the Contractor from carrying out his own quality control and making the work in conformity with the drawings and specifications.

- .2 Construction reviews are undertaken by the Consultant and the Inspection and Testing Agency so that the Owner may be informed in writing as to the quality of the Contractor's performance and for the protection of the Owner. They will be carried out by examination of representative samples of the Work.
- .3 The Contractor will receive copies of the construction review reports and the results of material tests. He will thereby be informed of any defects or deficiencies found.
- .4 Bring to the attention of the Consultant, any defects or deficiencies in the Work, which may occur during construction together with a proposal for remedy. The Consultant will decide what corrective action may be taken and will issue the necessary instructions.

3.2 FABRICATION AND ERECTION

- .1 Conform to CSA A23.1.
- .2 Fabricate and erect falsework in accordance with CSA S269.1. Do not place falsework and reshores on frozen ground.
- .3 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within required tolerances.
- .4 Make formwork tight and flush faced to prevent the leakage of mortar and the creation of unspecified fins or panel outlines.
- .5 Form sides of footings unless otherwise noted on the Structural Drawings.
- .6 See drawings for any camber required in hardened concrete. Measure cambers relative to member supports.
- .7 Obtain Consultant's approval for formed openings not indicated on Structural Drawings.
- .8 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .9 Clean forms before placing concrete.
- .10 Provide water stops and keys around temporary openings in basement and retaining walls for shoring rakers or similar purposes.
- .11 Use internal form ties.
- .12 Do not permit loads from formwork to be transmitted to adjacent existing structure.

SECTION 03 10 00 - CONCRETE FORMWORK

- .13 Apply a form coating and release agent uniformly to the contact surface of formwork panels before reuse.
- .14 Construction joints:
 - .1 Provide construction joints where specified or shown on the drawings. Locate and make other joints so as not to impair the required strength of the structure. Joints are subject to the review of the Consultant.
 - .2 Locate construction joints near third of spans of slabs, beams and girders unless a beam intersects a girder at this point. In that case offset the girder joint twice the beam width and provide additional shear reinforcement to the acceptance of the Consultant.
 - .3 Slabs on steel deck: Locate construction joints in slabs at centre of supports unless there are composite beams.
 - .4 Walls: Provide vertical construction joints in walls at 30m (100 feet) maximum. Provide vertical control joints in walls at 9m (30 feet) maximum.
 - .5 Outside walls: Provide vertical keyed expansion joints in walls at 14.6m (48 feet) maximum. Provide vertical control joints in walls at 4.8m (16 feet) maximum.
 - .6 Slabs: Provide construction joints in slabs at 30m (100 feet) maximum in both directions.
- .15 PVC Waterstops:
 - .1 Install waterstops in all expansion, construction and control joints in exterior walls, basement walls, retaining walls, slabs supporting earth, and other locations shown. Locate construction joints with waterstops at least 300mm away from corners and wall intersections.
 - .2 Heat splice all sections of waterstops for continuity over the full length of runs. Use prefabricated splice sections where two runs intersect.
 - .3 Securely wire waterstops to reinforcing bars at 1m (3 feet) maximum centres to keep them in alignment when concrete is placed.
- .16 Bentonite Waterstops:
 - .1 Install bentonite waterstops in all construction joints in exterior walls, basement walls, retaining walls, slabs supporting earth, and other locations shown. Use PVC waterstops at expansion joints.
 - .2 Locate bentonite waterstops 75 mm from outside face of concrete to avoid spalling of concrete due to swelling pressure of bentonite.
 - .3 Butt strips together. Do not overlap.
 - .4 Fasten to concrete at 600 mm maximum.
- .17 Void form: Conform to recommendations of manufacturer. Place on sand leveling bed. Protect from moisture until concrete is about to be placed. Protect from excessive construction loads. If void form collapses during construction, remove and replace affected area.
- .18 Dovetail anchor slots: Provide vertical dovetail anchor slots at 600 mm on centre where masonry covers face of concrete. Provide vertical dovetail slots at centre of masonry wythe where masonry abuts concrete.

3.3 REMOVAL AND RESHORING

- .1 Conform to CSA A23.1.
- .2 Survey tops of slabs and submit survey plan to Consultant before removal of supporting falsework. Survey slabs at supports, at midspans between supports and at centres of bays.
- .3 Remove falsework supporting beams and slabs only after concrete has reached at least 75% of its specified 28 day strength. For beams and slabs exceeding 6 m span, reshore at least until concrete has reached its 28 day strength.
- .4 Construction gaps: Do not remove falsework supporting beams and slabs adjacent to construction gaps until the gaps are filled and concrete in gaps has reached at least 75% of its specified 28 day strength.
- .5 Use pullout tests to determine in-situ strength of concrete prior to removal of falsework. Retain a testing company to supply, locate and test the inserts in accordance with ASTM C900. See CSA A23.2 Appendix A.
- .6 For multi-storey construction, reshore beams and slabs to prevent overloading of the structure while constructing the work above.

3.4 FIELD QUALITY CONTROL

- .1 Obtain field review of falsework and reshoring by a professional engineer registered in Ontario prior to each pour. The Consultant will not field review the formwork, falsework or reshoring

3.5 PITS, CURBS, BASES

- .1 Construct all concrete sumps, pits, trenches, curbs and machinery bases forming part of floor construction that are required within the building by other trades.

3.6 MECHANICAL AND ELECTRICAL WORK

- .1 Construct all concrete underground electrical duct banks, underground water service thrust blocks and supports for underground piping in unstable fill. Also construct all concrete pads for pipes passing through foundation walls, manholes and catch basins. See mechanical and electrical drawings and specifications for details and extent of work.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- .1 All reinforcement for cast-in-place concrete.
- .2 Supply of reinforcing bars for masonry.

1.2 RELATED WORK

- .1 Concrete Formwork, Section 03 10 00.
- .2 Cast-in-Place Concrete, Section 03 30 00.
- .3 Precast Structural Concrete, Section 03 40 00.
- .4 Masonry, Division 4.

1.3 REFERENCES

- .1 Reinforcing Steel Manual of Standard Practice published by the Reinforcing Steel Institute of Canada.
- .2 ACI SP-66, ACI Detailing Manual published by the American Concrete Institute.
- .3 CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
- .4 CSA-A23.3, Design of Concrete Structures.
- .5 ASTM A82, Standard Specification for Steel Wire, Plain, for concrete reinforcement.
- .6 ASTM A185, Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
- .7 CSA G30.18, Billet-Steel Bars for Concrete Reinforcement.
- .8 CAN/CSA G40.21, Structural Quality Steels.
- .9 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .10 ASTM D3963/D3963M, Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars.

1.4 SOURCE QUALITY CONTROL

- .1 Upon request, provide the Consultant with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis.
- .2 Upon request, inform the Consultant of proposed source of material to be supplied.

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- .3 Upon request, provide the Consultant with a copy of plant certificate by the Concrete Reinforcing Steel Institute for epoxy coating of reinforcement.
- .4 Upon request, provide the Consultant with a copy of manufacturer's instructions for patching factory applied epoxy coating.
- .5 Use welding firm certified by the Canadian Welding Bureau under the requirements of CSA W186.

1.5 SHOP DRAWINGS

- .1 Submit shop drawings including placing of reinforcement in accordance with Section 01 30 00 - Submittals. This applies to all reinforcement including reinforcing bars for masonry to be installed by the Masonry Trade.
- .2 Submit to the Consultant for review before the start of Work, 4 white prints of shop drawings. Leave room on drawings for the stamps of the Consultant and the Structural Engineer. Check and sign before submission. Only 2 copies will be returned to General Contractor.
- .3 Allow a minimum of 10 working days for review of each submission of shop drawings in the Structural Engineer's office. Shop drawings received after noon will be date-stamped as received the following working day.
- .4 If required, CAD diskettes of the Structural Drawings are available "as-is", and at cost, for use in the preparation of shop drawings provided that the title blocks are removed and provided that the Owner and the Owner's Consultants are not held responsible for any errors or omissions on the drawings. These CAD drawings are not to be scaled.
- .5 Submit plans, elevations, sections, and bar lists necessary to show reinforcing and to facilitate review and placing. Show location of construction joints and detail reinforcement at joints. Dimension strips for flat slabs and flat plates. Draw elevations of walls including reinforced masonry walls. Show concrete cover on the diagrams. Draw to scale not smaller than 1:50.
- .6 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacings, locations of reinforcement and splices with identifying code marks to permit correct placement without reference to Structural Drawings.
- .7 Conform to CSA A23.1 and the Reinforcing Steel Manual of Standard Practice, unless the Contract Documents contain a more stringent requirement, in which case the latter shall govern. Provide accessories as required by the Standard. Conform to ACI, SP-66 Detailing Manual whenever a detail condition is not covered by any of the above, but is covered by the ACI Manual.
- .8 Design and detail lap lengths and bar development lengths to CSA-A23.3, unless otherwise indicated. Provide standard hooks at ends of hooked bars.

SECTION 03 20 00 - CONCRETE MASONRY REINFORCEMENT

- .9 Do not release for fabrication reinforcing bars whose length may be affected by field conditions, such as the final elevation of footings, until the governing field dimensions have been ascertained.
- .10 Review of shop drawings by the Consultant is on a sampling basis for general conformity with contract documents. It is not a detailed check and must not be construed as relieving the Contractor of responsibility for making the work accurate and in conformity with the Contract Documents.
- .11 Design for which the Contractor is responsible under the contract will not be reviewed. Work done prior to the receipt of the reviewed shop drawings will be at the risk of the Contractor. Review comments are not authorization for changes to the contract price.
- .12 After review, drawings will be returned to the Contractor stamped to show one of the following:
 - .1 Reviewed - Released for fabrication.
 - .2 Noted - Released for fabrication after revisions noted are made. Submit revised drawing for Consultant's records.
 - .3 Resubmit - Correct and resubmit for review.

Conform to the requirements of each authority that has reviewed the drawings.
- .13 Keep on site at all times a set of reviewed shop drawings and use only these drawings and the Structural Drawings to place reinforcing steel. Neatly mark on the Structural Drawings changes issued during the course of construction.

1.6 TOLERANCES

- .1 Conform to CSA A23.1.
- .2 Cover to be not less than required for fire rating.

1.7 SUBSTITUTES

- .1 Substitute different size bars only if permitted in writing by the Consultant.

1.8 ALLOWANCE

- .1 Include an allowance of five tonnes of additional reinforcing bars in the Contract. Allowance to include all costs including supply, detailing, fabricating and placement of rebars. Provide detailed records of use. Provide credit for unused portion based on unit prices.

PART 2 - MATERIALS

2.1 MATERIALS

- .1 Reinforcing steel: billet steel, grade 400 MPa, deformed bars to CSA-G30.18, unless otherwise indicated.

SECTION 03 20 00 - CONCRETE MASONRY REINFORCEMENT

- .2 Weldable reinforcing steel: weldable steel, grade 400MPa, deformed bars to CSA G30.18. Required only where welding is indicated.
- .3 Cold-drawn annealed steel wire ties: to CSA G30.3.
- .4 Welded wire fabric: to CSA G30.5. Provide in flat sheets only.
- .5 Epoxy coated reinforcement: Apply fusion bonded epoxy coating conforming to the requirements of ASTM D3963/D3963M. Provide colour which contrasts sharply with reinforcing steel and rust colours. Brown is not acceptable. All bars must be supplied by plants certified by the Concrete Reinforcing Steel Institute for epoxy coated steel. Certified plants include:
 - .1 Harris Rebar - Stoney Creek, Ontario
 - .2 Teme Rebar Concepts - Fruitland, OntarioProvide patching material for areas where the epoxy coated is damaged or omitted in accordance with the coating manufacturer's written instructions using material supplied by the manufacturer.
- .6 Bar supports and side form spacers: to CSA-A23.1. For exposed concrete surfaces and for floor and roof slabs with directly applied ceiling finish: use either plastic bar supports or plastic tipped bar supports for at least the bottom 25mm; use plastic side form spacers; and use plastic with colour to match concrete. For epoxy coated reinforcement, use plastic bar supports, epoxy coated support bars and plastic coated tie wires.
- .7 Epoxy coating of existing reinforcement: Amerlock 400 High-Solids Epoxy by Amercoat Canada Inc. or an equivalent material acceptable to the Consultant. Provide colour which contrasts sharply with steel and rust colours.

2.2 FABRICATION

- .8 Fabricate reinforcing steel in accordance with CSA-A23.1, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .9 Obtain Consultant's approval for locations of reinforcement splices other than shown on placing drawings.
- .10 Where indicated, weld reinforcement in accordance with CSA-W186. Use weldable reinforcing steel.
- .11 Ship bundles of bar reinforcement, clearly identified in accordance with bar lists.

PART 3 - EXECUTION

3.1 PLACING REINFORCEMENT

- .1 Handle epoxy coated bars in accordance with CSA S413.
- .2 Place reinforcing steel in accordance with CSA-A23.1.

SECTION 03 20 00 - CONCRETE MASONRY REINFORCEMENT

- .3 Concrete cover to be not less than required for fire rating.
- .4 Use only reviewed shop drawings and the Structural Drawings for placing of reinforcement. Report discrepancies to the Consultant before proceeding.
- .5 Before placing, remove all loose scale, dirt, oil or other coatings, which would reduce bond.
- .6 Turn the ends of tie wire towards the interior of the concrete.
- .7 Use bar supports for beams and slabs. Use precast concrete chairs where supports rest on the ground. Where welded wire fabric is used in slabs-on-grade, place precast concrete chairs at 600 mm on centre each way. Use side form spacers for walls and columns.
- .8 No splicing of reinforcement is permitted other than shown on the Structural Drawings.
- .9 Do not cut reinforcement without written approval of Consultant.
- .10 Ensure concrete cover to reinforcement is maintained during concrete pour.

3.2 FIELD BENDING

- .1 Do not field bend reinforcement except where indicated or authorized by the Consultant. Do not field bend epoxy coated reinforcement.
- .2 When field bending is authorized, bend without heat, applying a slow and steady pressure. Replace bars, which develop cracks or splits.

3.3 FIELD WELDING

- .1 Do not field weld reinforcement except where indicated or authorized by the Consultant. Do not weld epoxy coated reinforcement.
- .2 Conform to CSA A23.1 and CSA W186.

3.4 PATCHING FACTORY APPLIED EPOXY COATING

- .1 If factory applied epoxy coating is damaged or omitted, patch in accordance with coating manufacturer's written instructions using material supplied by manufacturer.

3.5 REVIEW OF CONSTRUCTION

- .1 Provide the Consultant with a minimum of 24 hrs notice of intended concrete pours to allow review of reinforcement.
- .2 Review of construction by Consultant is to ascertain general conformity with contract documents. It does not relieve the Contractor of his contractual responsibilities. The review is based on representative samples of the work and does not relieve the Contractor from carrying out his own quality control and making the work in conformity with the drawings and specifications.

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- .3 Reviews are undertaken so that the Owner may be informed in writing as to the quality of the Contractor's performance and for the protection of the Owner.
- .4 The Contractor will receive copies of the construction review reports and the results of material tests. He will thereby be informed of any defects or deficiencies found.
- .5 Bring to the attention of the Consultant, any defects or deficiencies in the Work, which may occur during construction together with a proposal for remedy. The Consultant will decide what corrective action may be taken and will issue the necessary instructions.

3.6 REINFORCED MASONRY

- .1 Supply reinforcing bars required for the construction of masonry lintels, beams, walls, columns and piers. Provide shop drawings. Note that Structural Drawings do not show all openings. Refer to lintel notes on structural drawings.

3.7 PITS, CURBS, BASES

- .1 Construct all concrete sumps, pits, trenches, curbs and machinery bases forming part of floor construction that are required within the building by other trades.
- .2 Unless otherwise shown on drawings, reinforce curbs with 10M @ 400 dowels plus 2 - 10M continuous horizontal.
- .3 Unless otherwise shown on drawings, reinforce bases with 10M at 300 each way placed 50 mm below top of concrete.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- .1 All cast-in-place concrete including supply, placing, finishing and curing.
- .2 Installing embedment.
- .3 Grouting under base plates and bearing plates.
- .4 Installing shelf angles/plates and wall plates that bear on or are attached to concrete.

1.2 RELATED WORK

- .1 Concrete Formwork, Section 03 10 00.
- .2 Concrete Reinforcement, Section 03 20 00.
- .3 Precast Structural Concrete, Section 03 40 00.
- .4 Structural Steel, Section 05 10 00.

1.3 REFERENCES

- .1 ASTM C260, Standard Specification for Air-Entraining Admixtures to Concrete.
- .2 ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .3 ASTM C494/C494M, Standard Specification for Chemical Admixtures for Concrete.
- .4 ASTM D1751, Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
- .5 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .6 CSA A5, Portland Cement.
- .7 CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
- .8 CSA-A23.2, Methods of Test and Standard Practices for Concrete.
- .9 CAN/CSA A3000, Cementitious Materials for Use in Concrete.
- .10 CAN/CSA S448.1, Repair of Reinforced Concrete in Buildings.
- .11 CSA A283, Qualification Code for Concrete Testing Laboratories

1.4 QUALITY ASSURANCE

- .1 Concrete supplier to have a valid "Certificate of Ready Mixed Concrete Production Facilities" as issued by the Ready Mixed Concrete Association of Ontario.

1.5 PROJECT RECORDS

- .1 Batch Logs: Concrete supplier to keep record of each batch delivered to site.
- .2 Concrete Delivery Slips: Keep all concrete delivery slips ("driver's tickets") on site until building is completed. Record on delivery slip where concrete was placed including time and date.
- .3 Record Drawings: Record on a set of Structural Drawings extent of each pour including pour date and falsework removal date. Also record all changes to that shown on drawings including footing elevations.
- .4 Keep project records up to date and make available to Consultant at all times.

1.6 SUBMITTALS

- .1 Submit to the Consultant for review before the start of Work, 4 white prints of shop drawings. Leave room on drawings for the stamps of the Consultant and the Structural Engineer. Check and sign before submission. Only 2 copies will be returned to General Contractor.
- .2 Minimum 2 weeks prior to starting concrete work, submit certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA-A23.1.
- .3 Minimum 2 weeks prior to starting concrete work, submit all concrete mix designs, including pump mixes, and indicate where each concrete mix is to be used. Where Class C1, C2 or F1 mix designs are required, submit test data to confirm that air-void system conforms to CSA A23.1 for each mix design.
- .4 Minimum 2 weeks prior to starting concrete work, submit a written confirmation that all admixtures used in concrete will not have any adverse impact on the long term durability and performance of concrete, or any other materials embedded or in contact with concrete. Also provide a written statement that any admixtures used in concrete will not have any adverse effect on human health and the environment.
- .5 Minimum submission requirements for each concrete mix design shall include the following:
 - .1 minimum specified compressive strength at 28 days
 - .2 maximum aggregate size
 - .3 aggregate type (if not normal density)
 - .4 alkali-aggregate resistance
 - .5 concrete density range, wet and dry (if not normal density)
 - .6 CSA exposure class
 - .7 cement type (if not type 10)

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- .8 maximum water/cement ratio
 - .9 plastic air content range air-void system test data
 - .10 assumed method of placement of concrete
 - .11 slump range
 - .12 percentage and type of any supplementary cementing materials
 - .13 admixtures (type and name only)
 - .14 certificate of compatibility between admixtures unless all admixtures are supplied by same manufacturer
- .6 Minimum 2 weeks prior to starting concrete work, submit proposed quality control procedures for Consultant's approval for following items:
- .1 Finishing, curing and protection
 - .2 Hot weather concreting
 - .3 Cold weather concreting
- .7 Minimum 4 weeks prior to placing any slabs-on-grade, submit drawings showing proposed locations of construction joints and control joints in slabs-on-grade.

PART 2 MATERIAL

2.1 CONCRETE MIX MATERIALS

- .1 Portland cement: to CSA-A5.
- .2 Cementitious hydraulic slag: to CSA-A363.
- .3 Flyash: to CSA-A23.5, Type CI.
- .4 Water: to CAN/CSA-A23.1.
- .5 Aggregates: to CSA-A23.1. Coarse aggregates to be crushed stone or gravel which is suitable for type N concrete as defined by Supplementary Guidelines to OBC 2024, SG-2, . Do not use recycled concrete as aggregate.
- .6 To ensure compatibility, all admixtures to be supplied by a single manufacturer or certificate of compatibility to be provided with mix design.
- .7 Air entraining admixture: to ASTM C260.
- .8 Chemical admixtures: to ASTM C494. Do not use admixtures containing chlorides.
- .9 Corrosion inhibiting admixture: Containing calcium nitrite:
 - .1 DCI by W.R. Grace (use DCI-S with ambient temperatures above 20°C)
 - .2 Rheocrete CNI by Master Builders (add set retarder with ambient temperatures above 20°C).

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- .10 Shrinkage reducing admixture: Eclipse Floor for non-air entrained concrete and Eclipse Plus for air entrained concrete by W.R. Grace. Confirm compatibility with superplasticizer if being used.
- .11 Plastic fibre additive: fibrillated polypropylene fibres at least 19mm in length:
 - .1 Fibremesh by Master Builders
 - .2 ConLoc Fibres by Pro Technologies
 - .3 Fiberforce by Ampro
 - .4 Promesh by Canada Cordage

2.2 OTHER MATERIALS

- .1 Grout: Premixed, non-metallic, non-shrink:
 - .1 Euco NS Grout by Euclid Admixture Canada
 - .2 Masterflow 713 by Chemrex (M.B.T.)
 - .3 V-3 Grout by W.R. Meadows of Canada
 - .4 Sikagrout 212 by Sika Canada
 - .5 M-Bed Standard by Sika Canada
 - .6 CPD Non-Shrink Grout by CPD
- .2 Dry pack grout: Use 1:2 mix of Portland cement and concrete sand. Add sufficient water for the mixture to retain its shape when made into a ball by hand. When thickness of grout exceeds 50mm, use 1:1½:2 mix of Portland cement, concrete sand and 10mm pea gravel instead. Compressive strength at 28 days to be 30 MPa.
- .3 Liquid curing/sealing compound: to ASTM C309 Type 1, Class B, water based acrylic, compatible with surface hardener where hardener is used:
 - .1 Sealtight CS 309 by W.R. Meadows of Canada. Apply two (2) coats where exposed concrete floor is called for in Room Finishing Schedule. Apply first coat as soon as concrete sets - Apply second coat just prior to occupancy by Owner.
- .4 Premoulded joint fillers: Bituminous impregnated fibre board: to ASTM D1751.
- .5 Evaporation reducer: Confilm by Chemrex (M.B.T.)
- .6 Bonding agent: synthetic latex :
 - .1 Surfacrete Concentrate by Sika Canada
 - .2 Intralok by W.R. Meadows of Canada
 - .3 Acryl-Set by Chemrex (M.B.T.)
 - .4 CPD Concentrated Latex Adhesive by CPD
- .7 Drilled concrete expansion anchors:
 - .1 Kwik-Bolt by Hilti
 - .2 Wedge Anchor by Ucan Fastening Products
- .8 Drilled concrete adhesive anchors:
 - .1 HVA Adhesive Anchor by Hilti.
 - .2 ADH Adhesive Anchor by Ucan Fastening Products

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- .9 Epoxy for bonding anchors and dowels into predrilled holes in concrete:
 - .1 HIT-HY-150 by Hilti
 - .2 Epcon Ceramic 6 by ITW Construction Products
 - .3 Flo-Rok FR1-22 & FR3-22 by Ucan Fastening Products

- .10 Non-slip nosing insert for concrete stairs: Fine aluminum oxide strips, 6mm (¼") wide x 10mm (d") deep.

- .11 Vapour barrier:
 - .1 10mil polyolefin to CAN/CGSB-51.34

- .12 Rigid insulation: Extruded polystyrene boards:
 - .1 Styrofoam SM by Dow Chemical
 - .2 Styrofoam HI-100 by Dow Chemical

- .13 Control joint filler: semi-rigid filler to protect against slab edge breakdown:
 - .1 For sawcuts and joints in interior slabs:
 - .1 Rezi-Weld Flex by W. R. Meadows
 - .2 Loadflex by Sika Canada
 - .2 For sawcuts and joints in exterior slabs:
 - .1 Sikaflex 2C NS/SL by Sika Canada

- .14 Elastomeric bearing pads: Virgin natural polyisoprene or virgin polychloroprene conforming to CAN/CSA-S6,

- .15 Sliding bearing assembly: Galvanized top steel plate with a type 304 stainless steel highly polished lower surface and bottom elastomeric pad with a polytetrafluoroethylene (Teflon) upper surface. Static and kinetic coefficients of friction not to exceed 5% under working stress. Assembly to have a working stress capacity of 7 MPa on lower pad. Elastomeric bottom pad to allow a 2% rotation of upper plate and still maintain a substantially uniform bearing pressure between plate and pad. For concrete work, provide two 12 dia. anchor studs for top plate and provide water tight polyethylene wrapping for assembly, except for anchor studs, which can be left in place during construction. Manufactured by:
 - .1 Fabreeka Canada Ltd.
 - .2 Goodco Ltd.
 - .3 Structural Tech Corp. Ltd.

- .16 Controlled density concrete fill, $f'c = 4$ MPa:
 - .1 K-Crete by Dufferin Concrete Products or equivalent

- .17 Prefabricated Seepage Protection System:
 - .1 Terradrain 200 by Terrafix Geosynthetics Inc.
 - .2 Weeperwick by Subsurface Systems Inc.

- .18 Bentonite Geotextile Waterproofing:
 - .1 Voltex by CETCO (distributor : DRE Industries)

- .19 Crack Filler Epoxy: Capweld 524 by Cappar Ltd.

- .20 Base under concrete Slabs on Grade: Clean, crushed stone, 20 to 22mm.

2.3 CONCRETE MIXES

- .1 Use ready-mix concrete. Proportion concrete in accordance with CSA A23.1,,. Use a water-reducing agent in all concrete. Obtain approval of the Consultant for the use of admixtures other than water-reducing and air entraining agents.
- .2 Supplementary cementing materials: Conform to the directions of the slag and fly ash manufacturers for the proportioning and mixing of concrete. Except as otherwise required, limit supplementary cementing materials to no more than 25% of total cementitious content and limit the fly ash component to no more than 10% of total cementitious content. The limit on supplementary cementing materials may be increased for Class N exposure concrete provided that the effects of the resulting concrete properties, including finishing, rate of early-age strength gain, curing and protection, are considered by the Contractor and a letter describing these effects and any special construction procedures is submitted for review with the mix design. Do not use supplementary cementing materials in architectural concrete.
- .3 For columns less than 300mm in least dimension and for walls less than 200mm thick, reduce nominal size of coarse aggregate to 10mm.
- .4 Interior slabs, beams, walls and columns: Provide normal density concrete to give following properties unless otherwise noted:
 - .1 Class of exposure: N
 - .2 Cement: Type GU
 - .3 Minimum compressive strength at 28 days: 25MPa unless specified otherwise on Structural Drawings
 - .4 Nominal size of coarse aggregate: 20mm. See also clause 2.3.3.
 - .5 Slump at time and point of discharge: 50mm to 110mm
- .5 Footings, piers, and foundation walls: Provide normal density, frost resistant concrete to give following properties:
 - .1 Class of exposure: F-2
 - .2 Cement: Type GU
 - .3 Minimum compressive strength at 28 days: see Structural Drawings
 - .4 Maximum water/cementing material ratio: 0.55
 - .5 Nominal maximum size of coarse aggregate: 20mm. See also clause 2.3.3.
 - .6 Slump at time and point of discharge: 50mm to 110mm
 - .7 Air content: 4 to 7%
- .6 Lean concrete and mud slabs: Provide normal density concrete to give following properties:
 - .1 Class of exposure: N
 - .2 Cement: Type GU
 - .3 Minimum compressive strength at 28 days: 10 MPa

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- .4 Nominal maximum size of coarse aggregate: 20mm.
- .5 Slump at time and point of discharge: 50mm to 110mm

- .7 Exterior, exposed walls and columns exposed to freezing and thawing, but not exposed to chlorides: Provide normal density, frost resistant concrete to give following properties:
 - .1 Class of exposure: F-2
 - .2 Cement: Type GU
 - .3 Minimum compressive strength at 28 days: 25MPa unless specified otherwise on Structural Drawings
 - .4 Maximum water/cementing material ratio: 0.55
 - .5 Nominal maximum size of coarse aggregate: 20mm. See also clause 2.3.3.
 - .6 Slump at time and point of discharge: 50mm to 110mm
 - .7 Air content: 4 to 7%

- .8 Structurally reinforced concrete exposed to chlorides, including exterior reinforced slabs: Provide normal density concrete to give following properties:
 - .1 Class of exposure: C-1
 - .2 Cement: Type GU
 - .3 Minimum compressive strength at 28 days: 35MPa
 - .4 Maximum water/cementing material ratio: 0.40
 - .5 Nominal maximum size of coarse aggregate: 20mm. See also clause 2.3.3.
 - .6 Slump at time and point of discharge: 50mm to 110mm
 - .7 Air content: 5 to 8%

- .9 Interior slabs-on-grade: Provide normal density concrete to give following properties:
 - .1 Class of exposure: N
 - .2 Cement: Type GU
 - .3 Minimum compressive strength at 28 days: 25MPa unless specified otherwise on Structural Drawings
 - .4 Maximum water/cementing material ratio: 0.55
 - .5 Nominal maximum size of coarse aggregate: 20mm. Increase to 40mm where slab-on-grade thickness exceeds 130mm
 - .6 Slump prior to addition of fibres: 50mm to 110mm
 - .7 Plastic fibre additive: apply at rate of 0.9 kg/m³. Add sufficient water reducing agent to restore slump loss.
 - .8 Slump at time and point of discharge, after addition of fibres and plasticizer: 50mm to 110mm
 - .9 Provide curing/sealing coat to all slabs-on-grade; two coats where slab exposed-refer to 2.2.3. above.

- .10 Interior slabs-on-grade with resilient floor finishes: Provide normal density concrete to give following properties:
 - .1 Class of exposure: N
 - .2 Cement: Type GU
 - .3 Minimum compressive strength: 25 MPa
 - .4 Nominal maximum size of coarse aggregate: 40mm

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- .5 water/cementing material ratio: 0.55
- .6 Slump at time and point of discharge: 50mm to 110mm

- .11 Construction Method:
 - .1 Place & compact 200mm of clean, crushed stone, 20 to 22mm size.
 - .2 Construct slab-on-grade on 15 mil polyolefin sheet vapour barrier placed directly below concrete. Terminate vapour barrier by extending vertically up the abutting concrete walls.
 - .3 Saw cuts should be done with a dry process (soft-cut on the same day of a pour).
 - .4 Curing: Apply 24 hours of wet curing. Start curing immediately after finishing slab. Cover slab-on-grade for at least 72 hours using plastic sheets with joints taped and free edges covered.
 - .5 Protection: Protect finished and cured slab from surface water (ie. rain, snow).
 - .6 Refer to Architectural Specifications for acceptable moisture content and testing methods prior to placing floor finishes.

- .12 Interior and roof concrete toppings, curbs and bases: Provide normal density concrete to give following properties:
 - .1 Class of exposure: N
 - .2 Cement: Type GU
 - .3 Minimum compressive strength at 28 days: 25 MPa
 - .4 Nominal size of coarse aggregate for:
 - .1 Toppings between 25 and 35 mm thick: 10mm
 - .2 Toppings between 35 and 50mm thick: 14mm
 - .3 Thicker toppings: 20mm
 - .5 Slump at time and point of discharge: 20mm to 60mm

Where topping is less than 25mm thick, no coarse aggregate is allowed and a bonding agent shall be provided within the mix and to bond the topping to the substrate.

- .13 Exterior unreinforced slabs, driveways, sidewalks, curbs and gutters, parking slabs on grade: Provide normal density, chloride resistant concrete to give following properties:
 - .1 Class of exposure: C-2
 - .2 Cement: Type GU
 - .3 Minimum compressive strength at 28 days: 32 MPa
 - .4 Maximum water/cementing material ratio: 0.45
 - .5 Nominal maximum size of coarse aggregate: 20mm
 - .6 Slump at time and point of discharge: 50mm to 110mm
 - .7 Air content: 5 to 8%

- .14 Exterior, unreinforced pavements: Provide normal density concrete to give following properties:
 - .1 Class of exposure: C-2

- .2 Cement: Type GU
 - .3 Minimum compressive strength at 28 days: 32 MPa
 - .4 Maximum water/cementing material ratio: 0.45
 - .5 Nominal maximum size of coarse aggregate: 20mm
 - .6 Slump at time and point of discharge: 40mm to 80mm. Use plasticizer if necessary to increase slump for placement.
 - .7 Air content: 5 to 8%
- .15 Concrete in block lintels, masonry bond beams, masonry walls: Provide normal density concrete to give following properties:
- .1 Class of exposure: N
 - .2 Cement: Type GU
 - .3 Minimum compressive strength at 28 days: 20 MPa
 - .4 Nominal maximum size of coarse aggregate: 10mm
 - .5 Slump at time and point of discharge: 80mm to 110mm for lintels and beams, 200mm for masonry vertical walls.
 - .6 Pre-mixed Coarse Grout can be used for masonry vertical walls.

PART 3 - EXECUTION

3.1 CONSTRUCTION REVIEW

- .1 Construction reviews are undertaken by the Consultant and the Inspection and Testing Agency so that the Owner may be informed in writing as to the quality of the Contractor's performance and for the protection of the Owner. They will be carried out by examination of representative samples of the Work.
- .2 The Contractor will receive copies of the construction review reports and the results of material tests. He will thereby be informed of any defects or deficiencies found.
- .3 Bring to the attention of the Consultant, any defects or deficiencies in the Work, which may occur during construction together with a proposal for remedy. The Consultant will decide what corrective action may be taken and will issue the necessary instructions.

3.2 PREPARATION

- .1 Obtain written approval of each footing bearing surface by Geotechnical Engineer prior to placing concrete for footings/mud slabs.
- .2 Confirm that subgrade and backfill meets specifications and is free of frost and surface water before placing slab-on-grade.
- .3 Provide vapour barrier under all slabs placed on the ground including slabs-on-grade and framed slabs.

- .4 Grout column base plates and beam bearing plates as soon as steelwork is completed. Do not add load on steelwork until grouting is completed and grout strength has reached at least 20 MPa.

3.3 SLEEVES, OPENINGS AND EMBEDMENTS

- .1 Ensure that sleeves and openings do not impair the required strength of the member, and unless shown on the Structural Drawings, are accepted by the Consultant for size, location, and reinforcement before concrete is cast. No trade shall cut holes through existing concrete unless acceptable to the Consultant.
- .2 Do not embed in slabs and walls any conduit or pipe whose outside diameter is greater than one-quarter the concrete thickness. Do not space less than 3 diameters on centre. Locate so as not to impair the required strength of the member. Do not install in or below columns, conduit which displaces more than 3 percent of the cross-section.
- .3 Cooperate with any trade applying finishes to concrete surfaces to obtain a surface, which will ensure adequate bond. Provide chases, chamfers and reglets where required.
- .4 No sleeves, ducts, pipes or other openings shall pass through joists, beams, column capitals or columns, except where indicated on Structural Drawings or approved by the Consultant.
- .5 Where approved by Consultant, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere. Unless indicated on the Structural Drawings, sleeves and openings greater than 100 x 100 mm must be approved by Consultant.
- .6 Do not eliminate, cut or displace reinforcement to accommodate openings or hardware. If openings or hardware cannot be located as specified, obtain approval of modifications from Consultant before placing of concrete.
- .7 Check locations and sizes of sleeves and openings shown on Structural Drawings with Architectural, Mechanical and Electrical Drawings. Notify Consultant of any discrepancies.
- .8 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
- .9 Anchor bolts: Set anchor bolts using templates under supervision of appropriate trade prior to placing concrete. Locate each anchor bolt group to within 6 mm of required location with no accumulation of tolerances allowed between groups.

3.4 PLACING CONCRETE

- .1 Notify Consultant 24 hours before placing concrete and 24 hours before closing wall forms.
- .2 Do cast-in-place concrete work in accordance with CSA-A23.1.
- .3 Remove water and disturbed soil from excavations before placing concrete therein.

- .4 Do not overload forms.
- .5 Use rubber tipped vibrators for concrete containing epoxy coated reinforcement.

3.5 FINISHING FLATWORK

- .1 Finish flatwork in accordance with CSA-A23.1, and following clauses.
- .2 Protect concrete during finishing process in accordance with CSA-A23.1. Also use evaporation reducer during severe drying conditions.
- .3 Cast slabs with a top surface that is level or sloping as required by the Drawings. Allow for cambering where required. Set top of slab below finished floor level by the distance required for the type of applied finish.
- .4 Provide final finish in accordance with proposed use and as follows:
 - .1 Screeded and bull floated for: mud slabs and footings.
 - .2 Screeded and bull floated with scratch finish for: base slabs, which receive mortar setting beds or bonded toppings.
 - .3 Powered float finish for: roofs and slabs, which receive a membrane.
 - .4 Wood float finish with brooming for: exterior exposed slabs.
 - .5 Powered steel trowel finish for: interior exposed slabs; slabs which receive resilient flooring, carpet, epoxy-based finishes, thin-set tiles, etc.
- .5 Steel trowel exposed interior concrete floors at least twice. Provide final spin trowelling when non-slip finish is required.
- .6 Except as noted, conform to finish tolerance Class A for floors and Class B for exterior slabs and base slabs for toppings. For wood flooring, conform to finish tolerance Class C. Compliance will be considered satisfactory if 80% of the measurements, using the straightedge method, are less than or equal to the tolerance and no measurement exceeds the tolerance by more than 25%. When requested by Consultant, make measurements within 3 days of placing concrete and before falsework is removed and submit results to Consultant.

3.6 CURING AND PROTECTION

- .1 Cure and protect concrete in accordance with CSA A23.1. In addition to Cold-Weather Protection requirements in A23.1, provide protection so that temperature of concrete surfaces is maintained at not less than 21 degrees C for 3 days after placement, not less than 10 degrees C for the next 2 days and above freezing for the next 2 days. Vent exhaust gases from combustion type heaters to atmosphere outside heated enclosure.
- .2 Cure slab surfaces immediately after finishing is completed. Use a curing compound compatible with applied finishes except where bonded topping to be applied. Where curing compound is not used, cover slab surfaces with absorptive mat or fabric and keep continuously wet.

- .3 Extend basic curing period until concrete has reached following strength levels for structural safety:
 - .1 Framed slabs and beams: 75% of specified 28 day strength.
 - .2 Columns, piers and footings: 75% of specified 28 day strength.
 - .3 Walls: 50% of specified 28 day strength.

3.7 FINISHING FORMED SURFACES

- .1 Finish formed surfaces in accordance with CSA A23.1. Completely fill holes left by through-bolts with grout.
- .2 Do not patch surfaces until instructed in writing by Consultant.
- .3 Where honeycombing has cut out in accordance with CSA A23.1. do not patch until reviewed by Consultant.
- .4 Provide smooth-form finish for all exposed concrete surfaces.
- .5 Provide smooth-rubbed finish to all concrete surfaces exposed to public view. Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.

3.8 BONDED TOPPINGS

- .1 Not more than 24 hours prior to applying concrete toppings, clean base slab of dirt, laitance, loose material and grease. Scrub with 10 percent solution of muriatic acid and rinse clean. Four to six hours before laying topping, saturate surface with clean water. Surface shall have reached a damp condition at the time the new concrete is placed. Apply a slurry coat of cement and water to the surface and immediately follow with the topping or apply approved and compatible bonding agent in accordance with manufacturer's instructions.
- .2 Do not allow the temperature difference between base slab and new concrete to exceed 6 degrees C when concrete is placed.
- .3 Make mix consistency as stiff as can be worked with a sawing motion of the strike-off board. Consolidate concrete by rolling and tamping. Float with a power floating machine weighing at least 90 kg. Finish and cure as specified for floors.
- .4 Locate joints in top course directly over joints in base course.
- .5 Minimum thickness of topping over cambered base slab shall be 38 mm at high point.
- .6 Remove any concrete which seeps through joints of precast units and clean surface before concrete sets.

3.9 SLABS ON GRADE

- .1 Determine that the compacted granular fill supporting slabs-on-grade has been approved before starting work.
- .2 Over compacted granular fill, place & compact 200mm of clean crushed stone, 20 to 22mm size. Refer to Fill Type A.
- .3 Over crushed stone, lay 15mil polyolefin sheet vapour barrier. Lap all joints 200mm and seal any punctures prior to placing concrete. Seal all joints and punctures with tape. Repair all tears or holes with layers of sheeting, tapping all seams. Extend vapour barrier 150mm up walls at edge of slabs.
- .4 Provide and install joint filler between slab and masonry walls.
- .5 See Drawings for thickness of concrete and slab reinforcing.
- .6 Provide slab depressions and slopes as indicated on the Architectural Drawings. Slope floors to drain.
- .7 Testing & Inspection Company must inspect vapour barrier and reinforcing just prior to placement of concrete and Contractor must rectify any deficiencies noted prior to pour.

3.10 GROUTING UNDER BASE PLATES AND BEARING PLATES

- .1 Grout under base plates and bearing plates using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.
- .2 Grout column base plates and beam bearing plates as soon as steelwork is completed. Do not add load on steelwork until grouting is completed and grout strength has reached at least 20 Mpa.

3.11 JOINTS

- .1 Slabs-on-grade: Provide joints in both directions. Maximum spacing of construction joints to be 30m with sawcut joints in-between spaced at 30 times slab thickness maximum, but not more than 5m maximum. Locate joints on column centre lines wherever possible and on intermediate lines, which result in approximately square panels. Protect edges of sawcuts from breakage. Clean out sawcuts in exposed slabs and fill with control joint filler after concrete is at least 120 days old. At construction joints in exposed slabs, sawcut top 25 mm for a width of 5 mm and fill with control joint filler after concrete is at least 120 days old. Clean out sawcuts in other slabs and fill with a sand-cement paste one month prior to installing floor coverings.
- .2 Construction Joints and Control Joints: See Section 03 10 00.
- .3 Expansion Joints: See Structural Drawings for widths, locations and details. Remove all forming and filler material used during construction and provide clear space between structural elements equal to width specified.

- .4 Construction Gaps: See Structural Drawings for widths, locations and details. Do not place concrete in gaps in beams and slabs until all concrete at that level is at least 28 days old. Do not fill wall gaps until all adjoining framed slabs, above and below, are at least 28 days old.
- .5 Isolation Joints: Provide 10mm thick premoulded joint filler of the same depth as the thickness of the concrete wherever slabs-on-grade abut foundation walls, columns and piers. Omit if slab is chased or dowelled into structure.

3.12 DRILLED ANCHORS

- .1 Conform to requirements of manufacturer. Use hammer drill to make holes. Hole diameters must never exceed those required by manufacturer. Tighten all expansion anchors using a torque wrench unless finger-tight is required by the Drawings to allow for movement. Unless otherwise noted on drawings, provide manufacturer's standard embedment length into solid concrete.
- .2 Do not cut reinforcement to accommodate anchors. Relocate anchors, at no extra cost to the Contract, when obstructions prevent drilling holes to required depth in locations specified. Obtain Consultant's approval of new location before drilling hole. Fill all abandoned holes with grout.
- .3 Arrange for manufacturer's technical representative to be present during installation of first few anchors of each size and type. Submit site reports by manufacturer to Consultant within one week of each visit. Reports to indicate anchor sizes and types installed, locations, and names of those present during installation.
- .4 Retain an inspection and testing company to randomly select and pull test 5% of all types and sizes of anchors installed on a weekly basis, but not less than one anchor of each type and size. Pull test to twice the design tension capacity of the anchor given by the manufacturer. Submit reports to Consultant within one week of testing. Reports to indicate each anchor location, test load and mode of failure, if applicable. Notify Consultant immediately if any anchor fails the pull test.

3.13 CRACKS IN SLABS-ON-GRADE

- .1 Extensive cracking of slabs-on-grade or cracks in excess of 3 mm in width shall be cause for rejection of slab or portion of slab at the discretion of the Consultant.
- .2 Protect edges of cracks in slabs-on-grade from breakage.
- .3 Unless slab is rejected, repair cracks that are over 0.4 mm wide in exposed slabs-on-grade in unfinished areas after concrete is at least 120 days old. Repair by filling crack with a sand-cement grout and then, after 7 days, cutting out top 20 mm of crack for a width of 5 mm and filling with control joint filler.

3.14 INSPECTION AND TESTING

- .1 Inspection and testing of concrete and concrete materials will be carried out in accordance with A23.1 by a Testing Agency designated by Consultant. Testing agency shall be certified under CSA A283 with category to suit testing provided.
- .2 Agency will review all submittals pertaining to concrete mix designs and certification of plant, equipment and materials.
- .3 Agency will take additional test cylinders during cold weather concreting. Assist Agency by curing these cylinders for 7 days on site adjacent to the work which they represent and under the same conditions as the concrete which they represent.
- .4 Samples will be taken prior to the addition of steel fibre reinforcement or superplasticizers to the mix on site.
- .5 Methods for testing concrete will be in accordance with CSA-A23.2.
- .6 Inspection or testing by Agency will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.
- .7 Assist the Agency in its work. Notify Agency as to the concreting schedule and before each pour. Provide concrete samples.
- .8 The Agency will report to the Consultant, with copies to the Structural Engineer, Contractor, Concrete Supplier and Municipal Authorities. Reports will include the locations in structure to which tests relate, comments on abnormal results and conditions, and the Supplier's mix design numbers. Test reports shall be provided within five working days.

3.15 PITS, CURBS, BASES

- .1 Construct all concrete sumps, pits, trenches, curbs and machinery bases forming part of floor construction that are required within the building by other trades.
- .2 Provide isolation joints between machinery bases and slabs-on-grade.

3.16 EXTERIOR SLABS & SIDEWALKS

- .1 Exterior slabs shall be finished with a spin trowel finish followed with a fine broom and the edges shall be rounded with an edging tool. Slab thickness shall be 125mm except as noted on drawings. Reinforce slab with one layer of welded wire mesh in flat sheets or as otherwise noted on drawings and apply one coat of curing sealing compound as soon as the concrete will support a workman without damage to the finish. Saw cut slab into areas as indicated on drawings but not exceeding 9 square meters.

3.17 MUNICIPAL SIDEWALKS

- .1 Construction of concrete sidewalks, curbs, gutters, materials and finishes shall be in compliance with OPSS 351 and all other related OPSS. Contractor shall obtain specifications and approvals from the Municipality prior to start of work.
- .2 Thickness of sidewalk to be 125mm and 175mm across driveways. The top surface of concrete shall receive a broom finish. Provide dummy joints, contraction joints and expansion joints as specified in OPSS. Sidewalks within the Municipal road allowance shall also comply with the Municipal requirements

3.18 MECHANICAL AND ELECTRICAL WORK

- .1 Construct all concrete underground electrical duct banks, underground water service thrust blocks and supports for underground piping in specified fill. Also construct all concrete pads for pipes passing through foundation walls, manholes and catch basins. See mechanical and electrical drawings and specifications for details and extent of work.

3.19 REJECTED WORK

- .1 Do not deliver to the site materials which are known not to meet the requirement of the Specifications. If rejected after delivery, they shall be immediately removed.
- .2 Where review reveals materials or workmanship which appear to have failed to meet the specified quality or tolerances, the Consultant shall have the authority to order additional curing; to have tests made of in-situ concrete, concrete cores, reinforcement or other materials; to order a structural analysis of the existing elements; and to load test the structure. All such work will be carried out in order to assist in determining whether the structure may, in the opinion of the Consultant be accepted, with or without strengthening or modification. Testing shall meet the requirements of the Ontario Building Code. All expenses incurred shall be chargeable to the Contractor regardless of the results.

END OF SECTION

SECTION 04 05 13 - MORTAR AND GROUT

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Concrete fill for block lintels and reinforced masonry: Section 03 30 00
- .2 Masonry, including mortar joint workmanship: Section 04 22 00

1.3 QUALITY ASSURANCE

- .1 Quality Standards: meet requirements of CSA A179-14.
- .2 Source of Material: for mortar to remain exposed in finished project, brands of cementitious materials and source of supply of sand, shall remain the same for duration of work.

1.4 PRODUCT HANDLING

- .1 Store cementitious materials so as to prevent moisture absorption from any source. Do not use material affected by moisture.
- .2 Store mortar aggregate materials to prevent contamination. Do not use contaminated materials.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Water: Clean and non-staining.
- .2 Sand: CSA ASTM C144-18.
- .3 Portland cement: CAN/CSA-3000-18.
- .4 Masonry cement: CAN/CSA-3000-18.
- .5 Lime: ASTM C207-18, Type S.

PART 3 - EXECUTION

3.1 PROPORTIONING & MIXING

- .1 Mix mortar in accordance with CSA A179-14 except as specified herein.
- .2 Except where shown otherwise mix grout in accordance with CSA A179-14(R2019).
- .3 Place an experienced and competent person in direct charge of proportioning and mixing operations.
- .4 Accurately premeasure mortar ingredients before placing them in the mixer.
- .5 Except where specified otherwise do not add admixtures of any kind to mixes.
- .6 All mortar shall be mixed for a period of not less than 3 minutes and not more than 10 minutes.

3.2 TIME LIMITS & RETEMPERING

- .1 Use and place mortar in final position within following time limits after mixing:
 - .1 Air Temp. above 25°C - 2 hours.

SECTION 04 05 13 - MORTAR AND GROUT

- .2 Air Temp. below 25°C - 2.5 hours.
- .2 Standard mortar that has stiffened within above time limits because of evaporation of water may be retempered by adding water as frequently as needed to restore required consistency. Discard mortar not used within above time limits.

3.3 MORTAR/GROUT SCHEDULE

- .1 Bearing walls: Type S mortar.
- .2 Non-bearing interior partitions: Type N mortar.
- .3 Grout for reinforced masonry: refer to Section 03 20 00.

END

SECTION 04 22 00 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Mortar: Section 04 05 13
- .2 Supply of loose steel lintels: Division 5
- .3 Firestopping and smoke seals: Section 07 84 00
- .4 Caulking of control joints: Section 07 92 00

1.3 WORK INSTALLED BUT SUPPLIED BY OTHERS

- .1 Build into masonry elements inserts, anchors, bolts, sleeves and other items supplied by other Sections and which are required for installation and performance of work of other Sections.
- .2 Install loose steel lintels required for support of masonry elements.
- .3 Install steel door frames and access doors occurring in masonry elements.
- .4 Install reinforcing steel and concrete fill into block lintels and reinforcing steel grouted into masonry walls as shown on the structural drawings.

1.4 QUALITY ASSURANCE

- .1 Meet requirements of CSA A370-14, CSA A371-14 and CSA S304-14.
- .2 Ensure that work is executed under the continuous supervision and direction of a competent foreperson.
- .3 Masonry units used in partitions/walls designated to provide a fire separation shall be of thickness and material required to achieve required rating. Hollow masonry units used in fire separation shall have the necessary percentage of solid material to meet required rating. Concrete block used in fire separation shall be suitably identified to permit verification of fire resistance rating.

1.5 SUBMITTALS

- .1 Prior to start of work submit product data and duplicate samples of all masonry accessories including horizontal reinforcement and masonry anchors.
- .2 Prior to start of work submit drawings showing proposed locations of control joints.

1.6 PRODUCT HANDLING AND STORAGE

- .1 Deliver and handle masonry units so as to prevent soiling and chipping.
- .2 Store masonry units above and off ground on level platforms which permit air circulation under stacks.
- .3 During storage, protect masonry units against moisture absorption, damage and staining.

1.7 PROTECTION

- .1 Protect finished work at corners, sills, projections and other areas likely to be damaged, with suitable coverings until completion of building.

SECTION 04 22 00 - CONCRETE UNIT MASONRY

- .3 Adequately brace masonry walls and partitions to resist effects of lateral forces.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Concrete Masonry Units: to CSA A165 Series-14: by Permacon, Simcoe Block, Boehmers, Richvale York, Day & Campbell or other source approved by the Consultant.
 - .1 Standard weight: H/15/A/M and S/15/A/M.
 - .2 Lightweight: H/15/C/M and S/15/C/M.
 - .3 Units must be cured for at least 28 days before delivery and shall have a moisture content of not more than 30% of total absorption.
 - .4 Exposed concrete block units shall be uniform in size, free of perceptible warp or twist, without chipped, ragged or broken edges; have a uniform surface texture, free of cracks, blemishes or defects detrimental to appearance or performance.
 - .5 Where indicated provide solid and semi-solid (solid top) units.
 - .6 Provide manufacturer's catalogued special units such as bullnose, corner, end, return, lintel block and others as indicated.
 - .7 Where incorporated into existing block work provide masonry units matching existing block work.
 - .8 Provide 135 deg splay corner masonry units for ground floor retrofit corner conditions
- .2 Metal Reinforcement:
 - .1 Material: high tensile strength steel wire meeting ASTM A82, by Blok-Lok or Dur-O-Wall.
 - .2 Finish: hot dip galvanized after fabrication to ASTM A153, Class B.
 - .3 Horizontal reinforcement for interior walls and partitions: truss type with minimum 3.66 mm thick side and cross rods unless otherwise indicated; width 50 mm less than wall thickness; mill galvanized: BLOK-TRUS BL30.
- .3 Connectors, anchors and ties:
 - .1 Materials:
 - .1 Steel: hot dip galvanized to ASTM A123.
 - .2 Wire materials: high tensile strength steel wire meeting ASTM A82, hot galvanized after fabrication to ASTM A153, Class 2.
 - .2 Interior anchors and ties:
 - .1 Non-bearing walls and partitions to bearing walls: corrugated wall ties minimum 0.7 mm thick, 21 x 175 mm BLOK-LOK BLT7A.
 - .2 Masonry to existing masonry: Flexible wire tie, 4.76 mm thick, size to suit wall condition, and flat bar screw-on anchor: Blok-Lok, Flex-O-Lok Type C.
 - .3 Masonry to structural steel: Flexible, triangular 4.76 mm ties and weld-on column anchor straps: FLEX-O-LOK BLT9.

SECTION 04 22 00 - CONCRETE UNIT MASONRY

- .3 Lateral support angles:
 - .1 75 x 75 x 200 mm long steel angles.
 - .2 Steel: CAN/CSA-G40.21-04, minimum 260W.
 - .3 Finish: hot dip galvanized to CSA G164-18.
 - .4 Fasteners: Expansion type concrete anchors, two per angle.
- .4 Reinforcing bar positioners: Dur-O-Wal 1A 810.
- .4 Premoulded Joint Filler: Non-fire rated locations: Type 704 fibreglass board by Owens Corning or Rockboard 40 by Roxul.
- .5 Concrete block lintels:
 - .1 Reinforcing steel: CSA G30.18-09 (R2014).
 - .2 Cast-in-place concrete: CSA A23.1-14.

PART 3 - EXECUTION

3.1 ERECTION - GENERAL

- .1 Lay masonry work in uniform manner. No one portion of any section of work shall rise more than 750 mm above general level. Do not lay more than 1500 mm in height of any wall in any working day.
- .2 Unless otherwise noted, all walls and partitions shall extend to the underside of the structural deck.
- .3 Cut exposed masonry units with power driven table model masonry saw only. Ragged or chipped edges will not be permitted.
- .4 Consult with other Sections to avoid cutting and patching. Co-operate in setting and aligning built-in items. Build in conduit and piping so that they are not exposed. Do not break masonry bond to accommodate concealed built-in items.
- .5 Grout solid with mortar all spaces around built-in items.
- .6 Build in metal nailing plugs, grounds, inserts, anchor bolts, bearing plates, loose and miscellaneous items of steel and iron, isolated beams, lintels and shelf angles, sleeves, blocking and items furnished by other Sections.
- .7 Do not shift or tap masonry units after mortar has taken its initial set.
- .8 At masonry openings less than 450 mm wide, unless otherwise detailed, use mild steel plates, minimum 6 mm thick, of width 25 mm less than supported masonry thickness and with minimum 100 mm end bearing each side.
- .9 Construct structurally reinforced masonry elements in accordance with requirements indicated on structural drawings.

3.2 CHASES, SLEEVES, OPENINGS AND HOLES

- .1 Chases, sleeves and openings shall be built in during erection of masonry work, and purpose-made chased units shall be built into proper position.
- .2 Openings in masonry work exceeding 450 mm shall be provided with lintels in accord with lintel schedule.

SECTION 04 22 00 - CONCRETE UNIT MASONRY

- .3 Chasing of completed walls or formation of holes shall only be carried out with Consultant's prior approval, and then only with a tool designed to cleanly cut masonry units.
- .4 Chases shall be plumb and shall be minimum of one unit length from jambs of openings.
- .5 Horizontal or diagonal chases are not permitted.

3.3 MASONRY BEARING

- .1 Masonry bearing shall extend full thickness of wall.
- .2 Unless otherwise indicated, provide at least 200 mm of bearing for lintels and beams.
- .3 Bearings of block masonry walls: use minimum 2 courses of solid or grouted block units except where concrete bearing pads are required.
- .4 Bearings in brick masonry walls: use solid face brick where exposed to view.
- .5 Build masonry neatly around beam, and lintel bearings.

3.4 CONSTRUCTION JOINTS

- .1 Where fresh masonry joins partially or totally set masonry, clean exposed surfaces of set masonry and remove loose mortar and foreign material prior to laying fresh masonry.
- .2 If necessary to stop off a horizontal run of masonry, rack back one-half masonry unit length in each course. Tothing will not be permitted unless approved by the Consultant.

3.5 BLOCKWORK

- .1 Blockwork shall be laid up in running bond except where shown otherwise. Unless otherwise indicated, blocks shall be of thickness required to produce total wythe thickness. Provide standard weight block unless otherwise shown.
- .2 Do not wet blocks before laying.
- .3 Units shall be laid with webs aligning one over the other in full bed of mortar over entire laying surface including webs.
- .4 Exposed faces shall be full units laid out to minimize cutting with not less than 100 mm any at vertical edge or corner.
- .5 Top course of block walls shall be laid with semi-solid blocks at door and window sills, at wall changes to brick and where shown.
- .6 Partitions which do not extend full height, to underside of structural deck, shall be capped with solid or semi-solid (solid top).
- .7 Use solid block for at least two courses under all point bearing loads.
- .8 Provide bullnose block at all exposed vertical block corners. Where directed by Consultant provide square corner block at first course above floor; grind corner above base to match bullnose above.
- .9 Provide minimum 400 mm solid or grouted block for jambs of openings and at ends of walls. Provide return corner block where shown.
- .10 Cut with power saw exposed units to accommodate flush mounted electrical outlets, grilles and other components. Leave maximum 5 mm clearance. Cover plates and flanges must cover cut edges.

SECTION 04 22 00 - CONCRETE UNIT MASONRY

- .11 Where new masonry is located within existing masonry or where it is abutting existing masonry, match type of block coursing, sizes, and jointing of existing block.
- .12 Blockwork scheduled to be left exposed or painted shall be laid and pointed with utmost care. Distribute units of varying colour and texture evenly to achieve homogeneous blend. Replace at no extra cost to Contract, block units which in the opinion of the Consultant are too contrasting in appearance for satisfactory blending.

3.6 BLOCK LINTELS

- .1 Build block lintels; install reinforcement and concrete fill. Unless otherwise detailed make lintels 200 mm high.
- .2 Lintels shall have minimum 200 mm bearing, with care taken in layout of wall to ensure that lintel jointing coincides with regular bond of wall.
- .3 Provide building paper in joint at bearings and at vehicle joint at ends of block lintels to break bond.

3.7 JOINT WORK

- .1 Make joints uniform and 10 mm thick unless otherwise shown. Adjust joint thickness to minimum 9 mm and maximum 10.5 mm in order to achieve coursing shown.
- .2 Joints in exposed and painted surfaces, and in masonry behind wall mounted and built-in fixtures, lockers and cabinetwork shall be tooled when thumbprint hard with a 25 mm o.d. plastic tool to produce a concave joint.
- .3 Joints in unparged masonry below grade shall be pointed tight with a trowel.
- .4 Joints directly behind resilient base, rigid insulation, ceramic tile and gypsum board shall be struck flush.

3.8 ANCHORING, BONDING AND REINFORCEMENT

- .1 Anchor or bond walls and partitions at points where they intersect.
- .2 Except where stack bond is required bond each wythe or masonry walls and partitions at corners by alternately bonding 50% of units of each wall and partition at corner intersection.
- .3 Bond non-loadbearing walls and partitions to loadbearing walls with ties spaced at 400 mm o.c. vertically. Provide one tie for each 100 mm thickness, or part thereof, of wall or partition.
- .4 Anchor masonry walls and partitions to concrete and steel elements with anchors spaced at 400 mm vertically.
- .5 Unless otherwise indicated reinforce all walls and partitions with continuous horizontal metal reinforcement, installed at 400 mm o.c. vertically.
- .6 At wall openings place continuous reinforcement in first and second mortar joints above and below openings. Additional reinforcement at openings shall extend 610 mm beyond both sides of openings.
- .7 Install prefabricated corner assemblies at corners.
- .8 Lap continuous reinforcement 150 mm at splices. Cut reinforcement at control joints.
- .9 Provide lateral support angles at top of non-loadbearing masonry partitions/walls. Anchor angles to structural deck or beam at 10 x partition/wall thickness each side of partition and maximum 0.6 m from end of partition/wall.

3.9 CONTROL JOINTS

SECTION 04 22 00 - CONCRETE UNIT MASONRY

- .1 Provide control joints at masonry walls supported by foundation walls at approximately 7.5 m o.c. and at masonry walls supported on framed slabs at approximately 4 m o.c., and where shown. Confirm actual locations of control joints with Consultant before starting work.
- .2 Provide control joints at intersection of bearing and nonbearing walls.
- .3 Construct control joints as shown. Unless otherwise shown make control joints 10 mm wide. Interrupt masonry reinforcement at control joints. Provide expanding foam sealant at control joint, at exterior and interior wythe.
- .4 Control joints must be constructed during erection of masonry, and may not be sawcut later.

3.10 STEEL DOOR FRAMES

- .1 Install steel frames in masonry walls. Build in frames rigid, true and plumb. Fill voids between frames and masonry with grout. Fill fixed centre mullions at double doors with grout.
- .2 Brace frames solidly in position while being built in. Provide temporary horizontal wood spreader at mid-height of frames to ensure maintenance of required frame width until masonry work is completed. For frames over 1200 mm width provide temporary vertical support at centre of head.
- .3 Comply with installation requirements specified under Section 08 11 13.

3.11 MISCELLANEOUS

- .1 Where non-loadbearing, non-fire rated partitions extend to underside of structure, terminate partitions as detailed. Where not detailed allow for structural deflection and fill space with premoulded joint filler. Refer to Section 07 84 00 for firestopping requirements at fire rated partitions.
- .2 Provide continuous 0.1 mm thick polyethylene or glass fibre reinforced kraft paper - asphalt laminate bond breaker at base of partitions and walls which bear on concrete slabs.
- .3 Provide paper backed galvanized steel lath as required for support of grout and mortar fill within masonry elements.
- .4 Install access doors occurring in masonry elements, required by Divisions 20 to 28. Install access doors plumb, level, properly aligned and securely anchored, in locations directed by Divisions 21 to 28. Remove all excess grout and masonry debris from shafts and chases accessible by means of access doors.

3.12 GROUTED MASONRY

- .1 Provide vertically reinforced and grouted masonry in accordance with requirements shown on structural drawings. Secure reinforcing with reinforcing bar positioners.

3.13 PATCHING AND CLEANING

- .1 At completion of work, holes and other defects in masonry joints shall be repaired, and masonry surfaces shall be thoroughly cleaned.
- .2 Holes in masonry joints shall be filled with mortar and suitably tooled. Cut out and repoint defective joints.
- .3 Dry brush masonry surfaces at end of each day's work and after all final pointing.
- .4 Remove mortar smears and droppings from concrete block masonry surfaces after such smears and droppings have dried. When mortar joints are dry and hard, clean block masonry surfaces by rubbing down with abrasive blocks and stiff fibre brushes.

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- .5 Remove efflorescence from masonry surfaces by wet cleaning in accordance with manufacturer's recommendations.

END

PART 1 - GENERAL

1.1 DESCRIPTION

- .1 Coordinate this work with the work of the steel joist supplier. Provide all necessary dimensions and structural steel shop drawings to the steel joist supplier for the completion of their work.

1.2 WORK FURNISHED AND INSTALLED

- .1 Separate column base plates
- .2 Columns, beams, purlins, and girts
- .3 Bracing
- .4 Steel framing around roof and floor openings
- .5 Diagonal supports at columns for deck or slabs
- .6 Stair landing beams and hangers for steel stairs
- .7 Structural steel door frames and sill angles
- .8 Hoist beams
- .9 Weldable reinforcing steel bars attached to structural steel
- .10 Field connections to concrete and masonry

1.3 WORK FURNISHED BUT NOT INSTALLED

- .1 Anchor bolts
- .2 Connection assemblies set in concrete
- .3 Loose angle lintels that bear on concrete or masonry
- .4 Shelf angles/plates and wall plates that bear on or are attached to concrete or masonry

1.4 WORK INSTALLED ONLY

- .1 Installation of steel joists and steel bridging

1.5 RELATED WORK SPECIFIED ELSEWHERE

- .1 Grouting under base plates, Section 03 30 00.

SECTION 05 10 00 - STRUCTURAL STEEL

- .2 Supply of steel joists, Section 05 20 00.
- .3 Steel deck, Section 05 30 00.
- .4 Metal fabrications, Section 05 50 00.
- .5 Metal Soffit, Section 07 46 00.
- .6 Fireproofing, Section 07 80 00.
- .7 Fire resistant coating at exterior steel columns and beams, Section 09 96 43.

1.6

REFERENCES

- .1 CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Quality Steel / Structural Quality Steels.
- .2 CAN/CSA G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CAN/CSA S16.1, Limit States Design of Steel Structures.
- .4 CSA S136, North American Specifications for the Design of Cold Formed Steel Structural Members.
- .5 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.
- .6 CSA W48.1, Filler Metals and Allied Materials for Metal Arc Welding.
- .7 CSA W59, Welded Steel Construction (Metal Arc Welding).
- .8 CAN/CGSB 1.171, Inorganic Zinc Coating.
- .9 CAN/CGSB 1.181, Ready Mixed Organic Zinc Coating.
- .10 CISC/CPMA 1.73a, A Quick-Drying One-Coat Paint for Use on Structural Steel.
- .11 CISC/CPMA 2.75, A Quick-Drying Primer for Use on Structural Steel.
- .12 ASTM A53/A53M, Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- .13 ASTM A108, Standard Specification for Steel Bars, Carbon and Alloy, Cold Finished.
- .14 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength.
- .15 ASTM A325, Standard Specification for Bolts for Steel, Heat Treated 120/105 ksi Minimum Tensile Strength.

.16 ASTM A570/A570, Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.

.17 SSPC, Steel Structures Painting Council.

1.7 QUALITY ASSURANCE

.1 Structural steel fabrication shall be carried out by a firm that has been in structural steel business (for buildings) for at least five years and that is certified by the Canadian Welding Bureau under the requirements of CSA W47.1, Division 1 or 2.

.2 Erection of the structural steel and steel joists shall be carried out by the steel fabricator's own forces, unless written permission to sublet the Work is obtained from the Consultant. Welding shall be carried out by CWB approved welders under the supervision of a CWB approved firm.

.3 Engage a Professional Engineer to be responsible for the design, detailing and installation of all connections related to structural steelwork. Before submitting shop drawings, submit a letter signed and sealed by that Engineer stating that he has been engaged to undertake the responsibility for the above. Also submit a copy of that Engineer's Certificate of Authorization, and proof of his liability insurance. When requested, submit calculations signed and sealed by that Engineer. On completion of erection, submit a letter signed and sealed by that Engineer to certify that Work has been completed in accordance with all shop drawings reviewed by the Consultant and the Structural Engineer.

.4 Before the start of fabrication, supply the independent inspection and testing agency with mill test certificates or producer's certificates satisfactorily correlated to the materials or products to which they pertain. The onus for ensuring that the materials and products can be properly identified according to grade or specification rests with the Contractor.

.5 Do not splice sections without the prior acceptance of the Consultant and the submission of pertinent shop drawings. Accepted splices will be required to develop the section. Each splice shall be given a non-destructive test by an independent inspection company acceptable to the Consultant. Testing shall be at the Contractor's expense. Evaluate results in accordance with CSA W59 and report to the Consultant.

1.8 TOLERANCES

.1 Conform to the fabrication and erection tolerances of CAN/CSA S16.

.2 In addition if more stringent tolerances are specified elsewhere to suit interfacing materials, the latter shall govern in such cases.

1.9 SHOP DRAWINGS

- .1 Refer to Section 01 30 00 - Submittals. "Shop drawings" means erection diagrams and shop details. Shop drawings received after noon will be date-stamped as received the following working day.
- .2 Submit to the Consultant for review before fabrication, 4 white prints of erection diagrams. Leave room on drawings for the stamps of the Consultant and the Structural Engineer. Check and sign before submission. Only 2 copies will be returned to General Contractor. The first submission of the erection diagrams to include a complete materials list indicating steel grades, paints, etc.
- .3 Show orientation of bearing plates on erection drawings.
- .4 In addition to beam designation marks, show beam sizes on erection drawings.
- .5 Submit to the Consultant for review before the start of Work, 4 white prints of shop drawings. Leave room on drawings for the stamps of the Consultant and the Structural Engineer. Check and sign before submission. Only 2 copies will be returned to General Contractor.
- .6 All shop drawings shall bear the seal and signature of the Professional Engineer responsible for designing the connections.
- .7 The Professional Engineer designing the connections shall hold a Certificate of Authorization, and shall carry min. \$1,000,000.00 in liability insurance.
- .8 It is advisable to submit erection diagrams for review before preparing shop details. Include details of special conditions. Make erection diagrams. Copies of section details developed by VX Engineering Inc. will not be accepted as erection diagrams. If required, CAD diskettes of the structural plans are available "as-is" for use in the preparation of shop drawings provided that the title blocks are removed and provided that the Owner and the Owner's Consultants are not held responsible for any errors or omissions on the drawings. CAD files of the structural sections, elevations and schedules will not be made available for the preparation of shop drawings.
- .9 Show the sizes, spacing and the locations of structural steel, connections, attachments, reinforcing and anchorage. Include all necessary plans, elevation and details. Indicate size and type of fasteners. For welded connections use welding symbols in compliance with CISC and indicate clearly the length of weld. Prepare shop drawings using metric sizes and units. All documents shall carry the seal of a Registered Professional Engineer licensed to practice in the Province of Ontario, who shall be responsible for the design of connections and details, and the fabrication, temporary shoring and erection of all structural steel. Show also vent holes required for galvanizing process.
- .10 Review of shop drawings by the Consultant and Structural Engineer is a precaution against oversight or error and solely to review conformance with general design intent. It is not a detailed check and must not be construed as relieving the

SECTION 05 10 00 - STRUCTURAL STEEL

Contractor of responsibility for making the Work accurate and in conformity with the Contract Documents. Design for which the Contractor is responsible under the Contract will not be reviewed. Work done prior to the receipt of the reviewed drawings will be at the risk of the Contractor. Review comments are not authorization for changes to the Contract price.

- .11 Provide the office preparing shop drawings with a complete set of Contract Drawings and Specifications plus all Addenda and Change Orders.
 - .12 Do not release column shop details for fabrication before establishing on site the final elevations of the tops of supporting piers.
 - .13 Make corrections required by previous review before resubmitting drawings. Clearly indicate all changes and additions to previous submission. Do not add new details to drawings which have been stamped as reviewed or noted.
 - .14 After review, erection diagrams will be returned to the Contractor stamped to show one of the following:
 - .1 Reviewed - Reviewed with no comments.
 - .2 Noted - Reviewed with comments noted on drawing. Submit two final record prints as soon as corrections are made.
 - .3 Resubmit - Reviewed with comments noted on drawing. Correct and resubmit for review.
- Conform to the requirements of each authority that has reviewed the drawings.
- .15 Allow a minimum of 15 working days for review of each submission of shop drawings in the Structural Engineer's office. Allow more time when large quantities of shop drawings are submitted. Submit in general conformity with the sequence of construction intended. Co-ordinate with the Consultant. Shop drawings received after noon will be date-stamped as received the following working day.
 - .16 Keep on site at all times a set of shop drawings bearing the review stamps of the Consultant and the Structural Engineer and use only these drawings and the Structural Drawings to erect structural steel. Neatly mark on the Structural Drawings changes issued during the course of construction.
 - .17 Show details by which steel assemblies, which are set in concrete, are to be connected to the formwork.
 - .18 If additional instructions are required from the Consultant, allow a minimum of five working days for the Structural Engineer to review and respond to the request for instruction.

1.10 SUBSTITUTIONS

- .1 Submit all proposals for substitutions to the Consultant in writing in advance of shop drawings. Identify each item clearly. Do not proceed with a proposed change unless it is accepted in writing.
- .2 Substitution of alternative sections will be allowed provided the new members have equal or greater capacity and stiffness and are of dimensions acceptable at proposed locations.

1.11 SITE CONDITIONS

- .1 Determine any potential interference with existing services and protect from disruption and damage.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Rolled shapes and plates:
 - .1 Wide flange sections: CAN/CSA G40.21, Grade 350W.
 - .2 Hollow structural sections: CAN/CSA G40.21, Grade 350W, Class C.
 - .3 Channels, angles and plates: CAN/CSA G40.21, Grade 300W
 - .4 Cold formed shapes: ASTM A570/A570M Grade 50, $F_y=345$ MPa
 - .5 Standard S beams: ASTM A992, A572, Grade 50, $F_y=345$ MPa
 - .6 Structural pipe: ASTM A53, Grade B, $F_y=241$ MPa
- .2 Welded wide flange shapes: CAN/CSA G40.21, Grade 350W.
- .3 Weldable reinforcing steel: weldable steel, grade 400W, deformed bars to CSA G30.18.
- .4 Arc welding electrodes and equipment: CSA W48.1. Electrode Classification Number: E480XX.
- .5 High-strength bolts: ASTM A325M and CAN/CSA S16. Bolts shall be identifiable by their head markings and galvanized whenever used to connect members which are galvanized or painted with zinc-rich paint.
- .6 Machine bolts: ASTM A307.
- .7 Anchor bolts: CAN/CSA G40.21, Grade 300W

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- .8 Stud anchors, headed: ASTM A108, Grades 1010 through 1020, $F_y=345$ MPa (50 ksi). Lengths of studs given on drawings are the lengths after welding.
- .9 Load indicating washers: Coronet - Cooper + Turner
- .10 Cast-in-place concrete anchor with threaded bolt: Structural Connection Insert Type EC-2FW - Acrow - Richmond.
- .11 Drilled concrete anchor:
 - .1 Kwik-Bolt 3 – Hilti Carbon steel anchors to be used unless otherwise noted.
- .12 Drilled masonry anchor:
 - .1 Hilti HIT HY20 with threaded HIT-A Rods and screen tube (for hollow masonry).
 - .2 Hilti HIT HY150 with HAS –E Standard rods (for solid of grouted masonry)
- .13 Joint filler for exposed steelwork: Epoxy resin.
- .14 Shop primer paint for steel receiving finish coat of paint on site: CISC/CPMA 2-75 except no lead-based paints allowed.
- .15 Shop primer paint for steel receiving intumescent paint on site: Primer compatible with intumescent paint to be used. See Section 07800 (Fireproofing).
- .16 Shop paint for steel without finish coat: CISC/CPMA 1-73a except no lead-based paints allowed.
- .17 Zinc-rich primer and touch-up paint:
 - .1 inorganic: CGSB 1-GP-171M, or
 - .2 organic, ready mixed: CAN/CGSB 1.181-92.
- .18 Ensure compatibility with specified topcoat.
- .19 Galvanizing: CAN/CSA G164
- .20 Grating: Galvanized safety grating. Minimum thickness of material 2mm. Banded ends. Bolted connections. Capacity 4.8 kPa unless noted otherwise on drawings. Maximum deflection 1/180th of span. Provide:
 - .1 Type W/F by Borden Products (Canada) Ltd.
 - .2 Type 19-2 by Fisher and Ludlow
- .21 Checker plate: CAN/CSA G40.21, Grade 300W. Plate with rolled-in embossments to provide non-slip surface.

- .22 Sliding bearing assembly: Galvanized top steel plate with a type 304 stainless steel highly polished lower surface and bottom elastomeric pad with a polytetrafluoroethylene (Teflon) upper surface. Static and kinetic coefficients of friction not to exceed 5% under 7MPa to 14MPa working stress. Assembly to have a working stress capacity of 7 MPa on lower pad. Elastomeric bottom pad to allow a 2% rotation of upper plate and still maintain a substantially uniform bearing pressure between plate and pad. . Manufactured by:
 - .1 Fabreeka Canada Ltd.
 - .2 Goodco Ltd.
 - .3 Structural Tech Corp. Ltd.
- .23 Elastomeric bearing pad: Structural grade 50 durometer neoprene.
- .24 Zinc-Rich Shop Primer Paint: CAN/CGSB-1.132.

2.2 CONNECTIONS

- .1 Design connections to conform to CAN/CSA S16. Conform also to the CISC Handbook of Steel Construction, except as otherwise required by the specifications.
- .2 Retain a Professional Engineer to be responsible for the design of all connections.
- .3 In general, make shop and field connections with high-strength bolts or by welding. Use machine bolts only for secondary connections and at slotted holes with finger-tight bolts that are intended to accommodate movement.
- .4 Pretension all high-strength bolts used in:
 - .1 wind bracing connections;
 - .2 connections where bolts are subject to tensile loadings;
 - .3 connections using oversized or slotted holes unless finger-tight bolts are required to accommodate movement; and
 - .4 connections required by CAN/CSA S16 to be pretensioned.
- .5 Design non-composite beam connections for an end reaction due to the uniformly distributed load capacity of the member unless a greater reaction is noted on the Drawings.
- .6 Use double angle headers or end connection plates whenever possible. Do not use single angle headers for beams greater than 530mm deep. Make minimum depth of headers and end plates one-half the beam depth. Provide seated beam connections with top clip angles. Cantilevered plate connections will only be accepted for secondary members carrying minor loads. Provide all eccentrically loaded spandrel beams with top and bottom flange connections for torsional restraint.

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- .7 Provide connections designed for a pass-through force equal to the smaller axial force where axial forces occur in beams framing in on opposite sides of a supporting member. Axial force is centred in smaller beam if beam sizes differ.
- .8 Install web and flange stiffener plates at moment connections as required by connection design and detail but in every case when indicated on the drawings. If the shear generated in column web exceeds its shear capacity, reinforce the web.
- .9 Provide at least one stiffener plate each side of web of beams continuous over columns unless another type of stiffener is shown on the Drawings.
- .10 Design gusset plates at compression members for the force equivalent to twice the specified compression member force, or provide stiffeners to prevent gusset plate buckling.
- .11 Provide moment connections at splices to maintain continuity of cranked beams. Provide stiffener plates to resist unbalanced flange forces at splices.
- .12 Provide all wall supporting members (shelf angles, hangers, stubs, back braces, etc) which are attached to floor beams with adjustable connections capable to compensate for the deflection of the floor beams due to self weight of concrete slabs. Anticipate beam deflection to be 20 mm. Alternatively, fabricate based on actual deflected shape of the beams as measured after concrete slabs are installed.
- .13 Complete welded shop connections prior to galvanizing.
- .14 Where slotted holes are required to accommodate deflection, provide slotted holes long enough to allow for deflection indicated plus construction tolerance assuming bolts are in centre of slots. Use A307 bolts. Bolts are to be finger-tight with burred threads to allow for movement during life of structure without bolts loosening.
- .15 Where indicated on the drawings, connect to concrete using cast-in weld plates with headed stud anchors. Design and supply assemblies. Determine capacity of each anchor group considering edge distance, spacing and embedment.
- .16 Connect new steel members to masonry or concrete using drilled anchors. Design, supply and install anchors. Determine the capacity of each anchor group considering edge distances, spacing, and a factor of safety of 4 minimum against failure. Activate wedge type anchors by applying pre-determined torque recommended by the manufacturer. Do not use epoxy anchors unless approved by Consultant. Do not field weld at connections with epoxy anchors.
- .17 Where drilled anchors are shown on the drawings, but the embedment length is not shown, provide manufacturer's standard embedment length.

2.3 FABRICATION

- .1 Conform to CAN/CSA S16 and CSA W59.

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- .2 Orientate straight beams, which have cambers within allowable mill tolerances so that the resulting beam camber is up.
- .3 Install stud anchors in the shop with end welds in accordance with the recommendations of the stud manufacturer. Lengths of studs given on drawings are the lengths after welding. Replace studs that crack in the weld or shank.
- .4 Increase thickness of curved sections at no extra cost where necessary to fabricate and galvanize the required curvature or fabricate curved sections from plates at no extra cost where necessary to accommodate the required curvature.
- .5 Reinforce holes through webs of beams as indicated on drawings or in accordance with design procedure set forth in the CISC Handbook of Steel Construction provided calculations are submitted as part of the shop drawings.
- .6 Provide 16 mm diameter weep holes in base plates at all HSS columns, which are not made watertight or that are to be exposed to temperature changes.
- .7 Provide vent holes in HSS sections where required for galvanizing process. Holes are not to exceed 16 mm diameter and are to be located so that any water inside HSS will drain away when HSS is in its final position. After galvanizing, fill vent holes with weld material, grind smooth and touch-up with two coats of zinc-rich paint.
- .8 Where shop inspection is required, do not ship material to the site before it has been inspected.

2.4 LINTELS

- .1 Structural Drawings do not show all lintels required. Refer to lintel notes and Typical Details on the Drawings.
- .2 Provide lintels with a minimum of 150 mm bearing at each end but not less than the length of any specified bearing plate.
- .3 Weld or bolt together multiple member lintels. Provide spacers if separated. If angle seats are at different elevations provide steel packing.
- .4 Connect ends of suspended lintels to the structure and/or build into masonry to provide adequate restraint.
- .5 Connect ends of steel lintels to columns where openings are adjacent to columns.

2.5 PLATES AND ANCHORS

- .1 Provide beams bearing on walls with bearing plates and wall anchors as specified.
- .2 Weld steel members to bearing plates as required..

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- .3 Where bearing plate sizes are not noted on the Drawings, design bearing plates for a maximum factored bearing pressure of 1.65 MPa (240 psi) on masonry and 7.5 MPa (1100 psi) on concrete.
- .4 Set beam bearing plates 12 mm back from edge of support.
- .5 Extend beams for full length of bearing plates.

2.6 SUPPORTS AT COLUMNS

- .1 Provide cap plates at tops of columns where required for support of deck, slab, joists or beams.
- .2 Provide diagonal or cantilevered angles at sides of columns where required for support of deck or slab.
- .3 Provide seat angles for support of masonry lintels above openings adjacent to columns. Unless otherwise noted on the Drawings, provide 76 x 76 x 9.5 steel angles attached to sides of columns. Length of seat to equal width of lintel minus 25 mm.
- .4 Provide additional angle welded to column for support of precast or deck interrupted by column.

2.7 PAINTING AND GALVANIZING

- .1 Clean steelwork prior to application of paint. Refer to CAN/CSA S16.
- .2 Surface preparation in shop for paints shall be as follows:
 - .1 Shop paint CISC/CPMA 1-73a: Clean off all grease and oil to SSPC SP1 and remove all loose rust, loose scale, dirt, weld flux, etc. by any suitable method.
 - .2 Shop primer paint CISC/CPMA 2-75: Clean off all grease and oil to SSPC SP1. Clean steel to SSPC SP7 Brush-Off Blast Cleaning.
 - .3 Zinc-rich primer paint and intumescent paint: Clean off all grease and oil to SSPC SP1. Clean steel to SSPC-SP6 Commercial Blast Cleaning, to an average surface profile of 0.04 mm(1.5 mils) or more.
- .3 Apply paint under cover. Steel shall be dry when painted and paint shall be dry before loading for shipment.
- .4 Apply zinc-rich primer paint not more than 24 hours after blast cleaning, but prior to any visible rust occurring on the surfaces. Do not apply when relative humidity exceeds 80%. Apply to achieve a dry film thickness of 0.08 mm (3 mils).
- .5 Apply one coat of shop paint CISC/CPMA 1-73a to steelwork in the shop with the exception of:

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- .1 Members to receive a finish coat of paint on site for which a CISC/CPMA 2-75 shop primer is required
 - .2 Members to receive intumescent paint on site for which a compatible shop primer is required
 - .3 Members for which zinc-rich paint is specified
 - .4 Galvanized members
 - .5 Surfaces encased in or in contact with cast-in-place concrete including top flanges of beams supporting slabs
 - .6 Surfaces and edges to be field welded for a distance of 50 mm from the joint.
 - .7 Contact surfaces of slip-resistant type joints assembled with high-strength bolts.
 - .8 Surfaces to receive spray fireproofing
- .6 Unless otherwise noted, apply one coat of primer paint (CISC/CPMA 2-75) in the shop for steel to receive a finish coat of paint on site.
- .7 Unless otherwise noted, apply one coat of compatible primer paint in the shop for steel to receive intumescent paint on site.
- .8 Only paints tested to ASTM E736 and approved by the spray fireproofing supplier may be used for steel which will receive spray fireproofing.
- .9 Apply galvanizing to:
- .1 Shelf angles and hangers in exterior walls
 - .2 Lintels in exterior walls
 - .3 Exposed exterior steel members
 - .4 Other steel noted on the Drawings
- .10 When welding after galvanizing is in place, grind away galvanizing at areas to be welded. Touch up with two coats of zinc-rich paint.
- .11 Apply primer paint to architecturally exposed surfaces without runs or sags. Sand down and repaint areas not acceptable to the Consultant.
- .12 Apply touch-up paint after erection to all areas which have been missed, field welded, scraped or chipped using the same paint as the shop coat or primer.
- .13 Clean surfaces down to bare metal and apply two coats of zinc-rich touch-up paint to any galvanized surface, which has been damaged or field welded, and which is accepted by the Consultant as being capable of repair without galvanizing.
- .14 Clean and prepare surfaces of bolts, which will receive a finished coat of paint in the same manner as the connected steelwork.
- .15 At exposed exterior structural steel framing members which are to receive a fire-resistant coating, as specified in Section 09 96 43, apply one coat of zinc-rich primer paint, compatible with specified coating. Over zinc-rich primer, apply "Carboguard 888" primer supplied under Section 09 96 43. Comply with product manufacturer's

printed instructions for preparation of steel, application of product (over zinc-rich primer), and handling after application.

2.8 EXPOSED STEEL

- .1 Conform to the requirements of the A.I.S.C. Specification for Architecturally Exposed Structural Steel and to the additional requirements given below when fabricating and erecting steel members which will remain permanently exposed to view.
- .2 Remove all imperfections which are unsightly from members permanently exposed to view. Remove mill and shop marks.
- .3 Provide continuous welding at exposed joints or fill between welds with an approved epoxy resin filler finished to the same profile as the adjacent weld. Joint shall be weathertight and suitable for painting.
- .4 Exposed welds shall be smooth. Hide bolts in bolted connections. Where exposed bolted connections are permitted, adjacent bolt heads shall be on same side and extensions of shank beyond nuts shall be uniform and not exceed 20 mm.
- .5 Do not mark surface with marks that are visible after painting.

PART 3 - EXECUTION

3.1 CONSTRUCTION REVIEW

- .1 General Review During Construction by the Consultant and Structural Engineer and the services of the independent inspection and testing agencies appointed by the Owner are undertaken so that the Owner may be informed as to the quality of the Contractor's performance and for the protection of the Owner. They will be carried out by examination of representative samples of the Work.
- .2 The Contractor will receive copies of the construction review reports and the results of material tests. He will thereby be informed of any defects or deficiencies found. The provision of this information does not relieve the Contractor of his responsibility for the performance of the Contract and he shall implement his own supervisory and quality control procedures.
- .3 Bring to the attention of the Consultant and Structural Engineer any defects or deficiencies in the Work, which may occur during construction together with a proposal for remedy. The Structural Engineer will decide what corrective action may be taken. The Consultant will issue the necessary instructions.

3.2 COOPERATION

- .1 Cooperate with all engaged on the Project. Exchange with related trades shop drawings and other data required to coordinate and schedule Work. Deliver material for installation by other trades when required.

- .2 Provide where shown or required, holes and copings for connection and clearance of the Work of other trades. Show on shop drawings before submitting for review. Holes in members shall not cause any appreciable reduction in strength.
- .3 Do not cut holes in the field unless sizes and locations are accepted by the Consultant in each case. Accepted field cutting and welding shall be undertaken by this Trade.
- .4 Supply and install framing around openings in steel roof and steel floor decks in accordance with Typical Details and Drawing Notes.
- .5 Maintain horizontal bracing and its connections below the underside of the deck so as not to interfere with the seating of the latter.

3.3 EXAMINATION OF WORK

- .1 Do not begin operations before making a thorough examination of existing conditions and the Work of related trades. Report inconsistencies before proceeding.

3.4 INSPECTION AND TESTING

- .1 The Consultant will appoint an independent inspection and testing agency. Notify the Consultant two weeks in advance of the date when the first Work will be ready for inspection.
- .2 Pay for the cost of inspection from the Cash Allowance.
- .3 Assist the agency in its work. Do not commence fabrication until details of inspection have been worked out with the inspection agency.
- .4 Work will be inspected when erected. Items to be cast into concrete will be inspected on site before being installed.
- .5 The inspection agency will submit reports to the Consultant, Structural Engineer, Contractor and Municipal Authorities covering the Work inspected and provide details of errors or deficiencies observed.
- .6 Inspection will include:
 - .1 Checking that the mill test certificates or producer's certificates are satisfactorily correlated to materials and products supplied for the project or that legible markings were made on the material and products by the producers in accordance with the applicable material or product standards. Where this is not possible, notify the Structural Engineer and carry out sample tests as described below when required by the Structural Engineer.
 - .2 Confirming that all materials meet specifications.
 - .3 Sampling fabrication and erection procedures for general conformity with the requirements of the Contract.

SECTION 05 10 00 - STRUCTURAL STEEL

- .4 Checking welders' CWB Certification.
 - .5 Checking fabricated members against specified member shapes.
 - .6 Checking fabricated members against allowable sweep and camber.
 - .7 Checking fabricated members against specified camber.
 - .8 Visual inspection of all welded connections including spot checking of joint preparation and fit up.
 - .9 Sample checking bolted joints.
 - .10 Sample checking stud anchors.
 - .11 Sample checking of drilled concrete and masonry anchors.
 - .12 Sample checking that tolerances are not exceeded during erection including fit-up of field welded joints.
 - .13 Inspection of field cutting.
 - .14 Shop paint, including surface preparation, and field touch-up.
 - .15 Galvanizing and field touch-up.
 - .16 Grouting under base plates and bearing plates.
-
- .7 Arrange for the inspector to be present during the welding of 25% of moment connections and 25% of butt welds in direct tension.
 - .8 Sample testing: When required, test coupons will be taken and tested in accordance with CSA G40.20 to establish identification. Cut samples from member locations selected by Structural Engineer and provide to inspection and testing agency. Make good the locations if requested, at no extra cost, by adding new plates and welds acceptable to the Structural Engineer. The agency will have the samples tested for mechanical properties and for chemical composition and will classify the steel as to specification.
 - .9 Arrange for the inspector to start field inspection as soon as each section of the Work is completed, plumbed, bolts tightened and field welding finished.
 - .10 The inspector will check high-strength bolts in a representative 10% of bolted connections by torque testing each bolt. He will torque test 10% of the remaining bolts at random, but not less than 2 bolts in each connection. He will remove nuts from 1% of all bearing bolts and check that thread is excluded from the shear planes.
 - .11 The inspector will randomly select and pull test 5% of all types and sizes of drilled in anchors installed on a weekly basis, but not less than one anchor of each type and size. Pull test to twice the design tension capacity of the anchor given by the manufacturer. Submit reports to Consultant within one week of testing. Reports to indicate each anchor location, test load and mode of failure, if applicable. Notify Consultant immediately if any anchor fails the pull test.
 - .12 The inspector will visually check all the adjustable connections at wall supporting members to ensure the connections have been finalized after the concrete is poured.

3.5 FIELD MEASUREMENTS

- .1 Make field measurements necessary to ensure the proper fit of members.
- .2 Identify on shop drawings dimensions, which have been obtained by field measurement.

3.6 ERECTION

- .1 Comply with the requirements of CAN/CSA S16.
- .2 Submit a description of proposed erection methods and sequence to the Consultant for his records if requested.
- .3 Make adequate provision for all loads acting on the structure during erection. Provide erection bracing to keep the structure stable, plumb and in true alignment until the completion of masonry Work and the completion of floor and roof decks which together provide the permanent bracing. Prepare erection bracing drawings signed and sealed by a professional engineer and keep these drawings on site until erection bracing is no longer required.
- .4 Set column base plates with levelling screws to the proper elevation ready for grouting. Lift base plates for inspection when so directed.
- .5 Column base plates and beam bearing plates shall be grouted as soon as steelwork is completed. Do not add load on steelwork until grouting is completed and grout strength has reached at least 20 MPa.
- .6 Do not make permanent connections until as much of the structure as will be stiffened thereby has been properly aligned.
- .7 Adjust and finalize connections at wall supporting elements affected by floor beam deflections after concrete is poured.
- .8 Report ill-fitting connections to the Consultant before taking corrective measures.
- .9 Do not weld in an ambient temperature below -17°C. Preheat material adjacent to welding areas when ambient temperature is between -17°C and +4oc.
- .10 Remove slag from all completed welds so that they may be visually inspected.

3.7 DRILLED ANCHORS

- .1 Conform to requirements of manufacturer. Use hammer drill to make holes. Turn off hammer when drilling masonry with voids. Hole diameters must never exceed those required by manufacturer. Tighten all expansion anchors using a torque wrench unless finger-tight is required by the Drawings to allow for movement. Unless otherwise noted on drawings, provide manufacturer's standard embedment length into solid concrete.

- .2 Do not cut reinforcement to accommodate anchors. Relocate anchors, at no extra cost to the Contract, when obstructions prevent drilling holes to required depth in locations specified. Obtain Consultant's approval of new location before drilling hole. Fill all abandoned holes with grout.
- .3 Arrange for manufacturer's technical representative to be present during installation of first few anchors of each size and type. Submit site reports by manufacturer to Consultant within one week of each visit. Reports to indicate anchor sizes and types installed, locations, and names of those present during installation.

3.8 SUSPENDED LOADS

- .1 Do not overstress members supporting suspended loads. Hanger loads shall not exceed one kN (220 pounds). Loads from mechanical and heavy electrical services suspended from the steelwork shall not exceed the load allowance provided for such services and shall be distributed uniformly. Prevent torsion from hangers connected to beams by alternating their positions on either side of members. Do not apply twisting loads to joists and make attachment using U-bolts with double hangers or other devices that will centre the hanger load on the joist. Loads shall only be suspended directly at the panel points of joists, unless the chords of the joists have been specifically designed to support the concentrated loads.
- .2 Steel Beams: Vertical loads must be applied so that they do not cause twisting of the beams or excessive bending of the flanges. Lateral loads are not to be applied to beams unless approved in writing by the Consultant's structural engineer.

3.9 REJECTED WORK

- .1 Do not deliver to the site materials, which are known not to meet the requirements of the Specifications. If rejected after delivery, remove immediately from site.
- .2 Where review reveals materials or workmanship which appear to have failed to meet the specified quality or tolerances, the Consultant shall have the authority to order tests made of materials; to order detailed field surveys and measurements; to order a structural analysis of the existing elements and to load test the structure. All such Work will be carried out in order to assist in determining whether the structure may, in the opinion of the Consultant, be accepted, with or without strengthening or modification. Testing shall meet the requirements of the Ontario Building Code. All expense incurred shall be chargeable to the Contractor regardless of the results.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL

- .1 Work Furnished And Installed
- .2 Steel joists and steel bridging
- .3 Field connections to concrete and masonry

1.2 RELATED WORK SPECIFIED ELSEWHERE

- .1 Grouting under bearing plates, Section 03 30 00.
- .2 Structural Steel, Section 05 10 00
- .3 Steel deck, Section 05 30 00
- .4 Fireproofing, Section 07 25 30

1.3 REFERENCES

- .1 CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Quality Steel / Structural Quality Steels
- .2 CAN/CSA G164, Hot Dip Galvanizing of Irregularly Shaped Articles
- .3 CAN/CSA S16, Limit States Design of Steel Structures
- .4 CSA S136, North American Specifications for the Design of Cold Formed Steel Structural Members
- .5 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures
- .6 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding
- .7 CSA W59, Welded Steel Construction (Metal Arc Welding)
- .8 CAN/CGSB 1.171, Inorganic Zinc Coating
- .9 CAN/CGSB 1.181, Ready Mixed Organic Zinc Coating
- .10 CISC/CPMA 1-73a, A Quick-Drying One-Coat Paint for Use on Structural Steel
- .11 CISC/CPMA 2-75, A Quick-Drying Primer for Use on Structural Steel
- .12 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength

- .13 ASTM A325M, Standard Specification for Bolts for Steel, Heat Treated 120/105 ksi Minimum Tensile Strength
- .14 ASTM A570/A570M, Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
- .15 SSPC, Steel Structures Painting Council

1.4 QUALITY ASSURANCE

- .1 Steel joist fabrication shall be carried out by a firm that has been in business for at least five years and that is certified by the Canadian Welding Bureau under the requirements of CSA W47.1, Division 1 or 2.
- .2 Engage a Professional Engineer to be responsible for the design, detailing and installation of steel joists. Before submitting shop drawings, submit a letter signed and sealed by that Engineer stating that he has been engaged to undertake the responsibility for the above. Also submit a copy of that Engineer's Certificate of Authorization, and proof of his liability insurance.
- .3 Before the start of fabrication, supply the independent inspection and testing agency with mill test certificates or producer's certificates satisfactorily correlated to the materials or products to which they pertain. The onus for ensuring that the materials and products can be properly identified according to grade or specification rests with the Contractor.
- .4 Do not splice sections without the prior acceptance of the Consultant and the submission of pertinent shop drawings. Accepted splices will be required to develop the section. Each splice shall be given a non-destructive test by an independent inspection company acceptable to the Consultant. Testing shall be at the Contractor's expense. Evaluate results in accordance with CSA W59 and report to the Consultant.

1.5 TOLERANCES

- .1 Conform to the fabrication and erection tolerances of CAN/CSA S16.
- .2 In addition if more stringent tolerances are specified elsewhere to suit interfacing materials, the latter shall govern in such cases.

1.6 SHOP DRAWINGS

- .1 Refer to Section 01 30 00 – Submittals. "Shop drawings" means erection diagrams and shop details. Shop drawings received after noon will be date-stamped as received the following working day.
- .2 Submit to the Consultant for review before fabrication, 4 white prints of erection diagrams and shop details. Leave room on drawings for the stamps of the Consultant and the Structural Engineer. Check and sign before submission. Only 2

SECTION 05 20 00 - STEEL JOISTS

copies will be returned to General Contractor. The first submission of the erection diagrams to include a complete materials list indicating steel grades, paints, etc.

- .3 Show orientation of bearing plates on erection diagrams.
- .4 All shop drawings shall bear the seal and signature of the Professional Engineer responsible for designing the steel joists.
- .5 The Professional Engineer designing the joists shall hold a Certificate of Authorization, and shall carry min. \$1,000,000.00 in liability insurance.
- .6 Submit joists design sheets and erection drawings. Indicate, in addition to the requirements of CAN/CSA 16.1, the loading for which joist have been designed, including concentrated loads required by OBC and CISC and wind uplift loading, location and size of bridging, joist spacing, joist bearing plates, framing of openings and slopes. Joist designs shall be stamped by a registered Professional Engineer licensed to practice in the Province of Ontario.
- .7 Show on drawings: material specifications, member sizes, joint details, net weld lengths, section splices, bridging, loadings for each joist, and the seal and signature of the Professional Engineer who has designed steel joists. Show vent holes required for galvanizing process. Submit calculations for strength, deflection and camber.
- .8 Review of shop drawings by the Consultant and Structural Engineer is a precaution against oversight or error and solely to review conformance with general design intent. It is not a detailed check and must not be construed as relieving the Contractor of responsibility for making the Work accurate and in conformity with the Contract Documents. Design for which the Contractor is responsible under the Contract will not be reviewed. Work done prior to the receipt of the reviewed drawings will be at the risk of the Contractor. Review comments are not authorization for changes to the Contract price.
- .9 Provide the office preparing shop drawings with a complete set of Contract Drawings and Specifications plus all Addenda and Change Orders.
- .10 Make corrections required by previous review before resubmitting drawings. Clearly indicate all changes and additions to previous submission. Do not add new details to drawings which have been stamped as reviewed or noted.
- .11 After review, erection diagrams will be returned to the Contractor stamped to show one of the following:
 - .1 Reviewed - Reviewed with no comments.
 - .2 Noted - Reviewed with comments noted on drawing. Submit two final record prints as soon as corrections are made.
 - .3 Resubmit - Reviewed with comments noted on drawing. Correct and resubmit for review.

Conform to the requirements of each authority that has reviewed the drawings.

- .12 Allow a minimum of 15 working days for review of each submission of shop drawings in the Structural Engineer's office. Allow more time when large quantities of shop drawings are submitted. Submit in general conformity with the sequence of construction intended. Co-ordinate with the Consultant. Shop drawings received after noon will be date-stamped as received the following working day.
- .13 Keep on site at all times a set of shop drawings bearing the reviewal stamps of the Consultant and the Structural Engineer and use only these drawings and the Structural Drawings to erect. Neatly mark on the Structural Drawings changes issued during the course of construction.

1.7 SUBSTITUTIONS

- .1 Submit all proposals for substitutions to the Consultant in writing in advance of shop drawings. Identify each item clearly. Do not proceed with a proposed change unless it is accepted in writing.

1.8 SITE CONDITIONS

- .1 Determine any potential interference with existing services and protect from disruption and damage.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Steel joists: CAN/CSA G40.21
- .2 Arc welding electrodes and equipment: CSA W48.1. Electrode Classification Number: E480XX
- .3 High-strength bolts: ASTM A325M and CAN/CSA S16. Bolts shall be identifiable by their head markings and galvanized whenever used to connect members which are galvanized or painted with zinc-rich paint.
- .4 Machine bolts: ASTM A307
- .5 Anchor bolts: CAN/CSA G40.21, Grade 300W
- .6 Stud anchors, headed: ASTM A108, Grades 1010 through 1020, $F_y=345$ MPa (50 ksi). Lengths of studs given on drawings are the lengths after welding.
- .7 Joint filler for exposed steelwork: Epoxy resin
- .8 Shop primer paint for steel receiving finish coat of paint on site: CISC/CPMA 2-75 except no lead-based paints allowed. This includes intumescent paint.

- .9 Shop paint for steel without finish coat: CISC/CPMA 1-73a except no lead-based paints allowed.
- .10 Zinc-rich primer and touch-up paint:
 - .1 inorganic: CGSB 1-GP-171M, or
 - .2 organic, ready mixed: CAN/CGSB 1.181-92.
Ensure compatibility with specified topcoat.
- .11 Galvanizing: CAN/CSA G164

2.2 DESIGN OF STEEL JOISTS

- .1 Design steel joists to conform to CAN/CSA S16.
- .2 The Structural Drawings show the required depths of joists and their total service loading including dead load, live load and self weight. Loading diagrams are given for non-uniform loads and additional concentrated loads are noted where they occur. Apply live loads as full and partial loadings and any required point loads in accordance with CSA Standard CAN/CSA-S16.1, Loading for Special Open-Web Steel Joists.
- .3 In addition to loadings given on the Structural Drawings, design joist top and bottom chords for an additional live load of one kN (225 lbs) applied as a point load anywhere along their length in combination with the other design loads.
- .4 In addition to loadings given on the Structural Drawings, design joists for any pipe hanger loads resulting from piping 125 mm (5") in diameter or larger which runs parallel with the joists and for any other pipe hanger loads of one kN (225 pounds) or more. Refer to Mechanical Drawings for locations and obtain loadings from Contractor.
- .5 Where joists support 76 mm deep composite steel deck, total width of top chord elements that actually support the deck shall be 140 mm minimum.
- .6 Total load deflection shall not exceed 1/240th of the span and live load deflection not to exceed 1/360th of the span.
- .7 All steel joists, and their bridging, bearings and anchorages, shall be designed by a Professional Engineer retained by the fabricator.
- .8 Both joists and joist bridging shall, in addition to the requirements of this Section, satisfy the requirements of any Fire Rated Assembly Design specified for the Project.
- .9 On request, submit calculations and such further proof as is necessary to show that the joists conform to the requirements of the Specifications. All documents shall carry the seal and signature of the responsible Professional Engineer.

SECTION 05 20 00 - STEEL JOISTS

- .10 Design and fabricate joists in accordance with CAN/CSA S16 or CSA S136. Arrange members to form a statically determinate truss. Web and chord members shall have an axis of symmetry in the plane of the web.
- .11 Minimum thickness of material shall be: flats and hot rolled sections 4mm (0.10"); rods 10mm (0.39") diameter; cold formed sections 2mm (0.079"); members supporting steel deck 3.15mm (0.125").
- .12 Maximum slenderness ratio of tension web members of 1200mm (48") and deeper members shall be 240.
- .13 Make all joists shoes with solid webs. Design joist shoes for rollover forces where shown on Structural Drawings.
- .14 Chord member splices when used shall be staggered and shown on the shop drawings. Welding at each splice shall develop the section. Retain an independent testing agency to visually check all chord splices. The agency shall also undertake non-destructive testing of those chord splices, which occur in the middle half of the span and of each splice in web systems fabricated from bars. Arrange for the agency's reports to be reviewed by the Professional Engineer who has designed the joists and then submit these reports to the Consultant.
- .15 Centre reaction point of joist framing from one side only over centroid of supporting beam. Where necessary, provide special shoe depths to suit the required elevations of the joist bearing surfaces.
- .16 Arrange joists and bridging to accommodate recessed fixtures and ductwork. Refer to Mechanical and Electrical Drawings.
- .17 Provide special framed clearway openings through joists where required for ductwork passing through joists. Refer to Mechanical Drawings. Design joists for any concentrated loads resulting from such openings.
- .18 Line up web members along joist runs sufficiently to permit mechanical services set within the joist depths to be threaded through the joists.
- .19 Provide ceiling extensions where required.
- .20 Equipment and services hung from joists: Suspend vertical loads from top or bottom joist chords. Loads suspended from chords between any two adjacent panel points must not exceed 200 kg (440 pounds) total and must be connected to chords within 100 mm (4") of panel points. This condition may be waived if the total load between adjacent panel points does not exceed 50 kg (110 pounds). Loads must be applied so that they do not cause twisting of the joists or the joist chords. Attach by extending hanger rods between double angle chords where possible. Otherwise attach using only clamps or U-bolts. Do not cut or drill joist members. Lateral loads are not to be applied to joists.

2.3 CONNECTIONS TO SUPPORTS

- .1 Design connections to conform to CAN/CSA S16 and clearly show on erection drawings.

2.4 ARCHITECTURALLY EXPOSED STEEL JOISTS

- .1 Architecturally exposed steel joists consist of gymnasium.
- .2 Make joists, which will be permanently exposed neat and uniform in appearance. The chord members, end panel chord lengths, shoes, web members and web arrangements of any one joist shall be identical in appearance to adjacent joists in the same enclosed space or room. Horizontal bridging lines shall be straight and neatly lapped and welded at joist locations. Cross bridging lines shall be straight and neatly bolted or welded to gusset plates at joists. The location and appearance of splices must be acceptable to the Consultant.
- .3 As-fabricated straightness tolerances for members to be one-half of the standard camber and sweep tolerances.
- .4 Make all copes, mitres and cuts in surfaces that are exposed to view with uniform gaps of 3 mm if shown as open joints or in reasonable contact if shown without gaps.
- .5 Remove all imperfections, which are unsightly. Remove mill and shop marks including manufacturer's identification marks. Remove all temporary attachments and grind smooth. Fill temporary holes with weld metal and grind smooth and flush.
- .6 Provide continuous welding at exposed joints without gaps or fill between discontinuous welds with an epoxy resin filler, acceptable to the Consultant, finished to the same profile as the adjacent weld. Joints shall be weather tight and suitable for painting.
- .7 Exposed welds shall be smooth. Grind flush all groove and plug welds
- .8 Conceal connection bolts where possible. Orientate bolts in exposed bolted connections so that bolt heads are all on the more visually important side of the connection.
- .9 Orient seams in hollow structural sections away from the more visually important sides of the members.
- .10 Erection tolerances shall be one-half those normally permitted. Design connections to non-exposed steel to allow for adjustment during erection.

2.5 FABRICATION

- .1 Conform to CAN/CSA S16 and CSA W59.
- .2 Increase thickness of curved sections at no extra cost where necessary to fabricate and galvanize the required curvature or fabricate curved sections from plates at no extra cost where necessary to accommodate the required curvature.
- .3 Provide vent holes in HSS sections where required for galvanizing process. Holes are not to exceed 16 mm diameter and are to be located so that any water inside HSS will drain away when HSS is in its final position. Fill vent holes with weld material, grind smooth and touch-up with two coats of zinc-rich paint.
- .4 Do not ship material to the site before it has been inspected.

2.6 PLATES AND ANCHORS

- .1 Provide joists bearing on walls with bearing plates.
- .2 Provide joists bearing on walls, which continue above with standard wall anchors, unless otherwise noted on the Drawings.
- .3 Anchor roof joists to supporting walls with a minimum of two 16mm diameter x 380 long anchor bolts, unless otherwise noted on the Drawings.
- .4 Weld joists to bearing plates unless otherwise noted on the Drawings.
- .5 Where bearing plate sizes are not noted on the Drawings, design bearing plates for a maximum factored bearing pressure of 1.65 MPa (240 psi) on masonry and 7.5 MPa (1100 psi) on concrete.
- .6 Extend joist shoes for full length of bearing plates.

2.7 PAINTING AND GALVANIZING

- .1 Clean steelwork prior to application of paint. Refer to CAN/CSA S16.
- .2 Surface preparation in shop for paints shall be as follows:
 - .1 Shop paint CISC/CPMA 1-73a: Clean off all grease and oil to SSPC SP1 and remove all loose rust, loose scale, dirt, weld flux, etc. by any suitable method.
 - .2 Shop primer paint CISC/CPMA 2-75: Clean off all grease and oil to SSPC SP1. Clean steel to SSPC SP7 Brush-Off Blast Cleaning.
 - .3 Zinc-rich primer paint: Clean off all grease and oil to SSPC SP1. Clean steel to SSPC-SP6 Commercial Blast Cleaning, to an average surface profile of 0.04mm (1.5 mils) or more.

- .3 Apply paint under cover. Steel shall be dry when painted and paint shall be dry before loading for shipment.
- .4 Apply zinc-rich primer paint not more than 24 hours after blast cleaning, but prior to any visible rust occurring on the surfaces. Do not apply when relative humidity exceeds 80%. Apply to achieve a dry film thickness of 0.08 mm(3 mils).
- .5 Apply one coat of shop paint CISC/CPMA 1-73a to steelwork in the shop with the exception of:
 - .1 Members to receive a finish coat of paint on site for which a CISC/CPMA 2-75 shop primer is required
 - .2 Members for which zinc-rich paint is specified
 - .3 Galvanized members
 - .4 Surfaces and edges to be field welded for a distance of 50 mm from the joint
 - .5 Contact surfaces of slip-resistant type joints assembled with high-strength bolts
 - .6 Surfaces to receive spray fireproofing
- .6 Unless otherwise noted, apply one coat of primer paint (CISC/CPMA 2-75) in the shop for steel to receive a finish coat of paint on site.
- .7 Apply galvanizing to:
 - .1 Exposed exterior steel joists
 - .2 Other steel joists noted on the Drawings
- .8 When welding after galvanizing is in place, grind away galvanizing at areas to be welded. Touch up with two coats of zinc-rich paint.
- .9 Apply primer paint to architecturally exposed surfaces without runs or sags. Sand down and repaint areas not acceptable to the Consultant.

PART 3 - EXECUTION

3.1 CONSTRUCTION REVIEW

- .1 General Review During Construction by the Consultant and Structural Engineer and the services of the independent inspection and testing agencies appointed by the Owner are undertaken so that the Owner may be informed as to the quality of the Contractor's performance and for the protection of the Owner. They will be carried out by examination of representative samples of the Work.
- .2 The Contractor will receive copies of the construction review reports and the results of material tests. He will thereby be informed of any defects or deficiencies found. The provision of this information does not relieve the Contractor of his responsibility for the performance of the Contract and he shall implement his own supervisory and quality control procedures.

- .3 Bring to the attention of the Consultant and Structural Engineer any defects or deficiencies in the Work, which may occur during construction together with a proposal for remedy. The Structural Engineer will decide what corrective action may be taken. The Consultant will issue the necessary instructions.

3.2 COOPERATION

- .1 Cooperate with all engaged on the Project. Exchange with related trades shop drawings and other data required to coordinate and schedule Work. Deliver material for installation by other trades when required.
- .2 Provide where shown or required, holes for connection and clearance of the Work of other trades. Show on shop drawings before submitting for review. Holes in members shall not cause any appreciable reduction in strength.

3.3 EXAMINATION OF WORK

- .1 Do not begin operations before making a thorough examination of existing conditions and the Work of related trades. Report inconsistencies before proceeding.

3.4 INSPECTION AND TESTING

- .1 The Consultant will appoint an independent inspection and testing agency. Notify the Consultant two weeks in advance of the date when the first Work will be ready for inspection.
- .2 Pay for the cost of inspection from the Cash Allowance.
- .3 Assist the agency in its work. Do not commence fabrication until details of inspection have been worked out with the inspection agency.
- .4 Work will be inspected in the shop and when erected. Store fabricated members in the shop so that they are accessible for inspection.
- .5 The inspection agency will submit reports to the Consultant, Structural Engineer, Contractor and Municipal Authorities covering the Work inspected and provide details of errors or deficiencies observed.
- .6 Shop inspection will include:
 - .1 Checking that the mill test certificates or producer's certificates are satisfactorily correlated to materials and products supplied for the project or that legible markings were made on the material and products by the producers in accordance with the applicable material or product standards. Where this is not possible, notify the Structural Engineer and carry out sample tests as described below when required by the Structural Engineer.
 - .2 Confirming that all materials meet specifications.

- .3 Sampling fabrication procedures for general conformity with the requirements of the Contract.
 - .4 Checking welders' CWB Certification.
 - .5 Checking fabricated members against specified member shapes.
 - .6 Checking fabricated members against allowable sweep and camber.
 - .7 Checking fabricated members against specified camber.
 - .8 Visual inspection of all welded connections including spot checking of joint preparation and fit up.
 - .9 Shop paint including surface preparation.
 - .10 Galvanizing.
-
- .7 Arrange for the inspector to be present during the shop welding of 10% of butt welds in direct tension.
 - .8 Sample testing: When required, test coupons will be taken and tested in accordance with CSA G40.20 to establish identification. Cut samples from member locations selected by Structural Engineer and provide to inspection and testing agency. Make good the locations if requested, at no extra cost, by adding new plates and welds acceptable to the Structural Engineer. The agency will have the samples tested for mechanical properties and for chemical composition and will classify the steel as to specification.
 - .9 See Section 05121 for field inspection requirements.

3.5 FIELD MEASUREMENTS

- .1 Make field measurements necessary to ensure the proper fit of members.
- .2 Identify on shop drawings dimensions, which have been obtained by field measurement.

3.6 ERECTION

- .1 See Section 05121.

3.7 DRILLED ANCHORS

- .1 See Section 05121.

3.8 SUSPENDED LOADS

- .1 Suspend vertical loads from top or bottom joist chords. Loads suspended from chords between any two adjacent panel points must not exceed 200 kg (440 pounds) total and must be connected to chords within 100 mm (4") of panel points. This condition may be waived if the total load between adjacent panel points does not exceed 50 kg (110 pounds). Loads must be applied so that they do not cause twisting of the joists or the joist chords. Attach by extending hanger rods between double angle chords where possible. Otherwise attach using U-bolts with double

hangers or other devices that will centre the hanger load on the joist. Do not cut or drill joist members. Lateral loads are not to be applied to joists.

3.9 REJECTED WORK

- .1 Do not deliver to the site materials, which are known not to meet the requirements of the Specifications. If rejected after delivery, remove immediately from site.
- .2 Where review reveals materials or workmanship which appear to have failed to meet the specified quality or tolerances, the Consultant shall have the authority to order tests made of materials; to order detailed field surveys and measurements; to order a structural analysis of the existing elements and to load test the structure. All such Work will be carried out in order to assist in determining whether the structure may, in the opinion of the Consultant, be accepted, with or without strengthening or modification. Testing shall meet the requirements of the Ontario Building Code. All expense incurred shall be chargeable to the Contractor regardless of the results.

END OF SECTION

PART 1 - GENERAL

1.1 WORK FURNISHED AND INSTALLED

- .1 Steel roof deck
- .2 Acoustic steel roof deck
- .3 Steel floor deck
- .4 Holes for other trades
- .5 Hole and edge reinforcing fastened to deck
- .6 Closures and cover plates
- .7 Sheet metal edge forms for concrete
- .8 Other sheet metal items noted on the structural drawings to be provided by this Section.

1.2 WORK FURNISHED BUT NOT INSTALLED

- .1 Glass fibre batts for acoustic deck

1.3 RELATED WORK SPECIFIED ELSEWHERE

- .1 Structural Steel, Section 05 10 00.
- .2 Steel Joists, Section 05 20 00.
- .3 Fireproofing, Section 07 25 30

1.4 REFERENCES

- .1 CSA S136, North American Specifications for the Design of Cold Formed Steel Structural Members.
- .2 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.
- .3 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding.
- .4 CSA W59, Welded Steel Construction (Metal Arc Welding).
- .5 ASTM A108, Standard Specification for Steel Bars, Carbon and Alloy, Cold Finished.
- .6 ASTM A653/A653M, Specification for Sheet Steel, Zinc-Coated (Galvanized) Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

SECTION 05 30 00 - STEEL DECK

- .7 ASTM A792/A792M, Standard Specification for Steel, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .8 CSSBI 10M, Standard for Steel Roof Deck.
- .9 CSSBI 12M, Standard for Composite Steel Deck
- .10 CSSBI B13, Design of Steel Deck Diaphragms
- .11 Factory Mutual Loss Prevention Data 1-28, Wind Loads to Roof Systems And Roof Deck Securement.

1.5 QUALITY ASSURANCE

- .1 Welding shall be performed by a firm certified by the Canadian Welding Bureau under the requirements of CSA W47.1. Welders shall be qualified for deck welding by the Canadian Welding Bureau.
- .2 Before the start of fabrication, supply the Consultant and the independent inspection agency with mill test reports properly correlated to the materials. The onus for proving the properties of the steel supplied rests with the Contractor.

1.6 SHOP DRAWINGS

- .1 Refer to Section 01 30 00 – Submittals. "Shop drawings" means erection diagrams. Shop drawings received after noon will be date-stamped as received the following working day.
- .2 Submit to the Consultant for review before the start of Work, 4 white prints of shop drawings. Leave room on drawings for the stamps of the Consultant and the Structural Engineer. Check and sign before submission. Only 2 copies will be returned to General Contractor.
- .3 Submit copies of manufacturer's data sheets for each deck type.
- .4 If required, CAD diskettes of the structural plans are available "as-is" for use in the preparation of shop drawings provided that the title blocks are removed and provided that the Owner and the Owner's Consultants are not held responsible for any errors or omissions on the drawings. CAD files of the structural sections, elevations and schedules will not be made available for the preparation of shop drawings.
- .5 Show on drawings: material specifications, sheet lengths, inverted deck locations, thicknesses, local reinforcement, field fastening.
- .6 All shop drawings shall be signed and sealed by a professional engineer registered in Ontario.

- .7 Review of shop drawings by the Consultant and the Structural Engineer is a precaution against oversight or error and solely to review conformance with general design intent. It is not a detailed check and must not be construed as relieving the Contractor of responsibility for making the Work accurate and in conformity with the Contract Documents. Design for which the Contractor is responsible under the Contract will not be reviewed. Work done prior to receipt of the reviewed drawings will be at the risk of the Contractor. Review comments are not authorization for changes to the Contract price.
 - .8 Provide the office preparing shop drawings with a complete set of Contract Drawings and Specifications plus all Addenda and Change Orders.
 - .9 Make corrections required by previous review before resubmitting drawings. Do not add new details to drawings which have been reviewed.
 - .10 After review, drawings will be returned to the Contractor stamped to show one of the following:
 - .1 Reviewed - Released for fabrication.
 - .2 Noted - Released for fabrication after revisions noted are made. Submit final record print as soon as corrections are made.
 - .3 Resubmit - Correct and resubmit for review prior to fabrication.
- Conform to the requirements of each authority that has reviewed the drawings.
- .11 Allow a minimum of 10 working days for review of each submission of shop drawings in the Structural Engineer's office. Allow more time when large quantities of shop drawings are submitted. Submit in general conformity with the sequence of construction intended. Co-ordinate with the Consultant. Shop drawings received after noon will be date-stamped as received the following working day.
 - .12 Keep on site at all times a set of shop drawings bearing the review stamps of the Consultant and the Structural Engineer and use only these drawings and the Structural Drawings to erect steel deck. Neatly mark on the Structural Drawings changes issued during the course of construction.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Deck: ASTM A653/A653M, Grade 230, Zinc-Iron Alloy Coating ZF75, or ASTM A792/A792M, Grade 230, Aluminum-Zinc Alloy Coating AZ150.
- .2 Powder-actuated fasteners: Hilti Decking Fastening System.
- .3 Zinc-rich primer and touch-up paint:

SECTION 05 30 00 - STEEL DECK

- .1 inorganic: CGSB 1-GP-171M, or
- .2 organic, ready mixed: CAN/CGSB 1.181-92.

- .4 Glass fiber insulation: Density 17 kg per cubic meter (1.1 pounds per cubic foot), shaped to profiles of flutes.

- .5 Galvanized Deck (see drawing for locations): ASTM A653/A653M, Grade 230 Zinc coating Z275, or ASTM A792/A792M, Grade 230, Aluminum-Zinc Alloy Coating AZ150.

- .6 Coated Fasteners for galvanized deck and prefinished deck; Buildex Division, Canada ITW Ltd. Climaseal coating, encapsulated EPDM washer, self-drilling screw. 12-24 x 7/8" Hex Washer Head Traxx/4 (total thickness 6mm). 12-24 x 1/4" Hex Washer Head Traxx/5(total thickness 12mm).

2.2 DESIGN

- .1 Conform to requirements on drawings and in specifications and to Factory Mutual FM Class 90 approval rating requirements.
- .2 Conform to CSSBI 10M and 12M where applicable unless otherwise required by drawings and specifications.
- .3 Design deck profiles for indicated loads in accordance with CSA S136. Section depths and minimum steel thicknesses are shown on the Drawings. Deck to have interlocking male and female side laps.
- .4 Design deck for indicated diaphragm action, including deck thickness, anchorage and side laps, in accordance with CSSBI "Design of Steel Deck Diaphragms" and Hilti Product Technical Guide (for Powder Actuated Fasteners). If no diaphragm shear is indicated on drawings, design deck for shear of 5.0 kN/m.
- .5 Roof deck: Rib spacing, centre to centre, shall be 150 mm for 38 mm roof deck and 150 mm or 200mm for 76mm roof deck, unless otherwise noted.
- .6 Floor deck: Rib spacing, centre to centre, shall be 150 mm for 38 mm floor deck and 300 mm for 76 floor deck unless otherwise noted. All floor deck shall be composite.
- .7 Deck profiles and welding shall, in addition to the requirements of this Section, satisfy the requirements of any Fire Rated Assembly Design specified for the Project.
- .8 Limit deflection of roof deck under total load to 1/240th of span. Also limit deflection to that required by Factory Mutual for a person walking on the roof.
- .9 Limit deflection of floor deck under live load to 1/360th of span.
- .10 Limit long-term deflection of composite deck to 1/480th of span.

- .11 Make sections continuous over 3 spans or increase thickness of material to give the equivalent stiffness and strength of a 3-span deck.
- .12 Design anchorage of roof deck to supports to resist net factored uplift forces of 3 kPa on cantilevers and at all roof corners (6m x 6m areas) and 2 kPa elsewhere on 3m wide strip around perimeter of all roof areas, but not less than that shown on the drawings or required by Factory Mutual. Increase minimum welding specified under Erection if necessary.
- .13 Provide side lap connections, which distribute vertical loads between panels and also horizontal loads when acting as a diaphragm.

2.3 FABRICATION

- .1 Conform to CSA S136 and CSA W59.
- .2 Fabricate sections from steel sheets by rolling. Form integral ribs which will bear on supports and form interlocking male and female side laps.
- .3 Cellular units: Spot weld together upper and lower elements assembled into a cellular unit so as to develop the full horizontal shear along the length of the interface.

2.4 ACCESSORIES

- .1 Provide all required edge stiffeners, closures, reinforcing sheet steel plates and flashing.
- .2 Reinforce edge of free spanning deck with channel shaped closure fitted to edge and fastened to deck.
- .3 Provide flashing at columns and points of discontinuity to prevent leakage of mortar when concrete is placed over deck.
- .4 Provide edge forming for concrete slabs over deck. Fasten to deck.

2.5 CLOSURES

- .1 Provide fitted steel closures to fill hollow spaces between webs immediately above beams, partitions and walls transverse to deck when a ceiling is not specified. Where deck is continuous over support provide closures on each side and pack between closures with glass fibre insulation. Where deck span is parallel to walls and partitions, install steel flashings to provide a neat juncture.
- .2 Provide both interior and exterior fitted steel closures where deck cantilevers over exterior walls. Pack between closures with glass fibre insulation.
- .3 Provide fitted steel closures to fill hollow spaces between webs below all roof top sleepers or mechanical unit or skylight supports.

2.6 OPENINGS

- .1 Structural Drawings do not show all openings required. Refer also to Architectural, Mechanical, and Electrical Drawings.
- .2 Cut all required openings in steel deck and reinforce openings larger than 150mm.
- .3 Openings up to 150 mm wide across the flutes require no reinforcing. Minimum clear distance between unreinforced openings shall be 600 mm.
- .4 Reinforce roof openings 150 to 300 mm wide across the flutes. Use 55 x 55 x 6 mm angle under the flutes at each end of the opening. Extend across at least three flutes on each side. For openings over 300 to 400 mm across the flutes, provide suitable reinforcement based on a structural analysis of the loads involved. Roof openings larger than 400 mm wide across the flutes will be framed by the Structural Steel Trade.
- .5 Reinforce openings through floor deck as specified for roofs but the maximum size of reinforced openings shall be 300 mm x 300 mm. Larger openings will be framed by the Structural Steel Trade.

2.7 ACOUSTIC DECK

- .1 Provide 3 mm diameter holes on 10 mm staggered centres in a continuous band on all vertical ribs. Provide a noise reduction coefficient of 0.7.
- .2 Supply preformed glass fibre insulation for installation by the Roofing trade. Insulation shall fill flutes in the top of the deck.

2.8 COMPOSITE DECK

- .1 Provide data to substantiate the load capacity of composite deck when requested. Design shall have been undertaken by a Professional Engineer and load testing certified by an independent inspection agency.
- .2 Form sections to produce section moduli and moments of inertia not less than those in the published data of the manufacturer. Embossments shall ensure a composite unit of steel and concrete acting together to provide the required strength and stiffness.
- .3 Design deck as a form in accordance with CSSBI 12M.

PART 3 - EXECUTION

3.1 CONSTRUCTION REVIEW

- .1 General Review During Construction by the Consultant and Structural Engineer are undertaken so that the Owner may be informed as to the quality of the Contractor's performance and for the protection of the Owner. It will be carried out by examination of representative samples of the Work.
- .2 The Contractor will receive copies of the construction review reports. He will thereby be informed of any defects or deficiencies found. The provision of this information does not relieve the Contractor of his responsibility for the performance of the Contract and he shall implement his own supervisory and quality control procedures.
- .3 Bring to the attention of the Consultant and Structural Engineer any defects or deficiencies in the Work, which may occur during construction together with a proposal for remedy. The Structural Engineer will decide what corrective action may be taken. The Consultant will issue the necessary instructions.

3.2 COOPERATION

- .1 Cooperate with all engaged on the Project. Exchange with related trades shop drawings and other data required to coordinate and schedule the Work.
- .2 Cut and reinforce openings required by other trades.
- .3 Do not hang concentrated loads from the steel deck. Attach hangers, which support services to the steelwork.

3.3 EXAMINATION OF WORK

- .1 Do not begin operations before making a thorough examination of existing conditions and the Work of related trades. Report inconsistencies before proceeding.

3.4 INSPECTION AND TESTING

- .1 The Consultant will appoint an independent inspection and testing agency. Notify the Consultant two weeks in advance of the date when the first Work will be ready for inspection. Assist the agency in its Work.
- .2 Pay for cost of inspection from the Cash Allowance.
- .3 Work will be inspected when erected.
- .4 The agency will submit reports to the Consultant, Structural Engineer, and Contractor covering the Work inspected and provide details of defects or deficiencies observed.
- .5 Inspection will include:

- .1 Checking that mill test reports are properly correlated to materials
- .2 Checking welders' CWB certification
- .3 Checking deck types and gauge thicknesses
- .4 Checking all welding, fastening and button punching
- .5 Checking of all reinforcement required at holes cut in deck
- .6 Checking installation of sheet metal strips and edge reinforcing

3.5 FIELD MEASUREMENTS

- .1 Make field measurements necessary to ensure the proper fit of members.
- .2 Identify on shop drawings dimensions, which have been obtained by field measurement.

3.6 ERECTION

- .1 Carry out erection using only the forces of the steel deck fabricator unless written permission is obtained from the Consultant prior to the close of Bids to sublet the erection.
- .2 Align deck end to end for accurate fit with corresponding sections. Ensure that sections are parallel, even and straight.
- .3 Protect members supporting deck from damage when deck is being welded in place. Report damage to the trade that has provided the member and establish with that trade a procedure for repair or replacement. Obtain the acceptance of the Consultant before starting remedial measures.
- .4 Weld deck to supports to resist uplift and lateral forces but not less than using at all bearing points with 20 mm diameter fusion welds in alternate flutes, unless otherwise noted on drawings. Stagger welds along flanges of supporting members to the maximum obtainable by the width of the flange. Place one weld each side of side lap, in each flute where side lap is made. Increase weld size and spacing as required.
- .5 Provide min. 45mm bearing on all supporting members
- .6 Locate a rib of deck directly over steel beams and perimeter angles spanning parallel to deck and at same elevation as deck support. Weld deck to beam or angle at 450 mm centres.
- .7 Make end laps over supports lapping not less than 50 mm and not more than 100mm.
- .8 Provide adequate connection to withstand all forces, including uplift, acting on the deck during erection.
- .9 Prefinished metal deck shall be fastened through the low rib to all supporting members with Hilti direct fasteners (Type X-ENP-19-L15). Fasteners shall be placed in outside rib on both sides of deck unit and in every rib in between to supporting member transverse to the rib and at 450 mm max. To supporting members parallel to the rib. Side laps to be mechanically fastened at 610mm max.

- .10 Field welding to conform to requirements of CSA - W59.
- .11 For exposed deck end laps, ensure that lower deck sheets do not extend past the face of the supports.
- .12 Connect male and female side laps by welding or mechanically interlocking with a button punch at 600 mm on centre maximum including at supports. Reduce spacing as required for diaphragm action or if the ULC Fire Rated Assembly design specified requires a closer spacing..
- .13 Increase deck welding specified elsewhere if necessary to satisfy the requirements of any Fire Rated Assembly Design specified for the Project.
- .14 Inspect all surfaces of deck after erection and touch-up with zinc-rich paint where protective coating has been scratched or damaged. Minimum thickness 0.06 mm (2.5 mils).

3.7 REJECTED WORK

- .1 Do not deliver to the site materials which are known not to meet the requirements of the Specifications. If rejected after delivery, remove immediately from site.
- .2 Where review reveals materials or workmanship which appear to have failed to meet the specified quality or tolerances, the Consultant shall have the authority to order tests made of materials; to order detailed field surveys and measurements; to order a structural analysis of the existing elements and to load test the structure. All such Work will be carried out in order to assist in determining whether the structure may, in the opinion of the Consultant, be accepted, with or without strengthening or modification. Testing shall meet the requirements of the Ontario Building Code. All expense incurred shall be chargeable to the Contractor regardless of the results.

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Structural steel: Section 05 10 00
- .2 Metal deck: Section 05 30 00
- .3 Painting: Section 09 91 00

1.3 WORK SUPPLIED BUT NOT INSTALLED

- .1 Supply following items for installation under other Sections of work: Anchor bolts, bearing plates, sleeves and other inserts to be built into concrete and masonry elements and required for anchorage and support of metal fabrications.
- .2 Supply other Sections with instructions, and if required, templates, necessary for accurate setting of insets and components.

1.4 QUALITY ASSURANCE

- .1 Qualifications of Welders: Welding shall be performed by fabricator certified under CSA W47.1-09.
- .2 Upon completion of installation of ladders, stairs, platform, pit covers, balustrades and railings submit certification by professional engineer responsible for design of these components, verifying that they have been installed in accordance with reviewed shop drawings.

1.5 SHOP DRAWINGS

- .1 Submit detailed shop drawings of all metal fabrications required, showing profiles, members, fastenings, thicknesses, finishes and other pertinent data.
- .2 Shop drawings for stairs, platforms, balustrades, railings, ladders and pit covers shall bear stamp and signature of a professional engineer registered in Ontario.

1.6 PRODUCT HANDLING

- .1 Deliver, handle and store fabricated components to prevent permanent distortion, corrosion and damage.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Steel sections and plate: CAN/CSA-G40.21-13 Grade 300W.
- .2 Square steel tube: CAN/CSA-G40.21-13 Grade 350W, Class H.
- .3 Steel pipe: ASTM A53, Type E, Grade A.
- .4 Sheet steel: Hot dip galvanized, cold rolled, with stretcher level degree of flatness to ASTM A653; zinc coating designation Z275.
- .5 Welding materials: CSA W59-13.
- .6 Shop primer: CAN/CGSB-1.40-97.
- .7 Zinc rich paint primer:

SECTION 05 50 00 - METAL FABRICATIONS

- .1 Shop coat: Catha-Coat 302 Reinforced Inorganic Zinc Primer by Devoe Coatings.
- .2 Field touch up: CAN/CGSB-1.181-99.
- .8 Bituminous enamel: Alkali resistant asphaltic coating.
- .9 Non-shrink grout: Por-Rok by Hallemite Products Ltd., or SET 15 Minute Anchoring Cement by SET Products Ltd.

2.2 FABRICATION GENERAL

- .1 Fabricate components in the shop in largest size practicable to minimize field jointing.
- .2 Fabricate components square, straight, true, free from warpage and other defects. Accurately cut, machine file and fit joints, corners, copes and mitres.
- .3 Reinforce fabricated components to safely withstand expected loads.
- .4 Make joints in built-up sections with hairline joints in least conspicuous locations and manner.
- .5 Make allowance for thermal expansion and contraction when fabricating exterior work.
- .6 Joints shall be welded unless otherwise indicated and unless details of construction do not permit welding. Exposed welds shall be continuous and shall be ground smooth.
- .7 Close exposed open ends of tubular members with welded on steel plugs.
- .8 Where work of other Sections is to be attached to work of this Section, prepare work by drilling and tapping holes, as required to facilitate installation of such other work.
- .9 Work of this Section, supplied for installation under other Sections, shall be prepared as required ready for installation by: drilling, countersinking and tapping holes, forming shapes and cutting to required sizes.
- .10 Grind off mill stampings and fill recessed markings on steel components left exposed to view.

2.3 LADDERS

- .1 Unless otherwise detailed construct ladders as follows:
 - .1 19 x 38 mm steel bar stringers extending from floor to minimum 1.2 m above top rung.
 - .2 19 mm diameter rungs, minimum 400 mm wide, spaced at 300 mm o.c. vertically, welded to stringers.
 - .3 Stringers shall be attached to walls with 10 x 38 mm steel bar yokes, U-shaped, spaced at maximum 1.2 m o.c. vertically.
 - .4 Stringers shall have minimum 10 mm thick base plates for anchorage to floor.
 - .5 Provide safety cage in accordance with applicable OHSA requirements.

2.4 FINISHES

- .1 Thoroughly clean steel of loose scale, rust, oil, dirt and other foreign matter. Suitably prepare steel surfaces by power tool cleaning to receive specified finishes.
- .2 Grind smooth sharp projections.
- .3 Remove oil and grease by solvent cleaning.

SECTION 05 50 00 - METAL FABRICATIONS

- .4 Apply coatings in the shop and before assembly. Where size permits, galvanize components after assembly.
- .5 Shop apply coat of primer to interior components after fabrication except where galvanized or zinc rich paint finish is required.
- .6 Exterior components to be field painted: blast clean metals to "Near White Grade" (SSPC-SP-10) and spray apply a coat of zinc rich paint maximum 3 mils thick.
- .7 Hot dip galvanize exterior components, not scheduled for painting and where shown interior components, to CAN/CSA-G164-M92.
- .8 Apply coat of bituminous enamel to contact surfaces of metal components in contact with cementitious materials and dissimilar metals.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install components plumb, square, straight and true to line. Drill, cut and fit as necessary to attach this work to adjoining work.
- .2 Provide temporary supports and bracing required to position components until they are permanently anchored in place.
- .3 Securely anchor components in place; unless otherwise indicated, anchor components as follows:
 - .1 To concrete and solid masonry with expansion type anchor bolts.
 - .2 To hollow construction with toggle bolts.
 - .3 To thin metal with screws or bolts.
 - .4 To thick metal with bolts or by welding.
 - .5 To wood with bolts or lag screws.
 - .6 Fill space between railing members and sleeves with non-shrink grout.
- .4 Provide all components required for anchoring. Make anchoring in concealed manner wherever possible. Make exposed fastenings, where approved by Consultant, neatly and of same material, colour, texture and finish as base metal on which they occur. Keep exposed fastenings evenly spaced.
- .5 Dissimilar metals and metals in contact with cementitious elements shall have contact surfaces coated with bituminous paint or be isolated by other means as approved by Consultant.
- .6 After installation, clean and refinish injured finishes, welds, bolt heads and nuts. Refinish with zinc rich paint or primer to match original finish.

3.2 SCHEDULE OF COMPONENTS

- .1 Provide components made of steel unless otherwise indicated. Unless otherwise shown provide:
 - .1 Exterior components: zinc rich paint primer.
 - .2 Interior components: alkyd primer.
- .2 Provide the following components:

SECTION 05 50 00 - METAL FABRICATIONS

- .1 Elevator hoist beam.
- .2 Elevator pit ladder.
- .3 Miscellaneous steel angles, plates and lintels indicated on architectural drawings, but not included on structural drawings.
- .4 Other metal fabrications required.

END

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Concrete formwork: Section 03 10 00

1.3 QUALITY ASSURANCE

- .1 Lumber shall bear the grading stamp of an agency certified by The Canadian Lumber Standards Administration Board.
- .2 All lumber shall be sound, straight, dressed and kiln dried, and moisture content at any time during shipment and storage shall not exceed 19%.

1.4 WORK SUPPLIED BUT NOT INSTALLED

- .1 Supply to other Sections anchors, bolts, rough hardware and other items required to be built into work of other Sections to receive, accommodate, secure work of this Section.
- .2 Provide other Sections with instructions to ensure accurate setting of built-in items.

1.5 PRODUCT HANDLING

- .1 Store materials on site to prevent deterioration, loss or impairment of their structural and other essential properties. Prevent excessive moisture gain of materials.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Lumber
 - .1 Meet requirements of CAN/CSA-086-09 Strength Group D (S-P-F) and CAN/CSA-0141-05 and National Lumber Grading Authority (NLGA) Standard Grading Rules.
 - .2 Blocking, Copings, Nailers: NLGA 122c. "Standard" S-P-F.
- .2 Plywood: Douglas Fir to CSA O121-08 Unsanded Sheathing Grade.
- .3 Fasteners and Connecting Hardware
 - .1 Nails: to CSA B111-1974, hot dip galvanized steel for exterior work including components located in exterior walls and roofs; bright finish steel in all other locations. Unless otherwise indicated use common spiral flathead nails.
 - .2 Bolts, nuts, washers: ASTM A307, hot dip galvanized steel.
 - .3 Connectors, anchors, brackets, spikes: hot dip galvanized structural quality steel.
 - .4 Concrete/masonry anchors: self tapping screw anchors: Tapcon.
 - .5 Screws: zinc, cadmium or chrome plated.
 - .6 Fasteners in contact with preservative pressure treated wood shall be stainless steel.

2.2 WOOD TREATMENT

SECTION 06 10 00 - ROUGH CARPENTRY

- .1 Preservative pressure treated components: to CSA 080 Series - 15, arsenate free, using copper and azole.
- .2 Surface, cut, bore and trim components to sizes required as much as possible prior to pressure treatment.

PART 3 - EXECUTION

3.1 GENERAL

- .1 Erect work plumb, level, square and to required lines. Ensure that materials are rigidly and securely attached to each other and to adjacent building elements and will not be loosened by work of other trades.
- .2 Where other materials and components are to be applied directly over wood members recess heads of fastening devices below wood surfaces.
- .3 Where work remains exposed to view, fasteners shall be uniformly and evenly spaced and neatly installed.

3.2 NAILERS, BLOCKING, COPINGS GROUNDS

- .1 Provide wood nailers, blocking, copings, strapping, bucks, grounds and other rough carpentry components to sizes and in locations required for satisfactory support of fabricated items and other work.
- .2 Unless otherwise indicated, provide minimum 38 mm thick material. Grounds may be 21 mm thick material unless otherwise indicated.
- .3 Install wood members plumb, level, straight, true to line and solidly anchored to adjacent building elements.
- .4 Provide rough bucks where indicated or required for windows, doors and other elements.
- .5 Provide wood framed locker bases.

3.3 ANCHORS AND FASTENERS

- .1 Provide rough hardware including nails, screws, bolts, washers, brackets, hangers, and fastening devices of all types.
- .2 Unless otherwise indicated, attach wood members at maximum 600 mm o.c. as follows:
 - .1 To concrete and solid masonry with expansion type anchor bolts or self tapping screw anchors.
 - .2 To hollow masonry with toggle bolts.
 - .3 To heavy gauge metal with bolts.
 - .4 To light gauge metal with screws or bolts.
 - .5 To wood with nails, screws or bolts as required to ensure stability.
- .3 Fasten wood copings to supporting masonry elements with 13 mm galvanized steel bolts min. 450 mm long spaced max. 600 mm o.c. Where width of coping plate exceeds 100 mm, stagger bolts off centre.

3.4 PRESSURE TREATED COMPONENTS

- .1 Use preservative pressure treated lumber and plywood within exterior wall and roof systems, and at other locations indicated.

SECTION 06 10 00 - ROUGH CARPENTRY

- .2 Where it is necessary to cut, bore or otherwise alter pressure treated components in the field, treat cut surfaces with heavy coat of wood preservative.

END

SECTION 06 41 00 - CABINETWORK

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Metal fabrications: Section 05 50 00
- .2 Rough carpentry: Section 06 10 00
- .3 Glass and glazing: Section 08 80 00

1.3 DEFINITION

- .1 "Exposed" when referred to in this Section shall mean all parts than can be viewed and shall include interiors of cupboards, cabinets and counters, backs of doors, shelving, gables, drawers.

1.4 QUALITY ASSURANCE

- .1 Reference Standards: unless otherwise specified, carry out finish carpentry work in accordance with requirements of "Quality Standards" (latest issue) of Architectural Woodwork Institute (AWI) and Architectural Woodwork Manufacturers' Association of Canada (AWMAC), Premium Grade.

1.5 QUALITY CONTROL

- .1 The Board may arrange and pay out of the cash allowance included in Section 01020 for the inspection of the work of this section by AWMAC under their guarantee and inspection program (GIS).

1.6 SUBMITTALS

- .1 Submit detailed shop drawings for cabinetwork showing proposed assembly, connections, anchorage, materials, dimensions, thickness and finishes. Show locations, types and sizes of appliances, equipment and fixtures to be incorporated into cabinetwork.
- .2 Submit samples of each type of solid wood and plywood used in exposed work, complete with transparent finish, prior to fabrication of cabinetwork.
- .3 Submit sample of each type of cabinet hardware component used.

1.7 PRODUCT DELIVERY, HANDLING & STORAGE

- .1 Protect against damage, including damage by excessive changes in moisture content, during delivery and storage. Maintain minimum storage temperature of 16°C, and relative humidity 25% to 55%.
- .2 Cover plastic laminate faces at shop with heavy paper.
- .3 Do not deliver finish carpentry components to site before all wet trades are completed, the building is closed in and humidity conditions on site are acceptable. Do not deliver during rain or damp weather.
- .4 Store materials on site in such a way as to prevent deterioration or loss or impairment of essential properties. Prevent excessive moisture gain of materials.

1.8 WARRANTY

- .1 At no cost to Board remedy any defects in work of this Section due to faulty materials and/or workmanship for a period of 2 years from date of Substantial Performance.

PART 2 - PRODUCTS

2.1 MATERIALS

PROJECT NO. 2206

**TECUMSEH PUBLIC SCHOOL, MISSISSAUGA, ONTARIO
ALTERATIONS 2026**

SECTION 06 41 00 - CABINETWORK

- .1 Solid Wood:
 - .1 Unless otherwise indicated, provide AWI/AWMAC Premium Grade.
 - .2 All wood materials shall be new, straight and clean, free of sap, knots, pitch, and other defects, except as permitted by applicable grading rules.
 - .3 All wood shall be kiln dried to a maximum moisture content of 7%.
 - .4 Hardwood: plain sawn Maple for exposed locations.
 - .5 Softwood: to CAN/CSA 0141-05, dressed all sides used in concealed locations.
- .2 Panel Materials:
 - .1 Melamine faced panels: melamine resin impregnated sheet, thermally fused to MDF board core; colours/textures selected by Consultant: Panval by Uniboard, Permalam by Flakeboard, or equivalent product by other manufacturer approved by Consultant.
 - .2 Hardwood plywood: to CSA 0115-M1982, Type II; face veneer AWI/AWMAC AA Grade, Sequence Matched Select Maple, for transparent finish.
 - .3 Softwood plywood: to CSA 0151-09 Sanded Grade, solid two sides. Use in concealed locations only, except as indicated.
 - .4 Particleboard: ANSI A208.1 minimum 700 kg/m³ density.
 - .5 Medium density fibreboard (MDF): ANSI A208.2, density 750 kg/m³.
 - .6 Medium density fibreboard, moisture resistant (MDFMR): ANSI A208.2
- .3 Plastic Laminated Components:
 - .1 Plastic laminate facing sheet: ANSI/NEMA LD3-2005, grades HGS, VGS, HGP; colours, gloss and texture will be selected by Consultant; standard of acceptance: Nevamar, ARP.
 - .2 Backing sheet: BKL Grade by manufacturer of facing sheet.
 - .3 Core: particleboard or plywood.
 - .4 Laminating adhesive: CSA-0112 Series M1977.
 - .5 Core sealer: clear water resistant synthetic resin sealer.
- .4 PVC Edging:
 - .1 3 mm thick "Woodgrain" or "Solid Colour" edging by Woodtape; colour and pattern to be selected by Consultant, to match melamine.
- .5 Fasteners & Adhesive:
 - .1 Nails and staples: CSA B111-1974, galvanized.
 - .2 Screws: zinc, cadmium or chrome plated steel.
- .6 Cabinet Hardware:

Products listed below are a standard of acceptance. Products by other manufacturers, of equal quality and similar appearance may also be accepted subject to review and approval by Consultant.

 - .1 Hinges for 19 mm door Blum 91-650, 170° with self-closing spring.
 - .2 Hinges for 35 mm door: Salice Type F
 - .3 Door or drawer pull: GSH 302 x 100 mm CTC 7.5 mm o.d. brushed stainless steel.
 - .4 Drawer slides: full extension for 45 kg load by K&V or Accuride.
 - .5 Drawer locks: Olympus 078 or CompX National C8702 or Corbin CCL 02066; MK & KA by room.

SECTION 06 41 00 - CABINETWORK

- .6 Cabinet locks: Olympus 078 or CompX National C8702 or Corbin CCL 02067; MK & KA by room.
- .7 Automatic door catch (inactive door of locked pair): Hafele 245.58.754.
- .8 Pilaster & clips: KV 255, 256.
- .9 Coat hooks: GSH 307 x 115 mm brushed stainless steel.
- .10 Coat rods: K&V 660 with 734 and 735 flanges.
- .11 Casters: 100 mm diameter, 130 mm high caster with plate and brake, capacity 100 kg: Richelieu No. 21000190.
- .12 Hardware finish: Chrome or nickel plated.
- .13 Cable set grommets: plastic countertop fitting for computer/telephone wiring: 2 part cable set with spring closure top by Hafele, 60 mm diameter, colours selected by Consultant.
- .7 Access panel connectors: Invisible plug-type knock down connectors by Hafele.
- .8 Display/trophy case finish:
 - .1 Cork: 6 mm thick natural fine grained cork, bonded to 6 mm particle board: ASP Natural Cork by Architectural School Products or equivalent product by other manufacturer approved by Consultant.
 - .2 Felt: nylon fabric with polyester core and nylon jersey backing "bur-Fab 60" Display Fabric as distributed by Architectural School Products, Mississauga, 905-822-4287, or 303 g Viscose Felt by Brand Felt Limited, Mississauga, 905-279-6680. Colour: up to two colours selected by Consultant from supplier's standard selection.

2.2 FABRICATION

- .1 General Requirements:
 - .1 Exposed joints and edges:
 - .1 Uniformly space exposed joints unless otherwise indicated.
 - .2 No edge grain shall be visible; mitre external corners, house internal corners. Secure corners with corrugated metal fasteners. Glue mitred corners.
 - .3 All exposed edges of plywood and particle board shall have solid wood edging, minimum 3 mm thick, pressure glued.
 - .2 Mechanical fasteners:
 - .1 Inconspicuously locate mechanical fasteners. Wherever possible conceal fastenings.
 - .2 Countersink nail heads.
 - .3 Where exposed to view, countersink screw and bolt heads and fill holes with matching wood plugs.
 - .3 Cutting and fitting: make cutouts in work of this Section as required to accommodate work of other Sections.
 - .4 Make provisions in cabinetwork to accept built-in appliances, provided by others.
- .2 Standing & Running Trim:
 - .1 Fabricate trim of hardwood.
 - .2 Length: standing trim shall be in one piece. Running trim shall be in longest practicable lengths.
 - .3 Thickness: unless otherwise indicated minimum 12 mm.

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- .3 Plastic Laminate Components:
 - .1 Unless otherwise specified herein comply with requirements of AWI/AWMAC "Quality Standards".
 - .2 Assembly: Bond plastic laminate to core with adhesive, under pressure.
 - .3 Core: unless otherwise indicated 19 mm thick veneer core plywood or 25mm thick MDF board.
 - .4 Balanced construction: plastic laminate covered components shall be of balanced construction, with plastic laminate on both faces of core. Seal core edges not covered with plastic laminate.
 - .5 Use largest practicable plastic laminate sheet size.
 - .6 Provide joints symmetrically; provide joints at corners and at changes in superficial areas; provide concealed draw bolt anchors at joints. All butt joints shall have a blind spline.
 - .7 Construct countertops postformed or selfedged as detailed on Drawings.
 - .8 Apply self-edged minimum 1.1 mm thick plastic laminate to exposed ends of countertops.
 - .9 Construct splashbacks minimum 100 mm high or higher where indicated. Do not return postformed splashback at ends except where specifically called for.
 - .10 Openings and cutouts:
 - .1 Radius internal corners at least 3 mm and chamfer edges.
 - .2 Where core edge is to remain exposed, cover with plastic laminate edging.
 - .3 Where core edge is to be concealed, seal with sealer.
- .4 Cabinetwork:
 - .1 Except where otherwise detailed use flush overlaid construction. Tenon, dado, dowel or rabbet interior construction with all parts well glued. Shoulder mitre all exposed corners. Open ends or skeleton frames against walls are not permitted. Unless otherwise permitted by Consultant use unitized construction system for all components.
 - .2 Construct cabinetwork, interiors and exteriors, from melamine-faced particle board unless otherwise indicated. Finish exposed edges with PVC edging; finish both longitudinal edges of shelves (back and front). Construct counter tops of plastic laminate faced particle board except where other material is required.
 - .3 Provide moisture resistant medium density fibreboard (MDFMR) for doors of cabinets with sinks.
 - .4 Provide the following minimum thicknesses:
 - .1 Doors: 19 mm.
 - .2 Drawer fronts: 19 mm.
 - .3 Gables: 19 mm.
 - .4 Cabinet backs (wall mounted): 19 mm
 - .5 Cabinet backs (floor mounted): 12 mm.
 - .6 Shelves: 25 mm.
 - .5 Rout gables for pilaster strips where adjustable shelving is required.
 - .6 Provide shelves of melamine faced 25 mm thick particleboard. Reinforce shelves where span exceeds 900 mm.
 - .7 Construct drawers with sides tongued into front and back housed into sides. Construct bottom housed into front and sides.
 - .8 Install cabinet hardware in accordance with hardware manufacturer's directions. Unless otherwise indicated provide each drawer and door with pull, each drawer with extension

SECTION 06 41 00 - CABINETWORK

hardware and each door up to 900 mm high with 2 hinges, doors 900 to 1350 mm with 3 hinges, doors 1350 to 1800 mm with 4 hinges. Provide additional hinges if recommended by hinge manufacturer due to door size and weight. Provide locks at all doors and drawers; locks shall be keyed alike in each room.

- .9 Cabinet bases shall be fabricated from preservative pressure treated plywood or lumber, separate from body of cabinets.
- .10 Display/Trophy cases:
 - .1 Fabricate display/trophy case to details shown.
 - .2 Provide cork and felt/fabric finish at back and ends of trophy and display cases.
 - .3 Prior to installing fabric, rout out cork board to receive adjustable shelving pilasters.
 - .4 Apply materials to substrates with adhesive recommended by material manufacturers. Apply adhesive completely covering contact surface and as directed by adhesive manufacturer. Avoid depositing adhesive on exposed surfaces.
 - .5 Apply felt fabric and finish by rolling smooth with a dry roller, to ensure adhesion in all areas.
 - .6 Cut fabric/felt and install shelf pilaster strips where shown.

2.3 SHOP FINISHING

- .1 Except where plastic laminate or melamine finish is required, provide shop applied polymerizing two component catalytic conversion varnish system, stain colour and varnish sheen selected by Consultant. The individual components of the system used must be chemically compatible to assure perfect adhesion and top quality, durable final finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install cabinetwork components plumb, true and level and securely fasten in place. Accurately scribe and closely fit components to irregularities of adjacent surfaces.
- .2 Accurately fit joints in true plane, locate joints over bearing or supporting surfaces.
- .3 Provide mechanical fastening devices such as nails, screws and bolts required for fastening wood components. Unless permitted provide concealed fastening of components.
- .4 Where permitted, nail with small headed finishing nails. Countersink nail heads with nail setter.
- .5 Install plastic laminate components using concealed fastening devices.
- .6 Where components are fastened with screws or bolts, countersink screw and bolt heads and provide wood plugs matching surrounding wood.
- .7 Where cabinetwork abutts other building elements provide wood trim matching cabinetwork except where otherwise detailed.
- .8 Where access is required to valves and other mechanical and electrical components, located behind cabinetwork, provide removable plywood access panels of size required and secure with four brass screws.
- .9 Install specialty items incorporated into cabinetwork in accordance with details shown and in conformance with respective manufacturer's recommendation.
- .10 Install display/trophy case at location required. Coordinate with Section 08 80 00 to install glass components and all associated hardware.
- .11 Check operation of all movable parts and, if necessary, adjust to ensure proper and smooth function.

SECTION 06 41 00 - CABINETWORK

- .12 Upon completion of installation inspect work of this Section and touch up, where required, minor or damaged surface finish to restore it to original condition. Replace damaged components which, in the opinion of the Consultant, cannot be satisfactorily repaired.

END

SECTION 07 11 10 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Concrete foundation walls: Section 03300
- .2 Concrete block foundation walls, including parging: Section 04200
- .3 Underslab vapour retarder: Section 07115
- .4 Water repellent sealer for concrete block foundation walls above grade: Section 07190
- .5 Perimeter insulation: Section 07200

1.3 QUALITY ASSURANCE

- .1 Meet applicable requirements of CAN/CGSB-37.3-M89 and CGSB 37-GP-36M.

1.4 INDEPENDENT INSPECTION

- .1 Comply with requirements of Section 01400.
- .2 Work of this Section may be inspected and tested by independent testing agency as directed by Consultant.

1.5 PRODUCT HANDLING AND STORAGE

- .1 Deliver materials to site in unopened and undamaged sealed original containers.
- .2 Store solvent based liquids away from excessive heat and open flame. Store asphalt emulsions in temperature not lower than 5° C, nor higher than 30° C.

1.6 JOB CONDITIONS

- .1 Do not apply materials during periods of precipitation or when precipitation is imminent.
- .2 Protect materials against freezing and against contact with water from any source until applied and completely cured.
- .3 Protect surrounding surfaces from damage and overspray.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Dampproofing material for use above 5° C.
 - .1 Primer: emulsified asphalt as specified below, cut 20% maximum with clean, potable water.
 - .2 Dampproofing compound: emulsified asphalt to CAN/CGSB-37.2-M88.
- .2 Dampproofing material for use below 5° C.
 - .1 Primer: cutback asphalt, unfilled to CGSB 37-GP-9Ma.
 - .2 Dampproofing compound: cutback asphalt filled to CAN/CGSB-37.16-M89.

PART 3 - EXECUTION

3.1 PREPARATION

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SECTION 07 11 10 - BITUMINOUS DAMPPROOFING

- .1 Examine surfaces to receive bituminous dampproofing and ensure that they are reasonably smooth, free of cracks, holes and projections which might cause puncture of membrane, free of dirt, oil, grease and other foreign matter and cured to the point where moisture contained therein will not adversely affect membrane.
- .2 Do not apply dampproofing to a frozen or partly frozen substrate.
- .3 Remove dirt and dust from substrates and spray apply primer at rate recommended by manufacturer. Protect primed surfaces from rain and frost until it is cured.

3.2 MEMBRANE APPLICATION

- .1 Provide bituminous membrane dampproofing at exterior face of foundation walls below grade.
- .2 Start membrane at outside edge of footing or at bottom of grade beam or wall and extend to 100 mm below finish grade.
- .3 Brush or spray apply bitumen.
- .4 Dampproofing above 5° C:
 - .1 Apply primer at rate of 0.5 L/m² and allow to dry.
 - .2 Apply dampproofing compound at rate of 1 to 1.5 L/m², to obtain full coverage in all locations and allow to dry.
- .5 Dampproofing below 5° C:
 - .1 Apply primer and allow to cure until touch dry.
 - .2 Apply dampproofing compound at rate of 1 to 1.5 L/m², to obtain full coverage in all locations, and allow to dry.

END

SECTION 07 16 16 CRYSTALLINE WATERPROOFING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Cast-in-place concrete: Section 03 30 00

1.3 QUALITY ASSURANCE

- .1 Installer's qualifications: licensed or approved by material manufacturer.
- .2 Workmanship standards: execute work in strict accordance with manufacturer's printed directions.

1.4 PRODUCT STORAGE AND HANDLING

- .1 Deliver materials to site in original containers with seals and labels intact.
- .2 Store materials in dry place, protected from moisture.

1.5 WARRANTY

- .1 At no cost to Contract, remedy any defects in work, including work of this and other Sections, due to faults in materials or workmanship provided under this Section appearing within a period of 2 years from date of Substantial Performance.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Waterproofing system: one of the following:
 - .1 Capillary Concrete Waterproofing by Permaquik.
 - .2 Xypex Concrete Waterproofing by Xypex.
 - .3 CemKote CW Plus by W.R. Meadows.
 - .4 Krystol T1/T2 by Kryton
 - .5 MasterSeal 500 by Master Builders Solutions.
- .2 Mortar cove and plug: one of the following:
 - .1 Permaquik 200 by Tremco.
 - .2 Xypex Drypack.
 - .3 Meadow-Crete OV by W.R. Meadows
 - .4 Krystol Waterstop Grout by Kryton
 - .5 MasterSeal 500.
- .3 Water: CSA-A23.1-14, clean, non-staining.

2.2 MIXING

- .1 Use separate containers for measuring quantities of waterproofing materials and water.

SECTION 07 16 16 CRYSTALLINE WATERPROOFING

- .2 Water temperature shall be minimum 15°C.
- .3 Mix only enough material that can be applied before mixture starts to thicken. Stir frequently but do not add more water to restore workability.
- .4 Mix materials to proportions recommended by manufacturer.

PART 3 - EXECUTION

3.1 SUBSTRATE CONDITIONS

- .1 Surfaces shall be clean and free of oil, grease, paint, loose duct and laitance.
- .2 Surfaces and ambient temperature shall be minimum 5°C for a period of 24 hours before the installation, during and after the installation.

3.2 PREPARATION

- .1 Slabs: except where waterproofing is applied dry and floated into concrete, to produce acceptable substrate, sandblast surfaces or etch with muriatic acid; fill cracks and defective areas with mortar.
- .2 Smooth surfaces: roughen by sandblasting or other approved method.
- .3 Defective surfaces: remove defective concrete to a depth where sound concrete is found; fill tie holes, reglets, honeycombed areas and routed out cracks with mortar.
- .4 All surfaces: wash thoroughly with water and let dry to a damp condition.

3.3 APPLICATION

- .1 Provide cementitious waterproofing at elevator and sump pits, and in other locations indicated.
- .2 Install mortar cove at junction of walls to slabs.
- .3 At slabs and toppings broadcast waterproofing material dry at time of initial set of concrete and float thoroughly into concrete or apply by slurry coat method.
- .4 Apply waterproofing material to walls with brush, broom or suitable spray equipment. Where two coat application is required, apply second coat while first coat is still green.
- .5 Carry waterproofing minimum 200 mm above water level or higher as indicated.
- .6 Fill reglets at construction joints, and other locations shown, with mortar.
- .7 Give surfaces a smooth, dense and uniform finish.

3.4 CURING

- .1 Moist cure waterproofed surfaces for at least two days. Do not fill sumps for at least 28 days after application of waterproofing.
- .2 Allow for air circulation in enclosed areas.

END

SECTION 07 21 13 - THERMAL INSULATION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Air barrier: Section 07 27 00
- .2 Metal wall cladding: Section 07 46 19
- .3 Roof insulation at built-up bituminous membrane roofing: Section 07 51 00
- .4 Duct and pipe insulation: Divisions 22 and 23

1.3 PRODUCT STORAGE AND HANDLING

- .1 Deliver insulation to site in sealed wrappings bearing manufacturer's name, product name and RSI or KSI value.
- .2 Store materials in a dry area protected from the elements.

1.4 PROTECTION

- .1 Temporarily protect installed insulation from damage and action of the elements until it is permanently concealed or protected.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Insulation: rigid stone wool insulation to CAN/ULC – S702.1 April 2016: Cavityrock by Rockwool, meeting the following properties:
 - .1 Board thicknesses: as shown.
 - .2 Density: 100 kg/m³ outer layer, 60 kg/m³ inner layer.
 - .3 Flame spread: 0.
 - .4 Smoke developed: 0.
 - .5 Thermal resistance: RSI per inch at 24° C: 0.76 m² K/W.
- .2 Impaling clips: adhesive bonded perforated zinc plated base plate with spindle and speed washer: Perforated TACTOO Insul-Hanger by Continental or equivalent product by Gemco.
- .3 Impaling clip adhesive: as recommended by impaling clip manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Substrates to receive rigid board insulation, shall be sound, dry and free of dirt, oil grease and other foreign substances.
- .2 Clean substrates as required. Remove concrete surface ridges and deposits.

3.2 INSTALLATION

- .1 Provide under this Section all thermal insulation required except where it is specified to be part of other Sections. Where no particular type of insulation is indicated provide rigid fibrous type.

SECTION 07 21 13 - THERMAL INSULATION

- .2 Install insulation with impale clips or other mechanical securement approved by Consultant.
- .3 Provide continuous uniform thermal insulation over insulated areas.
- .4 Where insulation is interrupted by construction elements, neatly fit insulation around such elements and pack spaces around elements with same insulation.
- .5 Moderately butt insulation boards against each other so that there are no gaps.
- .6 Stagger joints at multiple layer installations.

3.3 EXTERIOR WALL INSULATION

- .1 Provide insulation in thicknesses shown. Stagger joints in second layer from joints in first layer.
- .2 Place insulation against air barrier/vapour retarder, tightly fitted at joints, at perimeter of insulated areas, and around penetrations; leave no gaps or voids.
- .3 Insulation shall fit tightly between and around wall cladding support brackets. All butt joints shall be brought into tight contact to ensure a monolithic thermal barrier. Any cutting or fabricating shall be made of the largest module possible of insulation, to reduce the number of joints.
- .4 Provide supplementary impale clip securement compatible with air barrier/vapour retarder membrane and acceptable to membrane manufacturer.

END

SECTION 07 27 00 - AIR BARRIER

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Concrete unit masonry: Section 04 22 00
- .2 Built-up bituminous membrane roofing: Section 07 51 00

1.3 SUBMITTALS

- .1 Submit prior to ordering materials proposal in writing indicating which membrane system is to be used. Include manufacturer's documentation verifying suitability of application for expected application conditions.

1.4 PRODUCT HANDLING

- .1 Handle and store membrane materials to prevent tearing, puncturing and other damage.
- .2 Store roll goods in upright position and protected from the weather.

1.5 JOB CONDITIONS

- .1 Apply membrane during dry weather and to dry substrates only.
- .2 Apply materials only within acceptable application temperature range determined by manufacturer. Use product from single manufacturer throughout entire project.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Sheet membrane: modified bitumen self-adhesive membrane 450 mm wide; one of the following; use the same product for entire project:
 - .1 Blueskin SA by Henry
 - .2 Perm-A-Barrier by W.R. Grace
 - .3 Sopraseal Stick 1100T by Soprema
 - .4 PQ7190 A/VR by Permaquick
 - .5 Sealtight Airshield by W.R. Meadows
 - .6 ExoAir 110 by Tremco
- .2 Fluid applied membrane:
 - .1 Membrane: water based, cold applied, elastomeric membrane: ExoAir 120 by Tremco or Air Shield LM by W.R. Meadows.
 - .2 Transition membrane: ExoAir 110 by Tremco or Air Shield by W.R. Meadows.
- .3 Roof transition membrane: modified bitumen membrane, 2 mm thick, to CGSB 37-GP-56M Type 2 Class C Grade 1, self adhesive lower surface, sanded upper surface: G100 Tack Sheet by Henry.
- .4 Primer for self-adhesive membrane: as recommended by membrane manufacturer.
- .5 Adhesives, mastics, joint backing: as recommended by membrane manufacturer.
- .6 Metal backing: hot dip galvanized sheet steel, minimum 0.9 mm thick, zinc coating designation Z275 (ASTM A653).

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Examine substrates to ensure conditions are satisfactory to receive work of this Section.
- .2 Start of work shall imply acceptance of conditions.
- .3 Substrates shall be sound, reasonably smooth, dry, clean, free of frost, grease, oil and other substances which would adversely affect membrane adhesion.

3.2 PREPARATION

- .1 Clean substrates as required.
- .2 Remove sharp projections and repair defective areas in substrate.
- .3 Prime substrates as recommended by membrane manufacturer.
- .4 At open joints in substrate, in excess of 3 mm width, and at other locations shown, provide metal backing for air barrier membrane, securely fastened to supporting work each side of joint.

3.3 SELF-ADHESIVE SHEET MEMBRANE

- .1 Install membrane system in accordance with manufacturer's installation instructions.
- .2 Apply membrane horizontally to exterior face of interior wythe of cavity walls, and in other locations shown on Drawings.
- .3 Completely cover substrates. Start at low point and proceed up the wall, overlapping subsequent sheets minimum 50 mm in the direction of water flow. Lap end joints minimum 100 mm.
- .4 At masonry wall ties and at other penetrations through membrane, accurately cut and fit membrane around penetrating component.
- .5 At wall openings return membrane into rough openings. Install additional strips of membrane to seal corners of openings.
- .6 Coordinate with other Sections to ensure continuity of air barrier at junction with roof systems and other wall systems. Connect as required.
- .7 Apply primer with roller, brush or spray equipment. Do not apply more primer than that which can be covered, on the same working day, with air barrier membrane. Recoat primed areas which are not covered with membrane the same day.
- .8 Position membrane for alignment, with protective film in place. Roll membrane back, remove film and press membrane in place.
- .9 Roll completed membrane, including seams, with suitable roller, to ensure full contact with substrate.
- .10 Seal around masonry ties and other penetrations with adhesive/mastic.

3.4 FLUID APPLIED MEMBRANE

- .1 Fluid applied membrane may be used in lieu of self adhesive sheet membrane.
- .2 Prepare substances and apply membrane in accordance with manufacturer's current directions. Mark adjacent surfaces not scheduled to receive membrane.
- .3 Prior to application of membrane install transition and through-wall flashing membranes.

SECTION 07 51 00 - BUILT-UP BITUMINOUS ROOFING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Steel deck: Section 05 30 00
- .2 Rough carpentry: Section 06 10 00
- .3 Air barrier: Section 07 27 00
- .4 Metal flashings: Section 07 62 00
- .5 Roof drains and sleeve flashings at mechanical roof penetrations: Division 22
- .6 Sleeve flashings at electrical roof penetrations: Division 26

1.3 DESCRIPTION

- .1 Roof System (from top to bottom):
 - .1 Aggregate and flood coat.
 - .2 4 ply glass felt bituminous roof membrane.
 - .3 Organic felt base layer
 - .4 Fibreboard.
 - .5 Insulation (sloping insulation where shown).
 - .6 Vapour retarder.
 - .7 Structural Steel (Section 05 10 00).
 - .8 Concrete Formwork (Section 05 30 00).

1.4 QUALITY ASSURANCE

- .1 Roofer qualifications: Member in good standing with the Ontario Industrial Roofing Contractors Association (OIRCA) or with the Canadian Roofing Contractors' Association (CRCA) and with minimum 5 years of experience in type of work specified.
- .2 Reference Standards: Where work required is not specified or shown in detail meet applicable requirements of CRCA Roofing Specification Manual, latest issue.
- .3 Ensure compatibility between all roofing materials used.
- .4 Use the same manufacturers for roofing felts and flashing materials.
- .5 Roof system and all its components shall be classified and listed by ULC as Class 'A'. Systems equivalent to that specified, subject to Consultant's approval, may also be used provided they too are classified and listed by ULC as Class 'A'.
- .6 Roofer to receive the confirmation from Soprema that materials used for this project will not affect existing material warranty for existing roof.

1.5 INDEPENDENT INSPECTION AND TESTING

- .1 Board may arrange and pay out of cash allowance included in Section 01 21 00 for independent inspection agency to inspect work of this Section as directed by the Consultant.

PROJECT NO. 2206

**TECUMSEH PUBLIC SCHOOL, MISSISSAUGA, ONTARIO
ALTERATIONS 2026**

SECTION 07 51 00 - BUILT-UP BITUMINOUS ROOFING

- .2 Make up to three test cuts of completed membrane system removing full depth of system including insulation, at locations directed by Consultant and in presence of independent inspection agency.
- .3 Immediately fill voids left by test cuts. Carefully cut out further materials so that each layer or ply of each roofing component overlaps preceding layer by minimum 50 mm. When all specified layers have been mopped in with bitumen, apply one additional ply of roofing felt and bitumen coating over entire test cut area with 100 mm side and end laps.

1.6 SUBMITTALS

- .1 Submit shop drawings for tapered insulation.
- .2 Prior to start of work submit description of each roof system component to be used and provide verification that all components are classified and listed by ULC as Class 'A'.

1.7 PRODUCT HANDLING

- .1 Store materials on raised platforms in approved manner at site preceding application, and protect from inclement weather at all times. Roofing felts which have become wet shall not be used and may be marked with paint by the inspector and must be counted and retained on site until completion of the roofing project. Do not store any materials on unprotected roofing surface.
- .2 Store roofing felts and insulation in heated atmosphere, 21° C for 24 hours, before application in cold weather. Polywrap roofing felts.
- .3 Do not store gravel on roof ahead of demand. Bring gravel to roof only as it is required for spreading as work proceeds.

1.8 JOB CONDITIONS

- .1 Protection
 - .1 Protect work of other Sections from damage. Cover vertical surfaces with tarpaulins at hoisting locations.
 - .2 When using open flame in connection with this work, maintain at all times 9 kg dry chemical fire extinguisher fully charged and in operable condition at location where open flames are in use.
 - .3 Locate kettles at grade level away from building, and so as to prevent smoke damage.
 - .4 Protect bitumens and felts against contact with water from any source until applied and fully cured.
 - .5 Protect completed portions of roofing and existing roofs scheduled to remain from damage due to traffic and materials handling until completion of work.
 - .6 Provide minimum 2 hour fire watch immediately following each work period when torching equipment has been used.
- .2 Environmental Conditions
 - .1 Do not apply roofing materials during precipitation or over damp or otherwise unsuitable surfaces.
 - .2 Apply materials only when air temperature is within limits specified by manufacturer.
 - .3 Materials and application methods used when temperature is below 5°C must be approved by the Consultant prior to start of work.

1.9 WARRANTY

- .1 At no cost to Board, remedy any defects in work, including work of this and other Sections, due to faults in materials or workmanship provided under this Section appearing within a period of 2 years from date of Substantial Performance.

SECTION 07 51 00 - BUILT-UP BITUMINOUS ROOFING

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 All materials used for the project to be verified by Soprema that has material warranty on the existing roof expiring on September 15, 2038.
- .2 Asphalt primer: CSA 37-GP-9Ma.
- .3 Asphalt: CSA A123.4-04, Type 2 for slopes up to 1:15, Type 3 for slopes greater than 1:15.
- .4 Vapour Retarder at roofs with steel deck:
 - .1 Vapour Retarder Adhesive: Permstop by Johns Manville or Permaste by Lexcor or Soprastop by Soprema.
 - .2 Vapour Retarder: CAN/CGSB-51.33-M89, Type 2: Permstop by Johns Manville or Permaste by Lexcor or Soprastop by Soprema.
- .5 Roofing Felts:
 - .1 Organic felt base layer: #15 felt to CSA A123.3-05.
 - .2 Inorganic glass felts: ASTM D-2178, Type IV.
- .6 Insulation: rigid polyisocyanurate board, faced, to CAN/ULC-S704-03; thickness as shown, maximum bond thickness 75 mm: Sopra-Iso by Soprema or equivalent product not affecting existing material warranty.
- .7 Sloping insulation: tapered mineral wool or rigid fibreboard, or polyisocyanurate slope unless otherwise shown 1:50; Sopra-ISO by Soprema or equivalent product not affecting existing material warranty.
- .8 Fibreboard: 13 mm thick to CAN/ULC S706-09, Type II Grade 2 high density, asphalt coated one side.
- .9 Cant strip: 100 x 100 mm rigid mineral wool or fibreboard, mopping grade, by Soprema or or equivalent product not affecting existing material warranty.
- .10 Adhesive for membrane flashing base sheet: Sopracolle 300 N by Soprema or equivalent product not affecting existing material warranty.
- .11 Membrane Flashing:
 - .1 Base sheet: modified bitumen to CGSB 37-GP-56M, Type 2, Class C, Grade 2, 180 g/m².
 - .2 Cap sheet: modified bitumen to CGSB 37-GP-56M, Type 1, Class A, B or C, Grade 2, 250 g/m², colour selected by Consultant.
- .12 Aggregate: Hard, durable, screened and washed pea gravel, free of organic matter, soluble elements; size 6 to 12 mm, no fines.
- .13 Mechanical Insulation Fasteners: FM approved, 40 mm longer than roof assembly thickness, with 75 mm diameter plastic or metal plates, as approved by membrane and insulation manufacturers.
- .14 Nails: Large head galvanized steel or aluminum roofing nails of sufficient length to penetrate and provide a secure fastening.

SECTION 07 51 00 - BUILT-UP BITUMINOUS ROOFING

- .15 Fastening bars: Cold rolled galvanized sheet steel, 2 mm ASTM A653 coating designation Z275 commercial, with slotted holes at 25 mm o.c.

2.2 BITUMEN

- .1 Maintain bitumen temperatures within range specified. Regulate temperatures by means of thermostatic heating control attached to kettle. Kettle temperature shall not exceed flash point of bitumen:
 - .1 Maximum kettle temperature: 260°C
 - .2 Minimum application temperature: 190°C.
- .2 In cold weather, maximum kettle temperature may be increased if required to facilitate pouring of bitumen. Check with Consultant before raising temperature.
- .3 Two kettles are required on site, one for Type 2 asphalt and one for Type 3 asphalt. No mixing of asphalt will be allowed. If a tanker is used a copy of the bill of lading must be supplied to the inspector showing the type of asphalt.

PART 3 - EXECUTION

3.1 SUBSTRATES AND PREPARATION

- .1 Examine materials over which work of this Section is applied and ensure that roof decks are free of snow, ice, loose or adhering materials which would impair this work.
- .2 Substrate shall be clean, dry and suitable for roofing application.
- .3 Start of work of this Section shall indicate acceptance of substrate conditions.
- .4 Prime concrete and masonry substrates in contact with roofing membrane and felt flashings. Allow primer to dry before applying succeeding components.
- .5 Install preformed metal curbs at locations shown. Securely fasten curbs to supporting work.

3.2 VAPOUR RETARDER

- .1 Over steel roof deck apply continuous ribbons of adhesive with suitable equipment, and in accordance with manufacturer's directions. Embed one ply vapour retarder, lapping edges minimum 100 mm. Seal laps with adhesive.
- .2 Where roofing abuts curbs and other vertical surfaces, extend vapour retarder up and over cant strip and mechanically secure.
- .3 Vapour retarder shall be continuous and complete in all locations. Seal at penetrations. Coordinate with Section 07 27 00 and others to ensure continuity at all locations.

3.3 INSULATION

- .1 Install insulation to thickness shown. Install insulation in 2 layers, with joints in second layer offset from joints in first layer.
- .2 Mechanically fasten insulation to steel deck with minimum 8 fasteners per 1200 x 2400 mm board, 50% more fasteners at perimeter of roof and 70% more fasteners at corners. At concrete deck bond

SECTION 07 51 00 - BUILT-UP BITUMINOUS ROOFING

insulation to vapour retarder with full bed of asphalt. Provide sloping insulation where shown, bonded with full bed of hot asphalt.

- .3 Over insulation place fibreboard; stagger joints, and bond with full coat of asphalt.
- .4 Butt boards together tight without gaps. Ensure that top surface of fibreboard is smooth, even and without steps.
- .5 Do not install more insulation/fibreboard, than that which can be covered with roof membrane the same day.
- .6 Reduce insulation thickness by 12 mm for an area of 1.2 m square around each roof drain; install tapered filler pieces to allow for smooth transition.
- .7 Place cant strip on top of insulation. Secure cant strip with full mopping of hot asphalt.

3.4 ROOFING MEMBRANE

- .1 Over fibreboard install organic felt base layer in hot asphalt mopping.
- .2 Over base layer, apply 4 plies of glass felts in hot asphalt mopping at rate of 1.25 kg/m² lapping each sheet 700 mm over preceding sheet and mopping full width of each sheet. Unless otherwise specified, carry roofing felts to top of cant strips and cut to a neat straight line.
- .3 Lay felts free of air pockets, wrinkles, fishmouths, prominent lap joints or tears, with end joints staggered and lapped minimum of 250 mm.
- .4 Apply felts with suitable equipment. Lay felts so that flow of water is over or parallel to laps and never against them. Thoroughly embed full width of each felt in bitumen. Terminating felts and cross-stripping in ends is not acceptable.
- .5 Cut felts to fit closely around openings and projections.
- .6 Do not walk on newly laid felts until bitumen has solidified.
- .7 Provide two additional plies of felt on lap joints and drain sump.

3.5 BITUMINOUS FLASHINGS

- .1 Seal roofing system against water penetration where roof terminates and at interruptions and penetrations, protrusions by means of two ply modified bitumen flashings.
- .2 Base Sheet: apply membrane with adhesive to all parapets and over areas shown. Apply at the rate of 1 to 1.5 kg/m²; lapping 75 mm laterally and 150 mm ends. Extend base flashing 225 mm onto roof surface. Carry base sheet to the top of coping.
- .3 Cap Sheet: torch apply cap sheet to previously applied base sheet and install as for manufacturer's printed instructions. Extend cap flashing 300 mm onto the roof surface. Extend cap sheet over top of coping to outside edge.
- .4 Where roof meets exterior wall, rising above roof, carry bituminous flashings up wall minimum 300 mm and secure along top edge with fastening bar.

3.6 AGGREGATE

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SECTION 07 51 00 - BUILT-UP BITUMINOUS ROOFING

- .1 Over completed roof membrane pour hot bitumen at 3 kg/m² into which while hot, embed aggregate 20 kg/m² covering roof membrane completely and uniformly.
- .2 Apply a second pour, for a total aggregate cover of 30 kg/m². Prior to second pour, remove any loose aggregate.
- .3 Do not place aggregate until Consultant has inspected roof membrane.
- .4 At locations indicated provide precast pavers in lieu of aggregate. Place pavers on top of insulation spacers.

3.7 SLEEVE & VENT PIPE FLASHINGS

- .1 Carry roof membrane to penetration and neatly trim.
- .2 Set flashing flanges in bed of mastic on top of membrane.
- .3 Install 3 ply felt flashing extending beyond flange 150 mm, 225 mm and 300 mm respectively.

3.8 ROOF SCUPPER

- .1 Provide scupper to details indicated.
- .2 Make watertight connection to scupper.

3.9 ROOF ALTERATIONS

- .1 Coordinate work of this Section with that of Divisions 22 to 26. Repair, make good, tie into and extend existing roof system, where new work penetrates existing roof.
- .2 Ensure compatibility of new materials with existing. Perform material tests where type of existing material is uncertain.
- .3 Cut existing roof system to straight line exposing each layer in a stepped fashion so as to facilitate tie-in of new materials.
- .4 Protect and temporarily seal adjacent roofing against intrusion of water. Make good roofing as promptly as possible.
- .5 Remove existing gravel from built-up membrane for a distance of minimum 600 mm beyond junction of new and existing membrane.
- .6 Remove debris and waste materials, clean deck and provide new vapour retarder, insulation, fibreboard and roof membrane, attaching thickness and type of existing systems components, at disturbed areas. Provide can strip at intersections with vertical surfaces.
- .7 Install built-up membrane lapping onto existing membrane 200, 300, 400 and 500 mm. Ensure watertight junction between existing and new membrane.
- .8 Make junctures at new or altered penetrations or added vertical surfaces, using modified bitumen sheet flashings, compatible with existing roof system, as follows:
 - .1 Base sheet: apply self adhesive membrane 75 mm over areas required, lapping laterally and 150 mm on ends. Extend base flashing 225 mm onto roof surface. Carry base sheet to the top of curb.

SECTION 07 51 00 - BUILT-UP BITUMINOUS ROOFING

- .2 Cap sheet: torch apply cap sheet to previously applied base sheet and install as per manufacturer's printed instructions. Extend cap flashing 12" onto the roof surface. Extend cap sheet over top of curb.
- .3 Mechanically secure membrane flashings along top edge.
- .9 Pour coat all altered, patched roof areas and cover with gravel matching existing.
- .10 Provide metal flashings at new penetrations, secured with continuous locking strips. Provide flat locked seams at maximum 3 m o.c. double back exposed edges.

END

SECTION 07 62 00 - METAL FLASHINGS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Wood nailers and copings: Section 06 10 00
- .2 Built-up bituminous membrane roofing: Section 07 51 00
- .3 Supply of sleeve flashings for mechanical roof penetrations: Divisions 22 and 23
- .4 Supply of sleeve flashings for electrical roof penetrations: Division 26

1.3 DESIGN AND PERFORMANCE REQUIREMENTS

- .1 Appearance: neatly and evenly lay out and install components. Exposed fastening devices not permitted.
- .2 Effects of wind: resist positive and negative wind pressures without detrimental effects.
- .3 Water control: prevent passage of water.
- .4 Thermal movement: accommodate expansion and contraction of component parts without buckling, failure of joints, undue stress on fasteners and other detrimental effects.
- .5 Compatibility: components shall be compatible with dissimilar metals and materials with which they are in contact or fastened to so as to prevent corrosion, staining and other detrimental effects. If required, treat or separate contact surfaces with inert and non-staining insulation material to achieve compatibility.

1.4 SAMPLES

- .1 Submit two accurate colour charts or 2 sets of samples of manufacturer's full range of precoated metal finishes.

1.5 JOB CONDITIONS

- .1 Schedule and co-ordinate installation of metal flashing components with work of other Sections where it is integral or contiguous therewith.
- .2 Install metal counter and cap flashings immediately after installation and inspection of roofing membrane base flashings.

1.6 WARRANTY

- .1 At no cost to Board, remedy any defects in work, including work of this and other Sections, due to faults in materials and/or workmanship provided under this Section of Specifications appearing within a period of 2 years from date of Substantial Performance.

PART 2 - PRODUCTS

2.1 MATERIALS

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SECTION 07 62 00 - METAL FLASHINGS

- .1 Prefinished sheet steel: galvanized sheet steel, pretreated and finished with 2-coat coating system: Baycoat Perspectra (Whites, Colours, Earthtones); colour selected by Consultant.
- .2 Galvanized Sheet Steel: Hot dip galvanized, cold rolled with stretcher level degree of flatness to ASTM A653; zinc coating designation Z275.
- .3 Mechanical Fastening Devices: Non-corrosive metal compatible with sheet metal.
- .4 Sealant: One of the following:
 - .1 Multi part chemical curing to ASTM C920.
 - .2 One part low modulus silicone to ASTM C920.
- .5 Asphaltic Paint: Alkali resistant asphalt based enamel.

2.2 FABRICATION GENERAL

- .1 Shop fabricate metal flashing components to profiles indicated where flashings are required but not detailed follow applicable requirements of SMACNA Architectural Manual. Provide the following minimum core thickness material for all components unless otherwise indicated:
 - .1 Flashings: 0.6 mm (24 ga)
 - .2 Lockstrips, cleats: 0.9 mm (20 ga)
- .2 Provide components free from distortion, waves, twists, buckles and other defects detrimental to performance and appearance. Form sections square, true and accurate to size.
- .3 Double back exposed edges at least 12 mm.
- .4 Seams: space seams uniformly at maximum 3m o.c. Unless otherwise indicated, use flat locked seams, lapped 25mm. Make horizontal seams in directions of water flow. Mitre and seal corners.
- .5 Unless otherwise indicated, counter flashings shall completely cover base flashings.
- .6 Cleats and edge strips: Non-corrosive metal compatible with sheet metal, thickness as required to provide rigid support and positive securement for metal flashings.
- .7 Fabricate scupper drain at elevator shaft roof to configuration shown.
- .8 Furnish everything necessary for complete metal flashing installation, including clips and fastening devices.
- .9 Back paint metal flashings with asphaltic paint.

2.3 SLEEVE FLASHING SYSTEMS

- .1 Aluminum flashing system by Thaler Roofing Specialties Products.
- .2 Fabricate sleeve flashings square or circular and of size to suit component being flashed. Unless otherwise indicated fabricate sleeves of 1.5 mm thick sheet metal, 450 mm high.
- .3 Inside of jacket base flange and all sides of protection cup shall be coated with bituminous paint.
- .4 Where possible size sleeves to allow minimum 25 mm thick insulation between component and sleeve.

SECTION 07 62 00 - METAL FLASHINGS

- .5 Provide sleeve flashings required except for those supplied by Divisions 22, 23 and 26.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Provide metal flashings at roof perimeters, penetrations, curbs, copings, junction with walls and where indicated.
- .2 Protect all membrane flashings with metal counterflashings.
- .3 Clean surfaces to be covered with metal flashings of dirt and other foreign matter. Drive projecting nails flush with substrate. Do not apply metal flashings over substrates likely to cause rupture.
- .4 Provide underlay of resin sized paper under metal flashings installed over masonry, concrete or wood. Lay underlay dry as sheet metal work is installed. Secure in place and lap joints 100mm.
- .5 Wherever possible, secure flashings to supporting building elements with concealed continuous edge strips; avoid exposed surface fasteners.
- .6 Provide standing seam corners at cap flashings.
- .7 Where flashing is punctured by bolts, provide sheet lead or neoprene washers, 6 mm larger than bolt hole.
- .8 Where flashing is installed around circular components and upper flashing edge is exposed, provide draw band around upper edge of flashing collar.
- .9 At reglets in masonry walls, secure metal flashings to reglet with mechanical fasteners at maximum 610 mm o.c.
- .10 Install sleeve flashing systems at penetrations through roof membrane. Install systems in accordance with manufacturer`s directions. Sweat solder or weld on rain collar. Mechanically secure sleeve flashings to roof deck.
- .11 Install scupper drain at elevator shaft roof.
- .12 Imperfections in metal flashing work such as holes, dents, creases, or oil-canning will not be accepted.

END

SECTION 07 81 33 - SPRAYED FIREPROOFING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Structural steel: Section 05 10 00
- .2 Steel joists: Section 05 20 00
- .3 Steel deck: Section 05 30 00
- .4 Firestopping and smoke seals: Section 07 84 00

1.3 APPLICATOR'S QUALIFICATIONS

- .1 Applicator shall be licensed or approved by manufacturer of fire resistant materials.

1.4 PERFORMANCE REQUIREMENTS

- .1 Apply sprayed fireproofing to all new steel components of floor and roof added to modify assemblies for the elevator shaft construction. Provide minimum 1 hour fire resistance rating. Meet requirements of ANSI/UL 263.
- .2 Fireproofing system shall meet the following:
 - .1 Coating shall not crack or delaminate under deflection when tested in accordance with ASTM E-759.
 - .2 Coating shall not crack or delaminate under impact when tested in accordance with ASTM E-760.
 - .3 Coating shall have a minimum bond strength of 9.6 kPa when tested in accordance with ASTM E-736.
 - .4 Coating shall not be subject to loss by sifting, flaking or dusting in excess of 0.27g/m² when tested in accordance with ASTM E-859.
 - .5 Coating shall not deform more than 10% when subjected to 24 kPa compressive force in accordance with ASTM E-761.
 - .6 Coating shall not attack or corrode steel components.

1.5 SUBSTITUTIONS

- .1 Contractor may propose and, subject to Consultant's review and acceptance, use other fire test assemblies under the following conditions.
 - .1 Submit request for substitution minimum 30 days prior to start of work.
 - .2 Verify that proposed fire test assembly does not require changes to building structure or other elements or, if changes are required, describe what they are and confirm that they would be implemented at no extra cost to Contract.
 - .3 Submit evidence of acceptance of proposed fire test assembly by jurisdictional authorities.
 - .4 The Consultant reserves the right to accept or reject any proposals made.

1.6 SUBMITTALS

- .1 Certificate: Upon completion of sprayed fireproofing application, submit a certificate in triplicate made out to the Owner and stating that the system as installed on this project, complies with the fire protection requirements as specified herein.

SECTION 07 81 33 - SPRAYED FIREPROOFING

1.7 PRODUCT HANDLING

- .1 Deliver and store materials in dry, protected area, off ground, in original, undamaged, sealed containers with manufacturer's labels and application instructions intact.

1.8 JOB CONDITIONS

- .1 Maintain ambient and substrate temperature at minimum 5°C during and for at least 24 hours after application.
- .2 Provide required ventilation to ensure proper drying and curing of coating.
- .3 Protect sprayed applied materials from weather until fully cured.
- .4 Prevent overspray; where adjacent floors, walls and similar surfaces are scheduled to be exposed, provide and maintain masking, drop cloths or polyethylene coverings for such surfaces during spraying operations.
- .5 Provide complete enclosures and human protective devices when spraying hazardous materials.
- .6 Hangers, inserts, clips, and similar items required for anchorage and support of other building components must be in place before sprayed materials are applied; apply coating before ducts, pipes, conduit ceiling suspension systems and similar items are installed.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Coating: premixed mineral wool fibres, cementitious organic dry binders and other additives requiring only water to form fire resistive coating: meet requirements of ANSI/UL 263.
- .2 Water: clean, potable and free of any substances which may be harmful to sprayed fibre.
- .3 Bonding adhesive and sealer: water emulsion as recommended by coating manufacturer.

PART 3 - EXECUTION

3.1 CONDITION OF SUBSTRATES

- .1 Substrate scheduled to receive spray-applied materials shall be free of dust, dirt, grease and other materials or substances which would impair bond.
- .2 Examine substrates and report any conditions which may have a detrimental effect on this work.
- .3 Commencement of work shall imply acceptance of substrate.

3.2 APPLICATION

- .1 Mix and apply materials in strict accordance with applicable fire protection design requirements and manufacturer's written directions.
- .2 Pre-wet substrate with primary bonding adhesive.
- .3 Spray apply fire-resistant materials with spray guns using contour spray method, to thickness and density required to meet required fire resistant rating.
- .4 Tamp sprayed coating if required to achieve minimum density.
- .5 Overcoat sprayed surfaces with sealer.
- .6 Apply coating after floor slab and roof deck are completed.

SECTION 07 81 33 - SPRAYED FIREPROOFING

3.3 PATCHING

- .1 Upon completion of work cut, patch and repair defective and damaged areas of fire resistant materials.
- .2 As application proceeds and upon completion of work, clean surrounding surfaces of accidental overspray and droppings.

3.4 FIELD QUALITY CONTROL

- .1 The Board may arrange and pay out of cash allowance included in Section 01 21 00 for inspection and testing by independent agency of work carried out under this Section, as directed by Consultant.

END

SECTION 07 84 00 - FIRESTOPPING AND SMOKE SEALS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Masonry, including mortaring in or fire dampers: Section 04 22 00
- .2 Sealants other than specified herein: Section 07 92 00
- .3 Firestopping within penetrating mechanical assemblies, (e.g. duct): Division 21 to 25
- .4 Firestopping within penetrating electrical assemblies, (e.g. bus duct): Division 26 to 28

1.3 DESCRIPTION

- .1 Include in work of this Section all firestopping required except for firestopping and smoke seals within mechanical assemblies (i.e. inside ducts, dampers) and electrical assemblies (i.e. inside bus ducts) which shall be provided as part of work of Divisions 15 and 16 respectively. Firestopping and smoke seals around outside of such mechanical and electrical assemblies, where they penetrate fire rated separations, shall be part of work of this Section.
- .2 Firestop and seal (draft-tight) gaps, control joints, expansion joints and penetrations in fire rated assemblies, including assemblies with a zero rating, against passage of fire, smoke, gasses, firefighter's hose stream and, where designated, passage of liquids. Smoke seal at angle support at fire dampers.

1.4 QUALITY ASSURANCE

- .1 Work of this Section shall be carried out by a firm specialized in the type of work specified herein. Use competent installers, experienced, trained and approved by material or system manufacturer for application of materials and systems being used. Installers shall have minimum 5 years experience in installation of firestopping materials.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver materials to site in manufacturer's sealed and labelled containers.
- .2 Store materials in protected location prior to use, in accordance with manufacturer's directions.

1.6 ENVIRONMENTAL CONDITIONS

- .1 Conform to manufacturer's recommended temperatures, relative humidity and substrate moisture content for storage, mixing, application and curing of firestopping materials.

1.7 SUBMITTALS

- .1 Prior to start of work submit list of proposed firestopping and smoke seal materials together with suitable documentation to verify that specified requirements will be met. Provide the following information as applicable to this Project.
 - .1 ULC assembly number certification.
 - .2 required temperature rise and flame rating.

SECTION 07 84 00 - FIRESTOPPING AND SMOKE SEALS

- .3 hose stream rating (where applicable).
- .4 thickness.
- .5 proposed installation methods.
- .6 material of firestopping and smoke seals, primers, reinforcements, damming materials, reinforcements and anchorages/fastenings.
- .7 size of opening.
- .8 adjacent materials.
- .2 Upon Consultant's request submit samples of materials.
- .3 Upon completion of work submit written certification that work of this Section has been carried out in accordance with specified requirements.

PART 2 - PRODUCTS

2.1 SYSTEMS

- .1 Firestopping and smoke seal systems shall be:
 - .1 tested in accordance with CAN/ULC-S115-11.
 - .2 listed by ULC or other fire testing agency approved by jurisdictional authorities.
 - .3 capable of providing fire resistance rating not less than that required by surrounding assembly.
 - .4 complying with F, FT and/or FTH rating as required by OBC.
- .2 Firestopping and smoke seals for vertical fire separations shall meet ULC designation PJ, JF and HW as required for respective location.

2.2 MATERIALS

- .1 Firestopping and smoke seal materials:
 - .1 Provide materials which are:
 - .1 PCB and asbestos-free.
 - .2 of easily identifiable colour, except where used in exposed location.
 - .3 suitable for intended application.
 - .4 compatible with adjacent materials..
 - .2 Provide elastomeric type materials at locations requiring future re-entry (such as cable) and at penetrations for ducts and other mechanical items requiring sound and vibration control.
 - .3 Sealant type materials shall be non-sagging for vertical surfaces and self-levelling for level floors.
- .2 Primer: as recommended by firestopping material manufacturer for specific substrate and use.

SECTION 07 84 00 - FIRESTOPPING AND SMOKE SEALS

- .3 Damming and back-up materials, support and anchoring devices: non-combustible, in accordance with tested assembly and as recommended by manufacturer.

2.3 MIXING

- .1 Mix materials at correct temperatures and in accordance with manufacture's directions.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Remove combustible material and loose material detrimental to bond from edges of penetration. Clean, prime or otherwise prepare substrate material to manufacturer's recommendation.
- .2 Do not apply firestop material to surfaces previously painted or treated with sealer, curing compound, water repellent to other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.
- .3 Verify openings, dimensions and surfaces conform to fire and smoke seal assembly.
- .4 Protect adjacent surfaces from marring or damage.
- .5 Prime surfaces in accordance with manufacturer's directions.
- .6 Remove insulation from area of insulated pipe and duct where such pipes or ducts penetrate fire separation unless ULC certified assembly permits such insulation to remain within assembly.
- .7 Provide temporary damming, forming, packing and bracing materials necessary to contain firestopping. Upon completion, remove forming and damming materials not required to remain as part of system.
- .8 Examine sizes, anticipated movement and conditions of opening and penetration to establish correct system and depth of backup materials and of firestopping material required.

3.2 INSTALLATION

- .1 Seal penetrations through and gaps in fire rated separations in accordance with ULC listing for tested system selected.
- .2 Apply firestopping materials in accordance with manufacturer's instructions and tested designs. Apply with sufficient pressure to properly fill and seal openings to ensure continuity and integrity of fire separation. Tool or trowel exposed surfaces as required.
- .3 Remove excess compound promptly as work progresses and upon completion.
- .4 Unless otherwise indicated or permitted by Consultant recess firestopping and smoke seals in exposed locations to permit installation of decorative sealant by Section 07 92 00.
- .5 Do not cover materials until full cure has taken place.
- .6 Provide firestopping and smoke seal systems at following locations, without being limited to:
 - .1 At all openings, voids and penetrations through all floor slabs except openings within shafts constructed with a fire resistance rating and slabs on granular fill.
 - .2 At all openings, voids, control joints and penetrations through fire rated masonry, concrete and gypsum board walls, partitions and shaft walls.

SECTION 07 84 00 - FIRESTOPPING AND SMOKE SEALS

- .3 At all openings, voids, penetrations installed for future use through fire rated masonry, concrete and gypsum board walls, partitions and shaft walls.
- .4 Around mechanical and electrical assemblies penetrating fire rated assemblies.
- .5 Between perimeter of all floor and roof slabs and exterior wall construction.
- .6 Between curtainwall and adjacent assemblies.
- .7 Between tops of all fire rated walls and partitions and underside of floor or roof slabs.
- .7 Curing: cure materials in accordance with manufacturer=s directions.

3.3 FIELD QUALITY CONTROL

- .1 Upon Consultant's request, manufacturer's representative shall inspect work of this Section and confirm in writing that it complies with specified requirements.
- .2 Request Consultant's review of installed systems before they are covered by other work.
- .3 Owner may arrange and pay separately for inspection and testing of work of this Section by independent agency as directed by Consultant.

END

SECTION 07 92 00 - SEALANTS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Caulking related to metal wall cladding: Section 07 46 19
- .2 Caulking related to metal flashings: Section 07 62 00

1.3 DEFINITION

- .1 Caulking = Sealant.

1.4 QUALITY ASSURANCE

- .1 Sealants must be installed by qualified caulking contractor with minimum five years experience and proven record of being able to produce good quality work.
- .2 Use only sealants which are proven to be compatible with materials they are in contact with. Notify Consultant prior to start of work should any sealant specified be considered unsuitable for the purpose intended.

1.5 PRODUCT HANDLING

- .1 Deliver sealants to site in sealed containers bearing manufacturer's name, brand name of sealant and reference standard to which sealant complies.
- .2 Store materials in a dry area having an ambient temperature within limitations recommended by material manufacturer.

1.6 JOB CONDITIONS

- .1 Unless otherwise specified, apply sealants when air temperature is between 10°C and 25°C. When air temperature is above 25°C or below 10°C follow sealant manufacturer's recommendations regarding application.
- .2 Co-ordinate work of this Section with that of Section 09 91 00. Prior to start of work review installation procedures with Consultant, where caulking is located adjacent to painted surfaces.

1.7 WARRANTY

- .1 At no cost to Board remedy any defects in work, including work of this and other Sections, due to faults in materials and/or workmanship provided under this Section appearing within a period of 2 years from date of Substantial Performance.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Sealants
 - .1 Compatibility: provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as recommended by sealant manufacturer based on testing and field experience.
 - .2 Joints at exterior vertical surfaces: two-part medium modulus silicone sealant with joint movement capability of $\pm 50\%$; ASTM C920, Type S, Grade NS, Class 25, uses NT, G,A, O: Standard of acceptance: Dow Corning 790 Building Sealant.
 - .3 Joints at interior vertical surfaces: one part acrylic latex with joint movement capability of \pm

SECTION 07 92 00 - SEALANTS

- 7½%, paintable: ASTM 834; Standard of acceptance: Tremco Tremflex 834.
- .4 Joints at exterior and interior horizontal surfaces: multi-component, self-leveling, chemically curing polyurethane: ASTM C920, Type M, Grade P, Class 25; Standard of acceptance: Tremco THC-900.
 - .5 Joints at interior wet locations: mildew-resistant silicone formulated with fungicide: ASTM C920, Type S, Grade NS, Class 25, Uses NT, G, A; Standard of acceptance: Dow Corning 786 Mildew Resistant Silicone Sealant.
 - .6 Sealant colours: selected by Consultant from manufacturer's standard range, unless custom colour is required.
- .2 Primers, thinners, cleaners: As recommended by sealant manufacturer, non-staining type.
 - .3 Premoulded backup for sealant: Non-gassing foam rope, compressed 25% when in joint: Sof-Rod by Tremco or Cera-Rod by W.R. Meadows.
 - .4 Bond breaker: Polyethylene tape, self-adhering one side.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Examine joints to be caulked and report in writing to the Consultant any defects in work of other Sections which would impair installation, performance and warranty of sealants.
- .2 Do not commence installation of sealants until conditions are acceptable.
- .3 Start of work implies acceptance of conditions.

3.2 PREPARATION

- .1 Clean and prepare joints to be caulked to produce clean sound surfaces for sealant adhesion.
- .2 Remove dust, oil, grease, water, frost, loose mortar and other foreign matter. Remove loose particles by blowing joint out with compressed air.
- .3 Chemically clean non-porous surfaces such as metal and glass, taking care to wipe solvents dry with a clean cloth. Use solvents recommended by sealant manufacturer.
- .4 Clean porous surfaces such as masonry, concrete and stone by mechanical abrading.
- .5 Surfaces adjacent to joints to be primed and which may be stained by primer shall be masked with tape before primer is applied.
- .6 Prime joints in accordance with sealant manufacturer's recommendations. Apply primer before installing premoulded backup.
- .7 Install premoulded backup in joints 6 mm and more in width. Roll rope type backup into joint, do not stretch or braid. Install bond breaker in joints less than 6 mm in width.
- .8 Protect adjacent surfaces from stains and contamination. Make good any damage caused.

3.3 APPLICATION

- .1 Apply sealants under pressure using suitable equipment. Gun nozzle shall be of proper size to fit, and seal joint.
- .2 Force sealant into joints in full bead, making certain that void free contact is made with sides of joint. Tool joints to produce a slightly concave surface.

SECTION 07 92 00 - SEALANTS

.3 Caulking must appear as a concave recessed joint, free of ridges, wrinkles and embedded foreign matter. Caulking shall not spread or bulge beyond surfaces on each side of joint.

.4 Apply sealants in accordance with following table:

<u>Joint Width</u>	<u>Sealant Depth</u>
5 mm	5 mm
10 mm	5 mm
15 mm	7 mm
20 mm	10 mm
25 mm	12 mm

.5 Vent exterior joints in accordance with Consultant's directions.

3.4 CLEANING

.1 As work progresses, remove sealant smears and stains from adjacent surfaces. Use cleaning method recommended by sealant manufacturer.

.2 Leave adjacent surfaces in neat and clean condition.

3.5 SCHEDULE

.1 Apply sealant at the following exterior locations:

- .1 Between dissimilar materials in exposed locations except where specifically indicated otherwise.
- .2 At penetrations through exterior building elements.
- .3 Where indicated.

.2 Apply sealant at the following interior locations:

- .1 Between dissimilar materials in exposed locations except where specifically indicated otherwise.
- .2 Perimeter of steel door frames.
- .3 Control joints in masonry elements, and joints between bearing and non-bearing masonry walls.
- .4 Control joints in gypsum board elements.
- .5 Perimeter of firehose cabinets, access panels, and control panels.
- .6 Floor and wall tile control joints.
- .7 Between floors and WC's.
- .8 Where shown.

.3 At interior locations use acrylic emulsion sealant except:

- .1 At floor control joints use self levelling polyurethane.
- .2 At vanities/countertops, at plumbing fixtures and at ceramic wall tile control joints use silicone sealant.
- .3 Where movement capability of acrylic emulsion sealant is exceeded use sealant specified for exterior use, as directed by Consultant.

END

SECTION 08 11 13 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Grout fill of door frames and fixed mullions: Section 04 22 00
- .2 Caulking at frame perimeters: Section 07 92 00
- .3 Supply of door hardware: Section 08 71 00
- .4 Painting: Section 09 91 00

1.3 QUALITY ASSURANCE

- .1 Acceptable manufacturers:
 - .1 Artek
 - .2 Daybar
 - .3 Fleming – Baron (Assa Abloy)
- .2 Reference standards: Unless otherwise indicated, meet requirements of "Canadian Manufacturing Specification for Steel Doors and Frames" and "Recommended Dimensional Standards for Commercial Steel Doors and Frames" published by the Canadian Steel Door Manufacturers' Association.
- .3 Fire protection requirements: fire rated doors and frames shall bear ULC or WHI label for required rating and shall be installed in accordance with NFPA80 - Fire Doors and Windows, current edition. Provide temperature rise rated assemblies where required.

1.4 WORK SUPPLIED BUT NOT INSTALLED

- .1 Supply frames and anchors to other Sections where it is necessary to build frames into work of other Sections.
- .2 Supply instructions required for accurate positioning and proper installation of components supplied to other Sections.

1.5 SHOP DRAWINGS

- .1 Prepare and submit detailed shop drawings. Include door and frame schedules, materials and finishes, hardware preparations and frame anchorage details.

1.6 PRODUCT HANDLING

- .1 Tag doors and frames at shop with identification marks indicating proper location for installation.
- .2 Deliver, store and handle components so as to prevent damage, distortion and corrosion. Store components off the ground and under cover in a dry protected area. Stack doors and frames to prevent twisting. Do not enclose components in plastic covers without venting.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Sheet Steel: hot dip galvanized (wipe coated) cold rolled steel with stretcher level degree of flatness, meeting requirements of ASTM A924 and A653; minimum zinc coating designation ZF120.
- .2 Core Material
 - .1 Fire rated doors: in accordance with fire test requirements.

PROJECT NO. 2206

**TECUMSEH PUBLIC SCHOOL, MISSISSAUGA, ONTARIO
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SECTION 08 11 13 - STEEL DOORS AND FRAMES

- .2 Interior doors, except fire rated doors: honeycomb core of rigid, pre-expanded resin impregnated Kraft paper having maximum 25 mm hexagonal shaped cells.
- .3 Finishing Materials
 - .1 Touch up paint: zinc rich paint CAN/CGSB-1.181-99.
 - .2 Metal filler: two component epoxy type.

2.2 HARDWARE PREPARATION

- .1 Comply with requirements of Section 08 71 00.
- .2 Prepare for mortised and cylindrical hardware in accordance with ANSI A115 Series standards, except where specified otherwise. Provide mortise lock preparation to ANSI A115.1, including integral reinforcement channel, mounting tabs, and lock support. Provide cylindrical lock preparation to ANSI A115.2, including integral latch case support.
- .3 Blank, reinforce, drill and tap doors and frames for concealed, mortised and surface mounted hardware. Provide door closer reinforcement at all steel doors and frames whether closer is required by hardware list or not.
- .4 Provide hardware reinforcements in accordance with CSDFMA-08100 'Specifications...'. Table 1, except as otherwise herein:
 - .1 For mortised template hinges, provide minimum 3.4 mm thick reinforcement, with integral high frequency angle, and integral field-conversion from standard-weight to heavy weight hinges, at all hinge locations in both doors and frames.
 - .2 For continuous hinges, provide minimum 2.7 mm thick continuous reinforcement, in both doors and frames.
 - .3 For mortise locks to ANSI A115.1, provide minimum 1.3 mm thick reinforcing box, with integral lock-edge mounting tabs and lock body supports.
 - .4 For cylindrical locks to ANSI A115.2, provide minimum 1.3 mm thick reinforcing, with integral lock-edge mounting tabs and latch case support.
 - .5 Provide all function holes for all latching and locking hardware, including those for through-bolted lever trim, (CSDFMA-08100, Article 2.3.5).
 - .6 Factory mortise, reinforce, drill and tap all preparations for mortised template hardware. Site drill and tap for installation of surface-applied hardware, in accordance with hardware manufacturer's installation templates. (CSDFMA-08100, Article 2.3.4).

2.3 DOORS

- .1 Construct fire rated doors in accordance with fire test requirements. Provide astragals at fire rated pairs of doors. Doors located in firewalls shall be temperature rise rated and labelled as required by regulatory requirements.
- .2 Provide all doors of seamless construction with no visible seams or joints on faces.
- .3 Interior doors, except high traffic doors, shall be of honeycomb core construction. Skins shall be minimum 1.2 mm thick. Join door faces at vertical door edges by tackwelding; fill, grind and dress smooth.
- .4 Interior high traffic doors shall be of steel stiffened construction with 1.6 mm thick door faces, joined at door edges with continuous weld, ground filled and dressed smooth. Provide high traffic doors where shown.
- .5 Provide flush galvanized steel end closures at top edge of exterior doors and where required for attachment of hardware.
- .6 Hardware reinforcements shall be minimum 3.4 mm thick, not including door skin thickness. Provide reinforcement at all hardware fastening points.

SECTION 08 11 13 - STEEL DOORS AND FRAMES

- .7 Surround openings in flush doors with minimum 1.2 mm thick steel edge channels, welded to both face sheets
- .8 Provide removable glazing stops of zinc coated steel channels, accurately fitted into position and fastened with oval head plated screws. Length of each glazing stop shall match length/height of glass retained; intermediate joints are not acceptable.

2.4 FRAMES

- .1 Provide welded frames to profiles shown, 1.6 mm thick unless otherwise shown; provide 2 mm thick frames at oversized double doors. Door stops and glass stops shall be formed integrally with frame and not added as a separate profile.
- .2 Assemble components with accurately cut joints. Mitre outside corner joints of frames. Continuously weld joints on inside of profile and grind welds, flush and sand to smooth uniform surface; tabbed and spotwelded connections are not acceptable.
- .3 Fit and assemble work in the shop wherever possible, eliminating field joints.
- .4 Glazing stops shall be minimum 0.9 mm thick steel, mitred at corners, drilled and secured with oval headed screws. Glazing stops at outside of exterior frames shall be rendered non-removable.
- .5 Side light and transom framing shall be of same thickness metal as adjacent door frame.
- .6 Countersink frames at anchor locations to accommodate 10mm screw fasteners for frames installed into concrete openings. Provide steel sleeves between frame and wall.
- .7 Drill interior door frames for rubber bumpers. Drill strike jamb of each single door frame for 3 bumpers. Drill head member of double door frames for 2 bumpers.
- .8 Provide angle or channel head reinforcement for door frames wider than 915 mm.
- .9 Tack weld two removable minimum 1.2 mm thick steel spreader channels to inside faces of door frames at base.
- .10 Provide adjustable base clips for anchorage to floor at bottom of each door jamb.
- .11 Protect strike and hinge reinforcements with 0.9 mm guard boxes.
- .12 Hardware reinforcements shall be minimum 3.4 mm thick, not including frame thickness. Provide reinforcement at all hardware fastening points. Provide high frequency (angle type) reinforcement at hinges.
- .13 Where indicated provide removable mullions.
- .14 Provide special head members to accommodate automatic door operators. Coordinate with Division 26 to permit access for wiring and equipment.
- .15 For glazed screens provide narrow frames with a 25 mm face (32 mm at fire rated screens).

2.5 FINISHES

- .1 Fill seams, corner joints and other depressions with filler and sand smooth.
- .2 Clean and remove all traces of oil, grease, and other foreign substances to ensure proper bond of touch up after fabrication.
- .3 Touch up damaged zinc coating with zinc rich paint.
- .4 Insulate, where necessary to prevent electrolysis, metal surfaces in contact with dissimilar metals or cementitious materials.

SECTION 08 11 13 - STEEL DOORS AND FRAMES

PART 3 - EXECUTION

3.1 FRAME AND SCREEN INSTALLATION

- .1 Allowable limit of distortion shall be 1.5 mm out of plumb at each jamb, measured on face of frame, resulting in maximum twist of frame of 3 mm measured from upper corner to lower diagonal corner.
- .2 Generally, anchorage of frames shall be by means of standard anchors. Where standard anchors cannot be used, provide special anchors to ensure proper installation. Method of anchorage shall not be visible when frames are installed.
- .3 Provide minimum 3 anchors at each jamb. At frames exceeding 2150 mm in height provide one additional anchor for each additional 610 mm or part thereof.
- .4 Anchor intermediate vertical frame members to structure above as required to ensure stability. Where required, provide steel frame extensions. Provide flexible connection at structure to allow for deflection.
- .5 Remove steel shipping spreaders; install wood installation spreaders at sill and at third points of frame rabbet height to maintain constant frame width. Remove wood spreaders only after frames are securely anchored in place.
- .6 Intermediate field joints shall be continuously welded or tack welded, filled and ground smooth.
- .7 Coordinate with Section 04 22 00 for grout fill of frames and fixed centre mullions.

3.2 DOORS

- .1 Install steel doors.
- .2 Install hardware in accordance with hardware supplier's instructions.
- .3 Adjust operable parts to ensure proper operation.

3.3 TOUCH-UP

- .1 Patch damaged finishes. Remove rust, sand damaged and abraded surfaces and touch-up with zinc rich paint.

END

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Installation of hardware for steel doors: Section 08 11 13
- .2 Washroom accessories: Section 10 28 00

1.3 QUALITY ASSURANCE

- .1 Meet requirements of Ontario Building Code and other applicable regulations.
- .2 Upon completion of finish hardware installation, hardware supplier shall inspect work and shall certify in writing that all items and their installation are in accord with requirements of Contract Documents and are functioning properly.

1.4 SUBMITTALS

- .1 Upon Consultant's request submit samples of door hardware.
- .2 Prepare and submit two copies of a detailed hardware and keying schedule.
- .3 Furnish other Sections with templates required for hardware preparation and installation. Issue templates when requested so as not to cause any delays but not before hardware list has received final review by Consultant.

1.5 PRODUCT DELIVERY, HANDLING & STORAGE

- .1 Deliver each hardware item packaged separately in individual containers with necessary screws, keys, instructions and installation templates.
- .2 Mark each container with item number corresponding to number shown on hardware schedule with respective door number.
- .3 Store hardware in dry, lockable area.

PART 2 - PRODUCTS

2.1 DOOR HARDWARE

- .1 Door Hardware List is included under Schedules, Lists and Reports.
- .2 Include for preparation of doors and frames accordingly.

2.2 KEYING

- .1 Locks shall be masterkeyed to existing master key system as directed by Board.
- .2 All master keys shall be stamped "Do not Duplicate".
- .3 Locks and cylinders shall be construction master keyed.
- .4 Provide 3 change keys per lock.
- .5 Provide master keys, sub-master keys, group keys and individual keys as directed by Board.
- .6 Keys shall be provided in individual envelopes, properly identified with door number, location and key

SECTION 08 71 00 - DOOR HARDWARE

coding.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Meet requirements of ANSI / DHI A115.1G-94, "Installation Guide for Doors and Hardware".
- .2 Confirm locations and mounting heights of finish hardware with Consultant.
- .3 Install finish hardware in accordance with hardware suppliers directions. Ensure that hardware is installed correctly. Issue instructions if required to Sections concerned.
- .4 Unless otherwise directed by the Consultant, install finish hardware at the following heights above finish floor:
 - .1 Locksets and Latchsets: 1025 mm to centre of strike
 - .2 Deadlocks: 1200 mm to centre of strike
 - .3 Panic Bolts: 1025 mm to underside of push bar
 - .4 Push Plates: 1025 mm to centre of plate
 - .5 Guard Bars: 1065 mm to centre of bar
 - .6 Door Pulls: 1065 mm to centre of pull

END

Finishing Hardware Schedule

TECUMSEH PS ALTERATION 2026

Architect
MG ARCHITECTS
18 Kuhl Avenue
Toronto, On M9B 5X9
Canada

Detailer: **Austin Baril**
Consultant: **Ross Ruprecht B.A., A.H.C.**

Plans Dated: **MAR 2026**
Submittal Date: **MAR 9**



Commercial Doors & Hardware Ltd.
2150 Winston Park Drive, Unit 16
Oakville, L6H 5V1

TECUMSEH PS ALTERATION 2026

Submittal Date: MAR 9

Manufacturers & Finishes

Manufacturers

Baron Metal
BEST
Camden
Camden Door Controls (Pgs 15-20)
Crowder
Gallery
GYRO-TECH
HES
K.N. Crowder
MISC
Standard Metal
Stanley

Finishes

626 - Satin chromium plated
over nickel
628 - Satin aluminum, clear
anodized
630 - Satin stainless steel
689 - Aluminum painted
US26D - Satin chromium plated
over nickel
US32D - Satin stainless steel



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Openings Schedule

Opening Number(s)	Qty	Door Catalog	Location 1	To/ From	Location 2	Nominal Width	Nominal Height	Door Thickness	Hand	Label	Degree of Opening	Hardware Group	Remarks	Heading Num.
101	1		CORRIDOR	TO	ELEVATOR							ELEVATOR	ELEVATOR DOOR AND FRAME by section 14410	1
E102	1		CORRIDOR	TO	ELEV MACH RM	1000	2150	45	LH	45 min	90°	STORAGE , WS, SS	HIGH TRAFFIC DOOR	2
103	1		MAIN FOYER	FROM	WORKROOM			45	LHR			EXISTING	EXISTING DOOR AND SCREEN	3
201	1		CORRIDOR	TO	ELEVATOR							ELEVATOR	ELEVATOR DOOR AND FRAME by section 14410	1
E203	1		CORRIDOR	FROM	LIBRARY	950	2150	45	RH		90°	CLASS RM ,CL,WS BEST	NEW FR IN OPENING CUT IN EXIST BLOCK	4
202	1		CORRIDOR	TO	WASHROOM	1000	2150	45	RH		90°	WR OP PUSH PD SB W SGL ANNUN	ADO / HIGH TRAFFIC DOOR / NEW FR IN OPENING CUT IN EXIST BLOCK	5



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GENERAL

-AUOTO DOOR OPERATORS TO BE SUPPLIED & INSTALLED BY HARDWARE SUPPLIER 08710 .

-WARRANTIES FOR FININISHING HARDWARE & AUTO DOOR OPERATORS BY HARDWARE SUPPLIER 08710.

-NO ALTERNATE WILL BE ACCEPTED FOR AUTO DOOR OPERATOR SPECECIFIED.



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Hardware Schedule

Heading #1 (Group: ELEVATOR)

Item #1 1 Elevation 101, CORRIDOR TO ELEVATOR
 Item #2 1 Elevation 201, CORRIDOR TO ELEVATOR

__ x __ x __ - HM DR x HM FR

ELEVATOR DOOR.
 HARDWARE COMPLETE BY ELEVATOR DOOR SUPPLIER

Heading #2 (Group: STORAGE , WS, SS)

Item #3 1 Single door E102, CORRIDOR TO ELEV MACH RM 90° LH

1000 x 2150 x 45 - HM DR x HM FR - 45 min

4	Standard Hinge	BEST FBB179 (4 1/2" x 4) US26D	US26D
1	Lockset	BEST 45H7D (Std.) 15 H 630 LH	630
1	Cylinder	BEST 1E74(Std.) 626	626
1	Cylinder	Best BEST PERMANENT CORE 1C7N1 GMK 3 Keys	626
1	Cylinder	Best CONSTRUCTION CORE 1CA Brass	
1	Surface Closer	Stanley HD8016 ARP x SNDTPK x689 REG Arm SN	689
1	Kick Plate	Gallery GSH 80A 200 X 950 C32D	US32D
1	Wall Door Stop	Standard Metal S120 C26D	US26D
1	Weatherstripping	Crowder W-50 C.A. 1X 1200, 2 X 2150	C.A.
1	Gasketing	K.N. Crowder CT-54 X 42 AL x SHIM	

Heading #3 (Group: EXISTING)

Item #4 1 Elevation 103, MAIN FOYER FROM WORKROOM LHR

__ x __ x 45 - HM DR x HM FR

EXISTING DOOR AND FRAME TO REMAIN.
 RE USE EXISTING HARDWARE



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Heading #4 (Group: CLASS RM ,CL,WS BEST)

Item #5	1 Single door E203, CORRIDOR FROM LIBRARY		90° RH
	950 x 2150 x 45 - HM DR x HM FR		
3	Standard Hinge	BEST FBB168 (4 1/2" x 4 1/2") US26D	US26D
1	Lockset	BEST 45H7R (Std.) 15 H 630 RH	630
1	Cylinder	BEST 1E74(Std.) 626	626
1	Cylinder	Best BEST PERMANENT CORE 1C7N1 GMK 3 Keys	626
1	Cylinder	Best CONSTRUCTION CORE 1CA Brass	
1	Surface Closer	BEST HD8016 SPA 689 SN	689
1	Kick Plate	Gallery GSH 80A 200 x 900 C32D	US32D
1	Wall Door Stop	Standard Metal S120 C26D	US26D



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Heading #5 (Group: WR OP PUSH PDSB W SGL ANNUN)

Item #6	1 Single door 202, CORRIDOR TO WASHROOM		90° RH
	1000 x 2150 x 45 - HM DR x HM FR		
4	Standard Hinge	BEST FBB168 (4 1/2" x 4 1/2") US26D	US26D
1	Lockset	BEST 45H7D (Std.) 15 H 630 RH	630
1	Cylinder	BEST 1E74(Std.) 626	626
1	Cylinder	Best BEST PERMANENT CORE 1C7N1 GMK 3 Keys	626
1	Cylinder	Best CONSTRUCTION CORE 1CA Brass	
1	Electric Strike	HES 1006CS-F-630 X 2005M3	630
		FAIL SAFE	
1	Electronic Closer	GYRO-TECH OPERATOR 8710 PULL SIDE FW HEADER 628 NO ALTERNATE	628
2	Kick Plate	Gallery GSH 80A 200 X 950 C32D	US32D
1	Wall Door Stop	Standard Metal S120 C26D	US26D
1	Accessory	HES 2005M3 MUST BE INSTALLED WITH ES	
1	Accessory	Camden CM-45/4 PUSH TO EXIT -FLUSH MTD.(2 X 4BB)	
1	Accessory	MISC ESCUTCHEON SS PDSB STD X 1 ACTUATOR CUT OUTS C32D	
1	Miscellaneous Hardware	Camden ACTUATOR CM-45/455/SE1 FLUSH MTD IN CORR GC CUT BLOCK WALL TO SUIT	
1	Miscellaneous Hardware	Camden (CAD) CIRCUIT CM-4000-60N INSTALL IN PARALLEL WITH OFFICE ANNUN & EMERG WR	
1	Miscellaneous Hardware	Camden CM-160/22 MTD IN ADO HEADER MOUNT IN OP HEADER	
1	Miscellaneous Hardware	Camden CM-331-/43S / SGLR/ SGL GANG (2 X 4BB)	
1	Miscellaneous Hardware	Camden CONTACT CX-MDA	
1	Miscellaneous Hardware	Camden (CAD) CX-IRB (FOR CUST WR KIT)	
1	Miscellaneous Hardware	Camden CX-TRX-4024 INSTALL IN OP HEADER	
1	Miscellaneous Hardware	Camden DEDICATED PS CX-PS13V3 INSTALL IN OP HEADER	
1	Miscellaneous Hardware	Camden EMERGENCY WR KIT CX-WEC10K2 (corr sgl gang, wr dbl gang)	
1	Miscellaneous Hardware	Camden RELAY CX-33	
1	Miscellaneous Hardware	MISC WIRING /RISER DIAGRAM BY HARDWARE SUPPLIER	

HARDWARE SUPPLIER TO SUPPLY AND INSTALL AUTO OPERATOR.

PDSB STD IS FOR ACTUATORS TO BE FLUSH MTD . GC MUST HAVE WALLS CUT TO SUITE .
GC TO OBTAIN WALL CUTOUT TEMPLATE FROM PDSB .

ELECTRICAL CONTRACTOR TO PROVIDE 120 VAC TO HEAD OF FRAME AND RUN LOW VOLTAGE WIRE TO PUSH BUTTON
LOCATIONS AND ALL ELECTRICAL COMPONENTS LISTED . REFER TO WIRING DIAGRAM SUPPLIED BY HARDWARE SUPPLIER.



Commercial Doors & Hardware Ltd.
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40H Series
Heavy Duty Mortise Locks
by BEST



BEST: Setting the Standard for Security

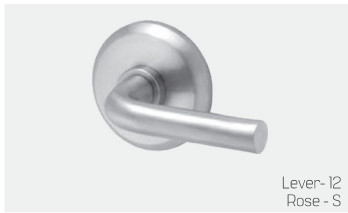


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Submission Date: MAR 9

40H Series - Standard Lever & Trims



40H Series **BEST**
dormakaba Group

11

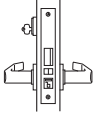
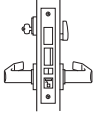
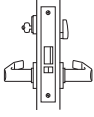
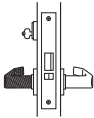
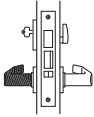
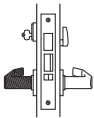
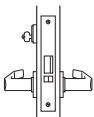
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Functions

Function & Diag (ANSI No)	Description	Outside Lever or Knob		Inside Knob/Lever		
		Latch operated by	Deadbolt operated by	Locked by	Unlocked by	Locked by
Single keyed						
Office (A) F04 	Rotating inside lever Rotating outside lever—only when locking toggle is in unlocked position Turning key in outside cylinder	N/A	Placing locking toggle in locked position	Placing locking toggle in unlocked position	Cannot be locked	Always unlocked
Office (AB) F20 	Rotating inside lever; Rotating outside lever—only when locking toggle is in unlocked position, Turning key in outside cylinder	Turning key in outside cylinder Inside turn lever Inside lever retracts deadbolt and latch simultaneously	Placing locking toggle in locked position, Projecting dead-bolt by key or turning inside turn lever	Turning key in outside cylinder and placing locking toggle in unlocked position	Cannot be locked	Always unlocked
Office (AT) F04 	Rotating inside lever; Rotating outside lever only when unlocked by key or turn lever, Turning key in outside cylinder	N/A	Turning inside turn lever Turn key in outside cylinder	Turning inside turn lever Turning key in outside cylinder	Cannot be locked	Always unlocked
Storeroom (D) F07 	Rotating inside lever Turning key in outside cylinder	N/A	Always unlocked	Cannot be unlocked	Cannot be locked	Always unlocked
Hotel (H) F15 	Rotating inside lever; Turning key in outside cylinder	Turning inside turn lever Turning emergency key in O/S cylinder. (Rotating inside lever retracts deadbolt and latch simultaneously)	Always unlocked	Cannot be unlocked	Cannot be locked	Always unlocked
Hotel (HJ) F15 	Rotating inside lever Turning key in outside cylinder	Turning inside turn lever Turning emergency key in O/S cylinder. (Rotating inside lever retracts deadbolt and latch simultaneously)	Always unlocked	Cannot be unlocked	Cannot be locked	Always unlocked
Classroom (R) F05 	Rotating inside lever Rotating outside lever only when unlocked by key Turning key in outside cylinder	N/A	Turning key in outside cylinder	Turning key in outside cylinder	Cannot be locked	Always unlocked

NOTE: The latchbolt is deadlocked with an auxiliary deadlatch (H) F15 & (HJ) F15 - Throwing deadbolt blocks out all keys except "ER" key.

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1E Series – Features

1E Mortise Cylinder



Standard mortise applications require use of BEST's 1E series cylinders with standard 1E-C4 cam. BEST cylinders may be altered to function with other manufacturers' locks by use of different cams (see page 8) and different cylinder rings (see page 9). Special cylinder variations are available for most applications (see pages 4 & 5). BEST cylinders are machined from brass or bronze bar stock and are available in a variety of finishes. Additional security is provided by a set screw that mounts diagonally in the cylinder wall and when tightened, holds the cylinder securely in the housing. BEST mortise cylinders feature the BEST interchangeable core and may be master-keyed into any existing BEST system. Contact your local BEST sales office for information on special cylinder applications not listed in this catalog.

Cylinder Nomenclature	Dimension 'A'	Door Thickness
1E-64	1-1/8"	1-5/8" to 2-1/4"
1E-74	1-1/4"	1-7/8" to 2-1/2"



Cylinder diameter: 1-5/32"
 How to order example: 1E74-C4-RP3-626
 Products covered by on or more of the following patents: 5,590,555 5,794,472

12E Rim Cylinder



Standard rim cylinder applications require the use of BEST's 1E rim cylinder series. BEST rim cylinders are interchangeable with other manufacturers' rim cylinders. BEST rim cylinders are machined from solid bar stock and are available in a variety of finishes. The standard package for the BEST rim cylinder includes cylinder, RP3 ring package, 1E-S2 spindle, clamp plate and clamp plate screws. BEST rim cylinders feature the BEST interchangeable core and may be masterkeyed into any existing BEST system.

Cylinder Nomenclature	Dimension 'A'	Door Thickness
12E62	1-3/16"	1" to 2-3/4"
12E72	1-11/32"	1-1/4" to 3"



Cylinder diameter: 1-5/32"
 How to order example: 12E72-S2-RP3-626

1E Series How To Order

Series	Core Housing	Function Code	Length Code	Cam or Spindle	Rings	Finish
See p.12	0 – dummy 6 – 6-pin 7 – 7 pin housing accepts all Best cores	See p.12	(1E74 only) Blank – Standard 22 – 1-3/8" 24 – 1-1/2" up to 6" (See page 4-5)	C4 – Standard cam C18 – Adams Rite MS cam S2 – Standard spindle (For special cams see page 8)	RP – Rim cylinder RP1 – Tapered cylinder RP2 – 6 pin mortise RP3 – 7 pin mortise (For special rings see page 9)	626 690 Satin* 606 612 613 619 Bright* 605 611 625

*Indicates extra cost ** Must specify keymark and number of keys or designate L/C for less core.

2 **BEST**  E Series Mortise and Rim Cylinders
Thormark Group

CDH

Commercial Doors & Hardware Ltd.
 2150 Winston Park Drive, Unit 16
 Oakville, L6H 5V1

TECUMSEH PS ALTERATION 2026

Submittal Date: MAR 9

HD8000 SERIES SURFACE CLOSERS



Versatile, durable, and reliable, featuring modern styling for institutional or high-traffic commercial applications.

BEST HD8000 series, Grade 1 hydraulic surface closers are housed in corrosion-resistant aluminum with a hardened pinion/piston providing toughness and high-strength. The arm hub is made from forged steel.

Standard on the HD8000 series closers are backcheck with two adjustment valves and adjustable spring size options from 1 - 6 or 5 - 6. The HD8000 series closers are ideal for a variety of heavy-duty, as well as barrier-free applications.

HD8000—Features

- Available with fully adjustable spring sizes 1 -6. Size 1 (5 lb opening force) meets interior barrier-free AD requirements.
- May be used on doors up to 48" wide interior (42" wide exterior) and up to 180 lb.
- Available with adjustable spring sizes of 5 -6 +50% for use on exceptionally wide, tall, or heavy doors.
- Non-handed for regular, top jamb, and parallel arm applications.
- Backcheck (BC) valve (standard) provides adjustable-intensity hydraulic cushioning, preventing uncontrolled door opening to protect door and frame during abusive or abrupt opening.
- AVB - advanced variable backcheck option maintains an effective backcheck range on parallel arm applications. Valve is accessible with the closer installed.
- Full adjustment using BC, Sweep and Latch valves standard.
- DA, AVB & AVB DA options with separate independent valve to allow for unobstructed passage through opening.
- Full plastic cover standard. Lead lined as well as full and oversized metal and plastic covers available to assist in concealing existing holes.
- All tamper-resistant (hex key) valve adjustments.
- Standard components required for three mounting configurations (Reg, TJ, PA).
- SNDTPK - Standard fasteners include separate self-drilling and self-tapping and sex nuts for 1-3/4" thick doors and machine screws.
- A variety of specialty arm options, interchangeable across most surface closer models.
- Full complement of optional plates and brackets available for special applications

HD8000—Certification

- ANSI/BHMA A156.4 Grade 1 certified
- UL and CUL listed
- Meets UL10C for positive pressure
- Meets ANSI/BHMA A117.1 and ADA for barrier-free accessibility.



dormakaba USA quality and environmental management systems in Reamstown, PA and Indianapolis, IN are certified to ISO 9001:2015 and ISO 14001:2015.

BEST Surface Applied Door Closers | 3

CDH

Commercial Doors & Hardware Ltd.
2150 Winston Park Drive, Unit 16
Oakville, L6H 5V1

TECUMSEH PS ALTERATION 2026

Submission Date: MAR 9

5 Knuckle Full Mortise Hinges

Standard Weight Ball Bearing

FBB179 – (ANSI A8112) Steel – polished and plated or phosphated and prime coated for painting

FBB191 – (ANSI A2112) Brass or bronze – polished and plated or painted

FBB191 (32) – (ANSI A5112) Stainless steel – highly polished

FBB191 (32D) – (ANSI A5112) Stainless steel – satin finish



- For medium weight doors of average frequency
- All hinges have template screw hole location for use on either wood or hollow metal doors and frames
- Equipped with two Stanley permanently lubricated non-detachable ball bearings
- Pins in non-ferrous hinges are stainless steel
- Hole in bottom tip for easy pin removal
- Reversible flush tips and pins
- Hinges can be furnished as follows:
 - with raised barrel (RB)
 - with electric wires and/or switches (CE and/or CS)
 - with hospital tips (HT)
 - with decorative tips
 - with security studs
 - with non-removable pins (NRP)



Size Open		Gauge of Metal		Flat Head Screws Per Piece		Quantity Per		Case Weight			
Inches	[mm]	Inches	[mm]	Machine	Wood	Each	Case	Bronze		Steel	
								Lbs.	[Kg]	Lbs.	[Kg]
3-1/2 x 3	[89 x 76]	123	[31]	6 - 10-24 x 1/2	6 -10 x 1	3	90	58	[26]	54	[24]
3-1/2 x 3-1/2	[89 x 89]	123	[31]	6 - 10-24 x 1/2	6 -10 x 1	3	90	65	[29]	59	[27]
4 x 3-1/2	[102 x 89]	130	[33]	8 - 12-24 x 1/2	8 -12 x 1-1/4	3	48	43	[19]	39	[18]
4 x 4	[102 x 102]	130	[33]	8 - 12-24 x 1/2	8 -12 x 1-1/4	3	48	45	[20]	42	[19]
4-1/2 x 4	[114 x 102]	134	[34]	8 - 12-24 x 1/2	8 -12 x 1-1/4	3	48	55	[25]	52	[24]
4-1/2 x 4-1/2	[114 x 114]	134	[34]	8 - 12-24 x 1/2	8 -12 x 1-1/4	3	48	59	[27]	55	[25]
5 x 4	[127 x 102]	146	[37]	8 - 12-24 x 1/2	4 -12 x 1-1/4	3	30	41	[19]	39	[18]
5 x 4-1/2	[127 x 114]	146	[37]	8 - 12-24 x 1/2	4 -12 x 1-1/4	3	30	45	[20]	43	[19]
5 x 5	[127 x 127]	146	[37]	8 - 12-24 x 1/2	4 -12 x 1-1/4	3	30	50	[23]	46	[21]
*6 x 4-1/2	[152 x 114]	160	[41]	10 -1/4 -20 x 1/2	5 -14 x 1-1/2	3	24	43	[19]	36	[16]
*6 x 5	[152 x 127]	160	[41]	10 -1/4 -20 x 1/2	5 -14 x 1-1/2	3	24	47	[21]	40	[18]
*6 x 6	[152 x 152]	160	[41]	10 -1/4 -20 x 1/2	5 -14 x 1-1/2	3	24	67	[30]	61	[28]

* Available in Steel only
Consult factory for other sizes not listed



5 Knuckle Full Mortise Hinges

Heavy Weight Ball Bearing

FBB168 – (ANSI A8111) Steel – polished and plated or phosphated and prime coated for painting

FBB199 – (ANSI A2111) Brass or bronze – polished and plated or painted

FBB199 (32) – (ANSI A5111) Stainless steel – highly polished

FBB199 (32D) – (ANSI A5111) Stainless steel – satin finish



- For use on heavy doors or doors where high frequency is expected such as entrance doors to office buildings, stores, public buildings and corridor entrance doors to offices
- All hinges have template screw hole location for use on either wood or hollow metal doors and frames
- Equipped with four Stanley permanently lubricated non-detachable ball bearings
- Pins in non-ferrous hinges are stainless steel
- Hole in bottom tip for easy pin removal
- Reversible flush tips and pins
- Hinges can be furnished as follows:
 - with raised barrel (RB)
 - with electric wires and/or switches (CE and/or CS)
 - with hospital tips (HT)
 - with decorative tips
 - with security studs
 - with non-removable pins (NRP)



Size Open		Gauge of Metal		Flat Head Screws Per Piece		Quantity Per		Case Weight		Case Weight	
Inches	(mm)	Inches	(mm)	Machine	Wood	Box	Case	Bronze		Steel	
						Each	Each	Lbs.	(Kg)	Lbs.	(Kg)
4-1/2 x 4-1/2	[114 x 114]	180	[4.6]	8 - 12-24 x 1/2	8 - 12 x 1-1/4	3	30	45	[21]	42	[19]
5 x 4-1/2	[127 x 114]	190	[4.8]	8 - 12-24 x 1/2	8 - 12 x 1-1/2	3	24	46	[21]	40	[18]
5 x 5	[127 x 127]	190	[4.8]	8 - 12-24 x 1/2	8 - 12 x 1-1/2	3	24	50	[23]	46	[21]
6 x 4-1/2	[152 x 114]	203	[5.2]	10 - 1/4 -20 x 1/2	10 - 14 x 1-1/2	3	24	63	[29]	53	[24]
6 x 5	[152 x 127]	203	[5.2]	10 - 1/4 -20 x 1/2	10 - 14 x 1-1/2	3	24	65	[30]	55	[25]
6 x 6	[152 x 152]	203	[5.2]	10 - 1/4 -20 x 1/2	10 - 14 x 1-1/2	3	24	76	[35]	64	[29]
8 x 6*	[203 x 152]	203	[5.2]	16 - 1/4 -20 x 1/2	16 - 14 x 1-1/2	3	12	57	[26]	51	[23]
8 x 8*	[203 x 203]	203	[5.2]	16 - 1/4 -20 x 1/2	16 - 14 x 1-1/2	3	12	68	[31]	61	[28]

* Available in Steel only
Consult factory for other sizes not listed



DOOR CONTROL RELAYS

DOOR CONTROL

CX-33: ADVANCED LOGIC RELAY

CX-33 is a 'state of the art' door controller designed for 'universal' operation in automatic door and application security. This compact unit is small enough to fit inside most door operator cases. It provides a large 3 segment LED and simple push buttons for the easiest programming, and supports illuminated signage in restroom applications. It also leads the market with a range of exclusive operating features, including time duration in airlock applications and protection of automatic door operators when utilizing magnetic locks.



Features

- 15 operating modes with sub-modes
- Easily sequence multiple inputs with multiple maintain and hold outputs
- New V3.2 Features Include:
 - Lock down mode
 - Delayed relay activation
 - Selectable N.O or N.C. inputs
- Large 3 segment (blue) LED display
- Outstanding power filtering and surge protection
- Selectable time delays with delay on input activation
- Larger terminal strips
- 12V to 24V AC/DC
- 3 year warranty

MODEL

CX-33	Advanced Logic Relay
-------	----------------------

Specifications

Voltage:	12V to 24V AC/DC
Current Draw:	105mA Typical, 320mA Max
Response Time:	0.5 Seconds
Display:	Blue Multi-Segment LED
Input:	4 x Dry 1 x Wet: min. 5V AC/DC N/O or N/C Selectable
Output:	3 x Form C (SPDT)
Contact Rating:	3A @ 30 VDC
Temp Range:	-22°F to +185°F (-30°C to +85°C)
Time Delay:	Hold 1 timer: 0-50 Seconds Delay 1 Timer: 0-15 Seconds Hold 2 timer: 0-50 Seconds Delay 2 timer: 0-60 Seconds Hold 3 Timer: 0-50 Seconds Delay on Activate: 0-10 Seconds
Dimensions:	2" H x 6" W x 7/8" D (51mm x 152mm x 22mm)

CX-33PS: ADVANCED LOGIC RELAY, POWER SUPPLY AND CABINET

The industry leading CX-33 Advanced Logic Relay is available in a metal cabinet that centralizes all door and security control system components; a 12/24 VDC power supply module, and color coded termination blocks for quick and easy installation.



Features

- Rugged and compact metal cabinet
- Pre-wired with large terminal block for easy access
- Removable door with option for cabinet lock
- Five convenient conduit knockouts; one per side
- 12/24V DC power supply, 2 Amp. (UL listed)
- Available as part of Camden Restroom Control Kits (See pages 36-37)
- Short circuit and thermal overload protection
- 3 year warranty

MODEL

CX-33PS	Advanced Logic Relay, 2 Amp Power Supply, Cabinet and Transformer
---------	---

Option

'L'	Add suffix 'L' to model number for Cabinet Lock
-----	---

Specifications

Voltage:	12V to 28V AC/DC
Output:	12V or 24 VDC
Current:	2 Amps
Temp Range:	32°F to +120°F (0°C to +49°C)
Dimensions:	11-1/16" H x 7-7/8" W x 2-13/16" D 281mm x 200mm x 72mm



HANDS-FREE SWITCHES

DOOR ACTIVATION DEVICES

ACTIVE INFRARED HANDS-FREE SWITCHES



SureWave™ touchless switches include exclusive features, including an extended range (up to 6 ft.), the option for wireless or hybrid wireless/wired operation and 'short range' activation designed to reduce false activation from highly reflective surfaces! CM-333 and CM-336 models are supplied with (2) 'AA' alkaline batteries.

Outdoor Applications: Lithium batteries recommended for environments below 32°F (0°C). Rain Hood recommended when installed with direct exposure to rain or snow.



Hands-Free Features

- A wide range of wired, wireless and battery powered models
- Adjustable operating range 1" - 6 ft.
- Adjustable time delay
- Super-fast activation response
- Heavy duty relays, for use with all automatic operators and electrified locks
- Narrow, single or double gang faceplates, stainless steel or polycarbonate

NOTE: See page 64 for faceplate, graphic and light ring options

Specifications - All Models

Technology: Active Infrared with Micro Burst
 Temp Range: -4°F to 153°F (-20°C to +85°C)
 Security: Fail Secure or Fail Safe

CM-331: WIRED, 1 RELAY

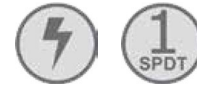
Features

- Standard Operating range, 1"- 28"
- Extended Range up to 6 ft.
- Adjustable time delay 1 - 30 seconds
- (5) Selectable operating modes
- Inputs for REX and door contact
- Option for light ring (stainless steel faceplates only)
- Option for plug-in wireless transmitter

MODEL

CM-331	Hands-free switch, wired, with 1 relay
--------	--

NOTE: See page 64 for faceplate, graphic and light ring options



Specifications

Sensors: (2) Voltage: 12/24V AC/DC
 Current Draw: 40mA
 Relay Outputs: (1) Form 'C', 3A @ 30 VDC
 Active Output: 9-12V
 Inputs: REX and Door Contact
 Operating Modes: Momentary, Momentary with Alarm, Maintained, Toggle, Extended Range

CM-332: WIRED, 2 RELAY

Features

- Advanced switch with Door Control Functions
- Standard operating range, 1" - 28"
- Extended Range up to 6 ft.
- Adjustable time delay 1 - 30 seconds
- (7) Selectable operating modes
- Inputs for REX and door contact
- Option for light ring (stainless steel faceplates only)
- Option for plug-in wireless transmitter

MODEL

CM-332	Hands-free switch, wired, with 2 relays
--------	---

NOTE: See page 64 for faceplate, graphic and light ring options



Specifications

Sensors: (2) Voltage: 12/24V AC/DC
 Current Draw: 40mA
 Relay Outputs: (2) Form 'C', 3A @ 30 VDC
 Active Output: 9-12V
 Inputs: REX and Door Contact
 Operating Modes: Momentary, Momentary with Alarm, Maintained, Toggle, Security, Extended Range, and Sequence



ALL-ACTIVE SWITCHES

DOOR ACTIVATION DEVICES



CM-45 & 46 SERIES: STAINLESS STEEL 4-1/2" SQUARE PUSH PLATES



Listed Components



Compliant

CM-45 Series (concealed screws) and CM-46 Series (exposed screws) stainless steel 4-1/2" square push plate switches mount to standard single gang or double gang electrical boxes. The SPDT (and optional DPDT) switches are rated 15A @ 30 VDC. The push switches are offered with different graphics, and in various architectural finishes. Water tight configurations available.



CM-45/2



CM-45/A4



CM-46/4



CM-46CB/4

Features

- 4 stud switch design and rubber dampers for quieter operation
- Weather resistant boot included
- Available in a range of architectural finishes
- Available with 'Active' wheelchair symbol graphics
- 3 year 'Camden Tough' warranty with '2 for 1' replacement

SQUARE SWITCHES

CM-45	4-1/2" Square push plate switch, concealed screws, brushed stainless steel
CM-46	4-1/2" Square push plate switch, exposed screws, brushed stainless steel
CM-46CB	4-1/2" Square push plate switch, exposed screws, aluminum, blue paint finish '1', '2', and '4' graphic options only.

NO BATTERY KINETIC BY CAMDEN™ WIRELESS SQUARE SWITCHES with built-in transmitters. Receiver required.

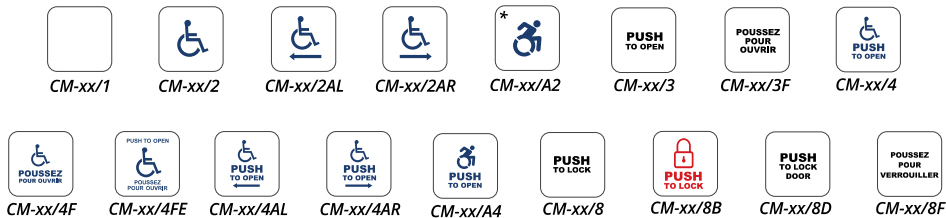
CM-45K	4-1/2" Square push plate switch, concealed screws, brushed stainless steel
CM-46K	4-1/2" Square push plate switch, exposed screws, brushed stainless steel
CM-46CBK	4-1/2" Square push plate switch, exposed screws, aluminum, blue paint finish '1', '2', and '4' graphic options only.

Specifications

Contact Rating:	15A @ 30 VDC
Contact Type:	SPDT Form 'C'
Mounting:	Single or Double Gang
Switch Type:	Momentary
Std. Finish:	CM-45/46: US32 / 630 CM-46CB: Paint
Dimensions:	CM-45/46/46CB: 4-1/2"H x 4-1/2"W x 1-1/4"D (114mm x 114mm x 32mm)

OPTIONS (Add suffix to model above)

Faceplate Graphic Options (* Black graphics on CM-46 series only)



Architectural Finishes (Only available with CM-45 /1, /2, /3, /4, /8 graphic options)

CM-xx-AB Antique Brass	CM-xx-OB Oil Rub Bronze
CM-xx-SB Satin Brass	CM-xx-PB Polished Brass

Water Tight Option

CM-xx-WT Boot & watertight coating

Contact Option

CM-xx-DP DPDT switch instead of SPDT



Commercial Doors & Hardware Ltd.
2150 Winston Park Drive, Unit 16
Oakville, L6H 5V1

TECUMSEH PS ALTERATION 2026

Submission Date: MAR 9



ALL-ACTIVE SWITCHES

DOOR ACTIVATION DEVICES

CM-54, CM-55 & CM-57 SERIES: ILLUMINATED PUSH PLATE ENCLOSURES & SWITCH KITS

Aura™ CM-54 (surface square) CM-55 (flush square) and CM-57 (flush round) illuminated push plate enclosures and switch kits provide high visibility and enhanced user convenience in ADA compliant automatic door and other applications.

Features include: selection of backlight color activation, an audible sounder that confirms switch activation, and Form 'C' contacts used to switch your device.

Aura™ illuminated mounting boxes are compatible with the widest range of 4-1/2" all-active push plate switches in the industry. Options include a complete selection of stock and custom graphic designs, architectural finishes (including polished brass and bronze) and water tight models.



Listed Components



Compliant



CM-45/454



CM-45/455



CM-40/457

Features

- Illuminated surface and flush mount box compatible with any CM-40, CM-45 or CM-46 'All Active' push plate switch
- High efficiency LED technology
- Improves switch visibility, even in daylight
- Flame and impact resistant polycarbonate construction
- Selectable 12/24V, AC/DC

AURA™ ILLUMINATED ENCLOSURES

CM-54i	Surface, 4-1/2" Square, Aura™ illuminated. Red, Green, Blue
CM-55i	Flush, 4-1/2" Square, Aura™ illuminated. Red, Green, Blue
CM-57GR	Flush, 4-1/2" Round (Illuminated Red/Green)

AURA™ ILLUMINATED SWITCH KITS - SURFACE MOUNT

CM-45/x54	4-1/2" Square push plate (concealed screws)
CM-46/x54	4-1/2" Square push plate (exposed screws)

AURA™ ILLUMINATED SWITCH KITS - FLUSH MOUNT

CM-40/x57	4-1/2" Round push plate
CM-45/x55	4-1/2" Square push plate
CM-46/x55	4-1/2" Square push plate

NOTES:

- DPDT Contacts: CM-40, CM-45 or CM-46 'DP' option cannot be used with Aura™ illuminated enclosures
- See Page 75 for faceplate graphic options and suffix to replace "x" in above models

Specifications

Voltage:	12/24V AC/DC
Current Draw:	130 mA. max.
Lumina:	Red: 5760 MCD Green: 3780 MCD
Contact Type:	1 Form 'C'
Contact Rating:	3A @ 24V AC/DC
Sounder:	85 DB @ 10cm
Dimensions:	CM-54: 5-1/4"H x 5-1/4"W x 2-1/8"D (133mm x 133mm x 54mm) CM-55: 6-1/2"H x 6-1/2"W x 2"D (165mm x 165mm x 51mm) CM-57: 6-5/8" Dia. x 2"D (168mm x 51mm)

ALL-ACTIVE SWITCHES



DOOR ACTIVATION DEVICES

AURA™ RESTROOM CONTROL SIGNS

Add suffix to Aura™ switch kit to add restroom sign. To order sign separately, add prefix 'CM-' to model (eg. CM-SE1)

/SE1	English, for CM-54 Square Surface box. Double sided. 'DOOR LOCKED WHEN RED' / 'UNLOCKED WHEN GREEN' and 'OCCUPIED WHEN RED' / 'VACANT WHEN GREEN'
/SF1	French, for CM-54 Square Surface box. Double sided. 'PORTE BARRÉE' / 'PORTE DÉBARRÉE' and 'OCCUPÉ' / 'LIBRE'
/SFE1	English, for CM-55 Square Flush box. Double sided. 'DOOR LOCKED WHEN RED' / 'UNLOCKED WHEN GREEN' and 'OCCUPIED WHEN RED' / 'VACANT WHEN GREEN'
/SFF1	French, for CM-55 Square Flush box. Double sided. 'PORTE BARRÉE' / 'PORTE DÉBARRÉE' and 'OCCUPÉ' / 'LIBRE'
/FRE1	English, for CM-57 Round Flush box. Double sided. 'DOOR LOCKED WHEN RED' / 'UNLOCKED WHEN GREEN' and 'OCCUPIED WHEN RED' / 'VACANT WHEN GREEN'
/FRF1	French, for CM-57 Round Flush box. Double sided. 'PORTE BARRÉE' / 'PORTE DÉBARRÉE' and 'OCCUPÉ' / 'LIBRE'



CM-54 Sign
Switch not included



CM-55 Sign
Switch not included



CM-57 Sign
Switch not included

Faceplate Graphic Options

CM-xx/1	CM-xx/2	CM-xx/A2	CM-xx/2AL	CM-xx/2AR	CM-xx/3	CM-xx/3F	CM-xx/4
CM-xx/A4	CM-xx/4AL	CM-xx/4AR	CM-xx/4F	CM-xx/4FE	CM-xx/8	CM-xx/8D	CM-xx/8F

Lazerpoint™ 915MHz. Wireless Door Control

CM-TX-9	Wall Switch Transmitter
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NOTE: TX-9 may be added to Aura to send switch signal to RX-90/91/92 receivers, and reduce wiring by two conductors.



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Commercial Doors & Hardware Ltd.
2150 Winston Park Drive, Unit 16
Oakville, L6H 5V1

TECUMSEH PS ALTERATION 2026

Submission Date: MAR 9

AUTOMATIC DOOR CONTROL SWITCHES



DOOR ACTIVATION DEVICES

CM-160 / 170 / 180 SERIES: KEY SWITCHES

Key switches for automatic doors are designed for mounting on the door operator cabinet or door frame, and are available in a range of 2 or 3 position momentary or maintained models. The key cylinder and 2 keys are included.

Features	
<ul style="list-style-type: none"> Black lamacoid (plastic) or stainless steel faceplates Key removable in all maintained positions 	<ul style="list-style-type: none"> 2, 3, 4 position maintained and 2 position momentary models All switches are keyed alike

MODELS	
CM-160	Key switch with plastic lamacoid (mini) faceplate
CM-170*	Key switch with stainless steel (narrow stile) faceplate
CM-180*	Key switch with stainless steel (single gang) faceplate

OPTIONS (Add suffix to model above)				
Faceplate Graphics				
MOMENTARY CM-xx/20	MAINTAINED CM-xx/21	MAINTAINED CM-xx/22	MAINTAINED CM-xx/23	MAINTAINED CM-xx/24
Extra Keys				
CM-A126	(2) Extra keys for CM-160, 170 and 180 series key switches			

*Faceplate includes "AUTOMATIC DOOR" text at bottom of switch (as shown in images)



CM-160/23



CM-170/21



CM-180/23

Specifications

Contact Rating:	4A @ 28 VDC
Switch Life:	100,000 cycles
Dimensions:	CM-160: 3"H x 1-11/16"W x 1-3/8"D (76mm x 42mm x 35mm) CM-170: 4-1/2"H x 1-3/4"W x 1-3/8"D (114mm x 44mm x 35mm) CM-180: 4-1/2"H x 2-3/4"W x 1-3/8"D (114mm x 70mm x 35mm)

CM-190 SERIES: TOGGLE SWITCH

CM-190 Series maintained toggle switches are designed to control automatic door operators, featuring a choice of faceplates, for mounting on the operator cabinet/wall.

Features	
<ul style="list-style-type: none"> Mini metal faceplate designed to install on door operator cabinet or door frame 2 or 3 position maintained operation 	<ul style="list-style-type: none"> Single gang faceplate for mounting on standard electrical box Heavy duty 6 Amp. contacts

MODELS	
CM-190	Mini aluminum faceplate
CM-195*	Single gang stainless steel faceplate

OPTIONS (Add suffix to model above)	
Faceplate Graphics	
 CM-xx/30	 CM-xx/31

*Faceplate includes "AUTOMATIC DOOR" text at bottom of switch (as shown in images)



CM-190/30



CM-195/31

Specifications

Contact Rating:	6A @ 30 VDC
Switch Life:	50,000 cycles
Temp Range:	-4°F - 185°F (-20°C - 85°C)
Dimensions:	CM-190: 2-5/8" H x 1-1/2" W x 2"D (59mm x 38mm x 51mm) CM-195: 4-1/2" H x 2-3/4" W x 2"D (114mm x 70mm x 51mm)

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The 1006 Series is also available in a **Complete One Box Solution**

HES[®] 1006 Electric Strike

Works with all cylindrical and mortise locksets with or without a deadbolt



The strongest, most versatile electric strike available.

The 1006 series is the strongest and most versatile electric strike available. The dual interlocking plunger design and heavy duty stainless steel construction, enables it to exceed every standard developed for electric strikes. With multiple faceplate options, the 1006 will fully accommodate every lock designed to work within an ANSI 4-7/8" strike plate. Tested to exceed 3,000 lbs of static strength, 350 ft-lbs of dynamic strength and factory tested to exceed 1 million cycles of operation, the 1006 is in a class of its own.

Features

Standard Features

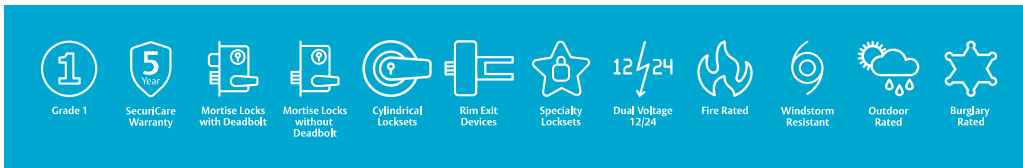
- Stainless steel construction
- Tamper-resistant
- Static strength 2,500 lbs
- Dynamic strength 350 ft-lbs (fail secure)
- Endurance 1 million cycles
- Fail secure (Standard)
- Non-handed
- Accommodates up to 1" deadbolt
- Plug-in connector
- Full keeper shims for horizontal adjustment
- Trim enhancer
- Strike body depth 11/16"
- SecuriCare five-year, no fault, no questions asked warranty

Optional Features

- **LBM** Latchbolt monitor
- **LB5M** Latchbolt strike monitor
- Fail safe
- Interchangeable faceplates
- Monitor switches may not work with all faceplate options

Accessories

- **1000-102** Rain guard
- **1006-103** Full keeper shims
- **1000-104** Lip extension trim adapter
- **1006-105** Trim enhancer BLK (goof plate)
- **1006-109** Trim adapter
- **1000-110** Replacement strike plate
- **1000-130** KD filler plate
- **150** Strike latch guard
- **HESCUT-MTK** Metal template kit
- **2005M3** SMART Pac[®] III



The global leader in door opening solutions

ASSA ABLOY



Commercial Doors & Hardware Ltd.
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TECUMSEH PS ALTERATION 2026

Submittal Date: MAR 9

AUTOMATIC DOOR BOTTOMS

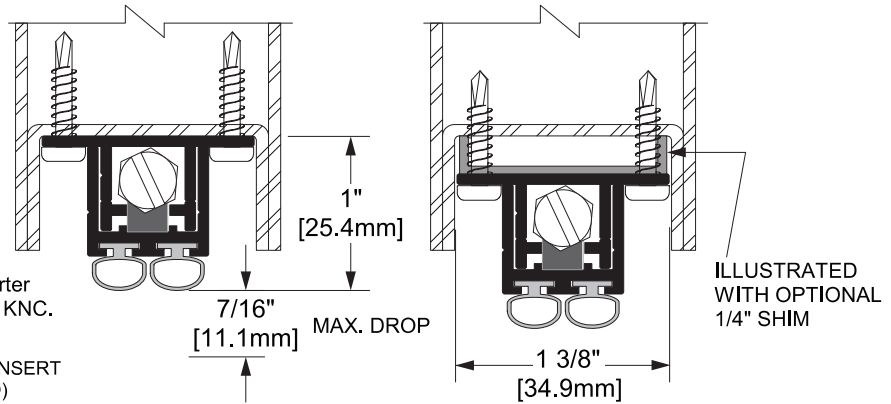
CT-54



EXTRUDED ALUMINUM AND VINYL

Designed to fit the recess of a standard hollow metal door. Available from stock sizes of 24", 30" 36", 42" and 48". *Stock sizes can be shortened up to 6" except 24" which can be shortened to 21". Longer and shorter sizes fabricated to order - contact KNC.

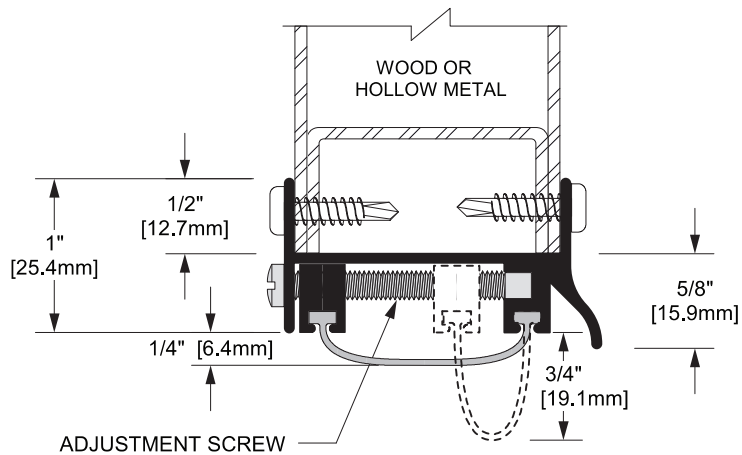
CT-54N C/W NEOPRENE INSERT (NOT FIRE RATED)



ADJUSTABLE DOOR SHOE

CT-730

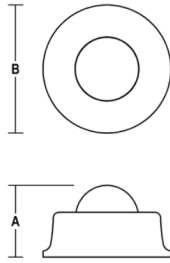
ADJUSTABLE DOOR SHOE
EXTRUDED ALUMINUM AND VINYL. FOR 1-3/4" DOORS





DOOR STOPS

WALL STOPS



S119

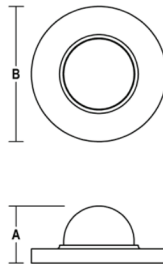
BUTTON WALL STOP

NO.	A	B
S119	0.5625"	Ø 1"

FEATURED FINISHES: Flat Black (19), Satin Chrome (26D)

FINISHES: 10BE, 19, 26D, PC

MATERIAL: Brass



S120

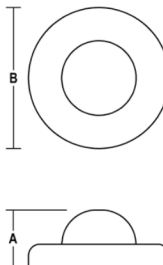
CONVEX WALL STOP

NO.	A	B
S120	1"	Ø 2.5"

FEATURED FINISHES: Flat Black (19), Satin Chrome (26D)

FINISHES: 3, 4, 10B, 15, 19, 26, 26D

MATERIAL: Zinc Die Cast



S121

CONVEX WROUGHT WALL STOP

NO.	A	B
S121	1"	Ø 2.5"

FEATURED FINISHES: Flat Black (19), Satin Stainless (32D)

FINISHES: 19, 26D, 32D

MATERIALS: Wrought Brass, Stainless

TOLL FREE: 1-800-267-5442 | www.smhardware.com | sales@smhardware.com

207



Commercial Doors & Hardware Ltd.
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Submittal Date: MAR 9



GT710/8710

Low-Energy
ADA Swing Door Operator
Where SOLUTIONS are AUTOMATIC



Product Features and Benefits

- Hydraulic design offers **proven reliability**
- Adjustable closing speeds to **enhance energy savings**
- Manual mode requires very little pressure to open **promoting ease of operation**
- Approved on fire door assemblies rated up to 3 hours, **maintaining security and safety**
- Hydraulic back-check during windy conditions **protects the door and operator from damage**

CDH

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Oakville, L6H 5V1

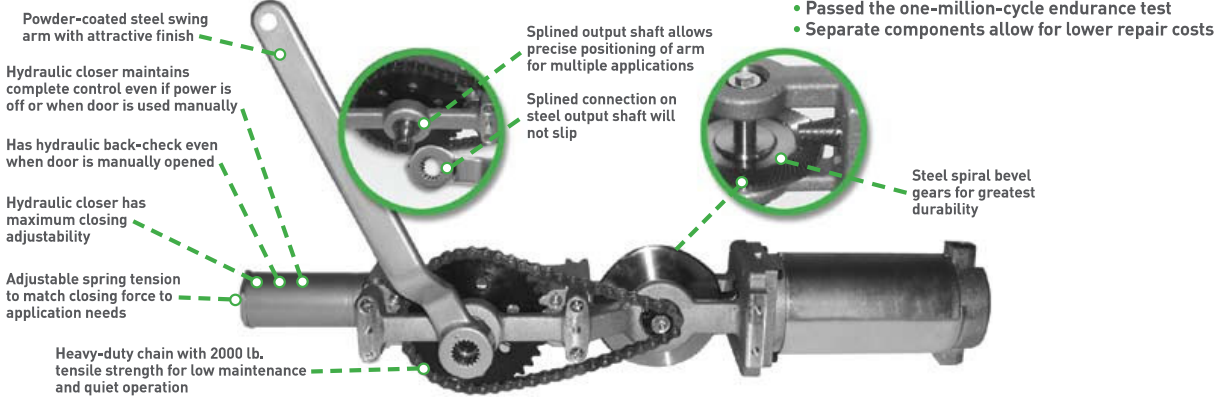
TECUMSEH PS ALTERATION 2026

Submittal Date: MAR 9

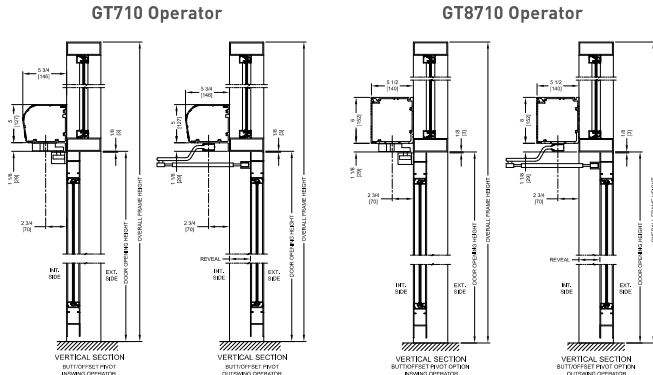


GT710/8710 Low-Energy ADA Swing Door Operator

The NABCO GT710/8710 Low-Energy Operator is engineered for interior and exterior use, and designed to automate essentially any new or existing door frame. The GT710/8710 operates in both automatic and manual modes with a hydraulic back-check that protects the door and mechanical operator from damage when forced open in windy conditions or when manually operated. The GT710/8710 Operator has been approved for use on fire door assemblies rated up to 3 hours. The low-energy performance, combined with the adjustable opening and closing speeds, reduces energy consumed, which offers a prompt return on your investment.



PRODUCT INFORMATION	
Header dimensions	Side load - 5" H X 5 3/4" D [GT710] curved header Side load - 6" H X 5 1/2" D [GT8710]
Standard finish	Clear and dark bronze anodized
Optional finishes	Painted, clad, special anodized
Mounting	Surface applied or overhead concealed
Installation types	Push or pull
Operating voltage	120 VAC @ <5 amps
Auxiliary power output	12VDC 750mA
Operator drive	Electro-hydraulic
Motor voltage	Pulse width modulated
Motor type	1/8th HP @ peak
Control type	Microprocessor
Door panel weight	300 lbs.
Adjustable open	Force and speed
Adjustable close	Force and speed
Closing method	Spring/hydraulic (with selectable power assist)
Adjustable opening angle	Up to 145°
Power boost close	Selectable
Basic features	Low-energy operation Push and go Obstacle detection in opening and closing cycles Sequential or timer mode operation LCD display for programming and diagnostics Open- or closed-circuit safety inputs Momentary or maintained activation
Switch modes	On, off, hold-open
Opening and closing speed	Adjustable
Hold-open time	Adjustable (0-30 seconds)
Code compliances	ANSI A156.19/ANSI A117.1
Approvals	UL, ULC



CONFIGURATIONS:
The GT710/8710 is available for multiple configurations, such as single doors, simultaneous pairs, and dual-egress, as well as the Opman configuration, which is a single continuous header for a pair of doors containing a manual closer on one side and an automatic operator on the other.

NABCO Service and Specifications

Along with the NABCO factory branches, NABCO has the largest independently owned network of automatic door distributors in North America. Their friendly, qualified installers and technicians always strive to exceed your expectations from install to after-sales service. NABCO's factory branches and independent distributors provide AAADM-certified technicians to ensure your doors meet all ANSI A156.10/A156.19 standards.

Complete three-part specifications and CAD drawings are available on the NABCO website.



Member of the Nabtesco Group

NABCO ENTRANCES INC.
S82 W18717 Gemini Drive | Muskego, WI 53150 | 877-622-2694 | Fax 888-679-3319
www.NABCOentrances.com | Email info@nabcoentrances.com



Distributed by:

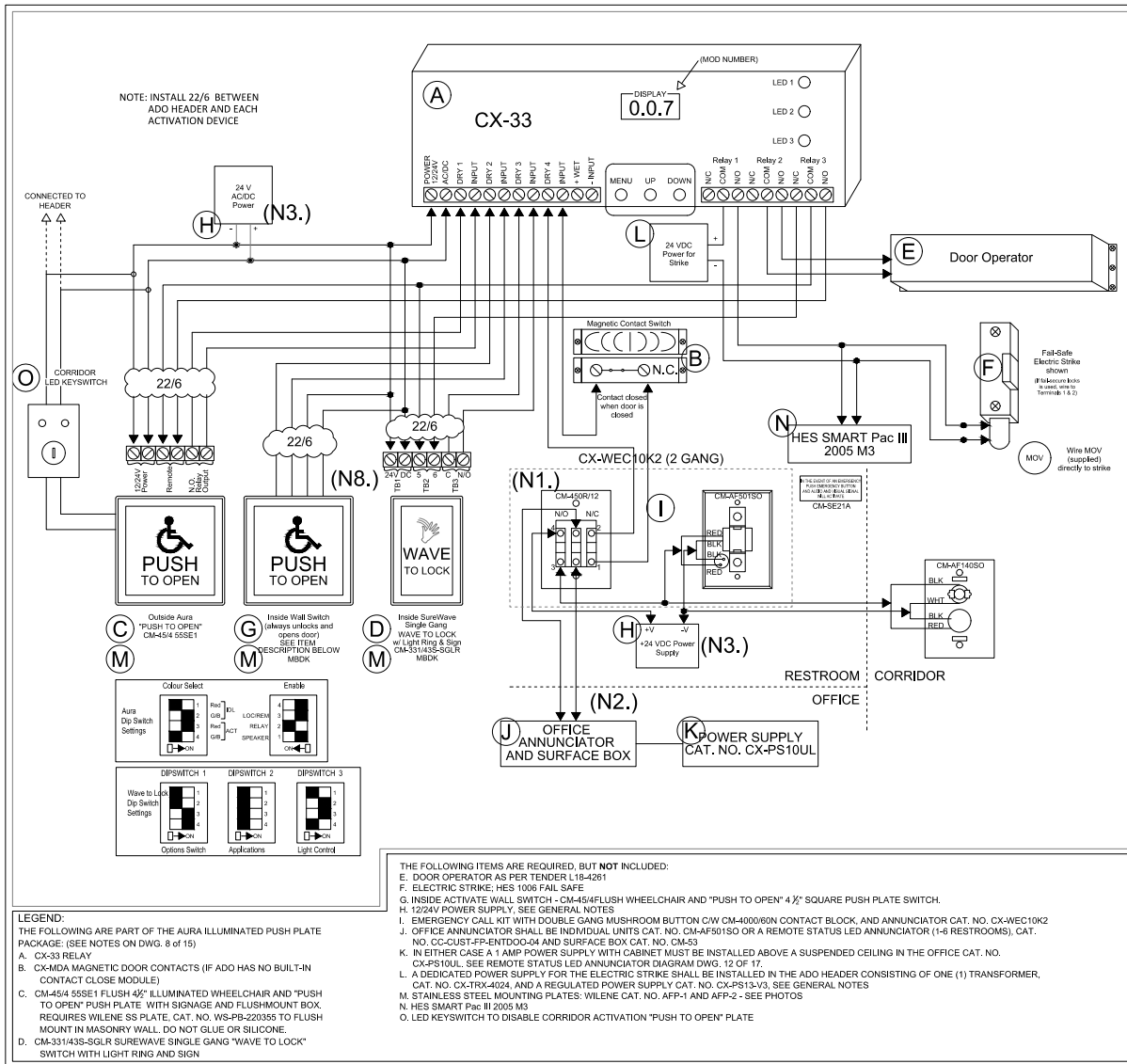
06/15



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TECUMSEH PS ALTERATION 2026

Submission Date: MAR 9



GENERAL NOTES:

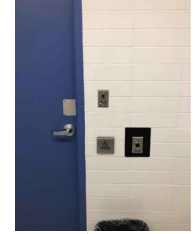
- (1) IF OFFICE ANNUNCIATOR IS GREATER THAN FIFTY FEET, (50'), AND/OR A REMOTE STATUS LED ANNUNCIATOR SERVING MULTIPLE EMERGENCY CALL SYSTEMS IS USED, A CM-4000/60N MUST BE INSTALLED ON EACH CM-450 R/12
- (2) IF OFFICE ANNUNCIATOR IS GREATER THAN FIFTY FEET, (50'), CONDUCTORS MUST BE MINIMUM #14 AWG COPPER
- (3) THIS ONE AND THE SAME 24VDC POWER SUPPLY LOCATED IN THE ADO HEADER AS FOLLOWS:
24V/20VA XFMR, CAT. NO. CX-TRX-2024 REGULATED POWER SUPPLY, CAT. NO. CX-PS13-V3
IF THE ABOVE POWER SUPPLY WILL NOT FIT IN THE AUTOMATIC DOOR OPERATOR HEADER A SELF-CONTAINED POWER SUPPLY, CAT. NO. CX-PS10UL MUST BE INSTALLED ABOVE THE CLOSEST ADJACENT SUSPENDED CEILING, DO NOT INSTALL THIS POWER SUPPLY ABOVE ANY DRYWALL CEILING, (H) IS ONE DEVICE, AND POWERS THE AURA ILLUMINATED PUSH PLATE SYSTEM AND THE EMERGENCY CALL SYSTEM.
- (4) AURA SYSTEM, AUTOMATIC DOOR OPERATOR, AND EMERGENCY CALL SYSTEM IN EACH WASHROOM TO SHARE THE SAME DEDICATED 120 VOLT CIRCUIT.
- (5) THE PARTS SPECIFIED IN THIS DRAWING WILL FIT IN A HORTON ADO HEADER. A NABCO ADO WILL REQUIRE A REMOTE SELF-CONTAINED POWER SUPPLY, CAT. NO. CX-PS10UL AS THE SECOND POWER SUPPLY DOES NOT FIT IN THE HEADER, OTHER APPROVED ADO MANUFACTURERS TO BE REVIEWED AND CONFIRMED.
- (6) ALL HANDS-FREE DEVICES/PUSH PLATE AND ASSOCIATED RACEWAY MUST BE FLUSH MOUNTED AT 980mm or 38 1/2" TO CENTER A.F.F. THE POSS HAS A TEMPLATE TO LOCATE THIS HEIGHT OF THESE PUSH PLATES.
- (7) THE AURA PUSH TO OPEN PLATE IS TO BE MOUNTED ON A CUSTOM STAINLESS STEEL MOUNTING PLATE FROM WILENE AND ASSOCIATES, CAT. NO. WS-PB-220355
- (8) THE "WAVE TO LOCK" STAINLESS STEEL SINGLE GANG PLATE AND THE INTERIOR "PUSH TO OPEN" PLATE ARE MOUNTED ON A FLUSH MOUNTED SINGLE GANG MASONRY BOX, CAT. NO. MBDK. THESE TWO (2) DEVICES MUST BE MOUNTED ON 16" (408mm) CENTRES WITH 3/4" EMT CONDUIT FROM THE MASONRY BOX TO THE WALL OPENING FOR THE INTERIOR "PUSH TO OPEN" PLATE, AND FROM THE MASONRY BOX TO ABOVE AN ACCESSIBLE LAY-IN CEILING PANEL NEAR THE ADO HEADER, DO NOT TERMINATE THESE BOXES ABOVE A FIXED CEILING SUCH AS DRYWALL WHEN SWINGING INWARDS, "PUSH TO OPEN" MUST BE MOUNTED AT LEAST 24" (610mm) CLEAR FROM LEADING EDGE OF DOOR. SEE DRAWING 3-13 OF 17.



SAMPLE INSTALLATION PHOTOS:



CORRIDOR SIDE "PUSH TO OPEN"



WASHROOM SIDE W/OUTWARD SWINGING DOOR "PUSH TO OPEN" AND "WAVE TO LOCK"

DATE:	DRAWN BY:
Nov. 8, 24	A. YANQUI
SCALE:	APPROVED BY:
N.T.S.	

NO.	DATE	REMARKS
1	05/02/19	ADDITION TO PACKAGE
2	11/08/24	ADDED LED KEYSWITCH

SAMPLE DIAGRAM:
PDSB ADO AND EMERGENCY CALL SYSTEM
WIRING DIAGRAM

DRAWING TITLE:
HANDS-FREE DOOR OPERATOR,
EMERGENCY CALL SYSTEM
CX-WEC10K2, AND REMOTE STATUS
LED ANNUNCIATOR OR
CM-AF501SO

SHEET NUMBER:
11 OF 22



Commercial Doors & Hardware Ltd.
2150 Winston Park Drive, Unit 16
Oakville, L6H 5V1

TECUMSEH PS ALTERATION 2026

Submittal Date: MAR 9

SECTION 08 80 00 - GLASS AND GLAZING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Steel doors, frames and screens: Section 08 11 13

1.3 QUALITY ASSURANCE

- .1 Every pane of glass shall be factory labelled and label shall remain in place until final cleaning.

1.4 SUBMITTALS

- .1 Submit detailed product data for each product to be used.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Setting blocks: neoprene, Shore 'A' durometer hardness of 70 to 90 points; spacer shims, 40 to 50 points, as recommended by glass manufacturer.
- .2 Glazing sealant: to ASTM C920, one part polysulphide or one part silicone.
- .3 Glazing tape: preshimmed polyisobutylene tape; acceptable product: Polyshim by Tremco.
- .4 Glazing gasket: Tremco Vision Strip; colour selected by Consultant.
- .5 Tempered glass (TG): fully tempered float glass to CAN/CGSB-12.1-M90. Tempered glass identification must be sandblasted into glass and shall be visible after installation.
- .6 Fire protective glass (FPG): one-side safety-film 5 mm thick ceramic: Pyran Platinum F by Schott or Firelite NT by Nippon Glass or Keralite Select F by Vetrotech/St.Gobain.
- .7 Display case gables: clear acrylic sheet.
- .8 Glass shelf supports: clear acrylic paddle type.
- .9 Display case door hardware: clear anodized aluminum, unless noted; "Ezy Roll" by Knape & Vogt:
 - .1 Perimeter frame: #1093
 - .2 Door top edge guide #1085 VINYL.
 - .3 Roller: #1098 ZC.
 - .4 Shoe for doors: #1095 (two rollers per panel at display cases; three rollers per panel at trophy cases).
 - .5 Bottom track: #1096.
 - .6 Bumpers: #1087 RUB.
 - .7 Locks: K & V 963 CHR.

PART 3 - EXECUTION

3.1 GLASS INSTALLATION GENERAL

- .1 Do not glaze when ambient or surface temperature is less than 5EC. Ensure that glazing rabbets, stops and glass are dry, free of frost, grease, oil, dust, rust and other substances detrimental to adhesion of compounds and sealants.

SECTION 08 80 00 - GLASS AND GLAZING

- .2 Provide clearance at perimeter edge of glass on all four sides, minimum equal to glass thickness. Accurately cut glass to fit openings, allowing for expansion in accord with glass manufacturer's recommendations.
- .3 Provide sealer space between face of glass and glazing stops of minimum 3 mm.
- .4 Clean sealing surfaces at perimeter of glass and sealing surfaces of rabbets and stop beads before applying glazing tapes, gaskets and compounds. Use solvents and cleaning agents recommended by manufacturer of sealing materials.
- .5 Install glazing tapes uniformly with accurately formed corners and bevels. Ensure that proper contact is made with glass and rabbet interfaces.
- .6 Set glass on setting blocks, spaced as recommended by glass manufacturer. Provide at least one setting block at quarter points from each corner.
- .7 Centre glass in glazing rabbet to maintain specified clearances at perimeter on all four sides. Maintain centred position of glass in rabbet and provide the required sealer thickness on both sides of glass.
- .8 Use spacers and shims in accordance with glass manufacturer's recommendations.
- .9 Carefully remove glazing stops and reinstall after glazing.
- .10 Mark each pane of glass with a white cross of flour paste or other approved means to indicate presence of glass.

3.2 INTERIOR GLAZING

- .1 Unless otherwise indicated glaze interior openings as follows:
 - .1 Apply glazing tape to permanent stop; centre glass in opening and set on setting blocks; apply glass and press against tape.
 - .2 Apply glazing tape to removable stops and install stops. Trim tape for neat appearance.

3.3 FIRE PROTECTIVE GLASS

- .1 Install fire protective glass (FPG) where required.
- .2 Comply with provisions of UL/ULC test assembly for selection of accessory materials (setting block, glazing tapes) and for method of installation. Use PVC tapes; butyl tapes shall not be used.

3.4 DISPLAY AND TROPHY CASES

- .1 Unless otherwise shown provide 6 mm thick tempered clear glass doors.
- .2 Prepare doors to accept door hardware. Install hardware. Check test doors and if necessary adjust to ensure smooth operation. Provide perimeter frame, bottom shoes, rollers and tracks, top guides, rubber bumpers and lock at each location.
- .3 Unless otherwise indicated provide shelves of minimum 8 mm thick tempered clear glass, with all edges polished and corners eased.
- .4 Provide intermediate gables consisting of back to back 12 mm thick clear acrylic sheet, drilled to accept shelf supports at 25 mm o.c. vertically. Handle, install and clean acrylic sheet in accordance with manufacturer's recommendations. Avoid scratching of surfaces.

SECTION 08 80 00 - GLASS AND GLAZING

3.5 CLEANING

- .1 Remove dirt, scum, plaster, paint spatter, and other harmful and deleterious matter from glass promptly and completely, before they establish tight adhesion.
- .2 Avoid using abrasives, steel wool, razor blades, solvents, alkaline or other harsh cleaning agents.
- .3 Remove glazing compound droppings promptly from all surfaces as the work progresses.
- .4 Replace scratched or otherwise damaged glass.

3.6 SCHEDULE

- .1 Provide glazing for the following elements and components:
 - .1 Steel doors and screens.
 - .2 Display and trophy cases
 - .3 Other glazing shown and not covered in other Sections.
- .2 Provide the following glass:
 - .1 Fire protective glass with safety film: at fire rated locations and where shown.
 - .2 Tempered glass: display and trophy cases, steel doors and sidelights up to 2.1m above finish floor level (interior and exterior) and where shown.
 - .3 Float glass: where shown and at locations where no particular type of glass is indicated.
 - .4 Clear acrylic: display case gables.
 - .5 Unless otherwise shown provide 6 mm thick glass.

END

SECTION 09 21 16 - GYPSUM BOARD

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Caulking, except as specified herein: Section 07 92 00
- .2 Supply of steel door frames: Section 08 11 13
- .3 Painting: Section 09 91 00
- .4 Supply of access doors: Divisions 21 to 28

1.3 DEFINITIONS

- .1 Drywall = gypsum board.

1.4 FIRE PROTECTION REQUIREMENTS

- .1 Provide fire rated gypsum board components and assemblies as indicated.
- .2 Comply with requirements of Section 01 41 00.

1.5 WORKMANSHIP STANDARDS

- .1 Interior metal framing and furring: comply with applicable requirements of ASTM C754 and ASTM C840 unless otherwise shown.
- .2 Gypsum board application and finishing: Comply with requirements of ASTM C840, unless otherwise shown.
- .3 Gypsum board surfaces exposed to view shall meet Gypsum Association GA 214-10 Recommended Levels of Gypsum Board finish "Level 4".

1.6 PRODUCT HANDLING & STORAGE

- .1 Handle gypsum board panels to prevent damaged and broken edges.
- .2 Store materials in dry place so as to preserve their quality and fitness for work.

1.7 JOB CONDITIONS

- .1 Install and finish gypsum board when ambient temperature is between 14 and 22°C. Maintain this temperature range in areas to receive gypsum board for 24 hours before and during application and until joint cement and adhesives are fully cured.
- .2 Apply gypsum board after building has been completely enclosed. Ensure that work to be concealed by gypsum board has been installed, tested, inspected and approved before starting work.

PART 2 - PRODUCTS

2.1 FRAMING, FURRING AND TRIM

- .1 Unless otherwise specified provide framing, and frame members of minimum 0.5 mm core thickness steel hot dip galvanized (wipe coat) to ASTM A653. Provide 0.9 mm thick framing to support cementitious board, and where partition height exceeds 3.6 m.
- .2 Studs: channel shaped screw-on type: depth as indicated; with knurled supporting flanges at least 34mm wide; with service pass-through holes at 610mm o.c. in web.

SECTION 09 21 16 - GYPSUM BOARD

- .3 Top and bottom runners: channel sections, 35mm legs. Depth to suit studs.
- .4 Rough furring members: 38 x 19 x 1.2mm and 19 x 13 x 1.2mm galvanized steel channels.
- .5 Furring and strapping members to receive gypsum board: 19mm deep channel shaped section with outstanding flanges and 35mm wide knurled supporting face.
- .6 Corner beads: beaded angle with perforated flanges.
- .7 Casing beads: channel shaped; beaded corners.
- .8 Hangers: minimum 3mm galvanized steel wire.
- .9 Tie wire: minimum 1.5mm soft annealed galvanized steel.
- .10 Metal control joint section: bellows shaped section with perforated flanges.
- .11 Special reveals and feature strips: extruded aluminum, to profiles indicated: Fry Reglet or Pittcon Softforms or Gordon.

2.2 GYPSUM BOARD

- .1 Exposed gypsum board for interior use: tapered edge: ASTM C1396.
- .2 Unexposed gypsum board for interior use: backing board: ASTM C1396.
- .3 Fire rated gypsum board: Type 'X' board: ASTM C1396.

2.3 FASTENING AND FINISHING MATERIALS

- .1 Drywall screws: self-drilling, self-tapping, case hardened.
- .2 Laminating adhesive: CGC Durabond 90 compound by CGC, or equivalent product by CertainTeed.
- .3 Joint tape: 50mm perforated type.
- .4 Joint filler and topping cement: Casein, vinyl or latex base, slow setting.

2.4 ACOUSTICAL MATERIALS

- .1 Acoustic insulation inside partitions: AFB Acoustic Fire Batt by Roxul or equivalent product by Fibrex, Owens Corning or CertainTeed..
- .2 Steel deck closures: Emseal 25V Expanding Foam Sealant sized and shaped to fit flutes.
- .3 Acoustical sealant: ASTM C920: Tremco Acoustical Sealant or equivalent product by other manufacturer approved by Consultant.
- .4 Isolators: Neoprene type, providing nominal deflection of minimum 6 mm under load of ceiling: Mason WHD by Vibrasonic, or equivalent product by BVA.
- .5 Acoustic insulation at perimeter of and at penetrations through ceilings: Semi-rigid fibrous board: Noise-Stop by Fiberglas Canada Inc. or equivalent product by other manufacturer approved by Consultant.

PART 3 - EXECUTION

3.1 METAL FRAMING

- .1 General
 - .1 Framing and furring indicated is schematic and shall not be considered exact or complete. Location and spacing of members, bracing, supports and securement shall be in accord with

SECTION 09 21 16 - GYPSUM BOARD

- referenced standards as required to provide complete and finished work.
- .2 Make provision for supporting recessed and surface mounted fixtures and equipment. Provide additional framing, supports and stiffeners as required.
 - .3 Neatly frame around recessed fixtures and openings.
 - .4 Examine mechanical and electrical drawings and co-ordinate with Divisions 15 and 16 to determine openings required.
- .2 Ceilings
- .1 Erect suspension and furring system level with a maximum tolerance of (+) (-) 3mm over a 3000mm length.
 - .2 Suspension system shall support ceiling assemblies, with maximum deflection of L/360, L being span between supports.
 - .3 Hangers for suspended ceilings shall support grillage independent of walls, columns, pipes and ducts. Space hangers at maximum 1220mm o.c. along rough furring members and not more than 150mm from ends.
 - .4 Space rough furring members at maximum 915mm and not more than 150mm from perimeter walls.
 - .5 Space furring channels transverse to runner channels at maximum 610mm o.c. except at exterior soffits, and secure to each support with clip or saddle tie with 2 loops of tie wire. Install furring channels so as not to contact perimeter walls.
 - .6 Where ductwork, piping and other elements within ceiling spaces interfere with direct suspension of ceiling from structure, install additional framing securely fastened to main structure to accommodate proper hanging of ceiling.
- .3 Bulkheads
- .1 Frame to profiles shown, rigid, square, true to line and securely fastened to supporting building elements.
 - .2 Space furring members to receive gypsum board at maximum 610mm o.c.
 - .3 Provide rough framing and bracing members as required to ensure stability and accuracy of work.

3.2 GYPSUM BOARD INSTALLATION

- .1 Unless otherwise specified, erect gypsum board and cementitious board vertically or horizontally, whichever results in fewer end joints.
- .2 Locate board end joints over supporting members.
- .3 Cut and fit board as required to accommodate other work.
- .4 Unless otherwise shown or specified, extend board on both sides of partitions to underside of structural slab above. Fasten gypsum board to studs, not to top channel. Allow for deflection.
- .5 Provide corner beads at external corners.
- .6 Provide casing beads around openings and where board abutts dissimilar material and construction.
- .7 Fasten gypsum board and cementitious board to supports with screws spaced at maximum 305mm o.c.
- .8 Adhesive bonded gypsum board; apply 13 x 13mm ribbons of laminating adhesive to back side of board, parallel to long dimension; space adhesive ribbons at maximum 150mm o.c. temporarily brace boards until complete adhesive bond develops.

SECTION 09 21 16 - GYPSUM BOARD

- .9 In areas requiring gypsum board ceiling, gypsum board shall extend over the whole ceiling area including furred and pipe spaces.
- .10 Where double layer gypsum board is required, screw fasten second layer through first, into framing, offset joints.

3.3 GYPSUM BOARD FINISHING

- .1 Tape and fill exposed joints, fastener heads, edges, corners, to produce an acceptable surface ready for decoration.
- .2 Conceal exposed flanges of corner beads, casing beads and other trim sections with at least 3 coats of cement, feathered out minimum 200mm.
- .3 Fill depressions at fastener head with cement, then apply 2 additional coats of cement to produce smooth, level surface.
- .4 Treat joints using 3 coat method as follows:
 - .1 Apply thin uniform layer of cement and embed joint tape.
 - .2 Immediately apply thin skim coat of cement over tape and allow to dry.
 - .3 Apply 2 additional coats of cement. Allow first coat to dry before applying second coat.
- .5 Sand each coat of topping cement with fine sandpaper as required to produce smooth surface. Do not sand paper face of gypsum board.
- .6 Finish concealed joints at fire rated and at acoustically insulated gypsum board elements. Provide tape and one coat of cement.

3.4 CONTROL AND RELIEF JOINTS

- .1 Control Joints
 - .1 Provide control joints where shown and at maximum 10 m o.c.
 - .2 Break continuity of gypsum board and framing system at control joints; install continuous metal control joint section.
- .2 Relief Joints
 - .1 Provide relief joints where shown and where gypsum board assemblies abutt dissimilar construction. Provide channel type reveal moulding.
 - .2 Where indicated provide other reveals, and feature strips. Install in accordance with manufacturer's directions, plumb, level, accurately aligned at joints and securely fastened to supporting work.

3.5 ASSOCIATED WORK

- .1 Install access doors supplied by Divisions 20 to 28. Build doors into gypsum board elements flush and parallel to walls and securely fastened.

3.6 GYPSUM BOARD SCHEDULE

- .1 Use Type 'X' gypsum board at fire rated elements.
- .2 Provide 13 mm thick gypsum board at ceilings and bulkheads, except where otherwise shown.

SECTION 09 21 16 - GYPSUM BOARD

- .3 Include in Contract 4 additional steel framed gypsum board bulkheads, 3 m long, 400 mm wide, 300 mm deep.

END

SECTION 09 30 13 - TILING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Caulking: Section 07 92 00

1.3 QUALITY ASSURANCE

- .1 Installer Qualifications: Member of Terrazzo, Tile and Marble Association of Canada (TTMAC) or approved in writing by the Consultant.

1.4 SUBMITTALS

- .1 Of each type of tile required, submit sample consisting of minimum 4 tiles bonded to rigid board back-up and joints filled with grout. Select tiles to show full range of tile to be used. Resubmit sample if required until tile range and grout colour is approved by the Consultant.
- .2 Submit duplicate minimum 300 mm long samples of not less than 3 types of grey stone sills.
- .3 Submit list of mortar mixes and grouts to be used. In each case products proposed must be suitable for the purpose intended and they shall be capable to produce top quality work. Upon Consultant's request submit evidence of material manufacturer's endorsement of products proposed.
- .4 Upon Consultant's request submit samples of bases, trim and fittings.
- .5 Submit manufacturer's recommended maintenance procedures and materials for inclusion into operation and maintenance manual.
- .6 Provide extra 5% of each size, type, colour floor tiles used.

1.5 JOB CONDITIONS

- .1 Maintain minimum air temperature of 10°C during installation and curing period.
- .2 Exclude construction traffic from areas to receive tile during installation and curing period.
- .3 Protect tile flooring subjected to construction traffic with non-staining protective covers.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Products by Laticrete listed herein are specified to establish a standard of acceptance. Equivalent products, subject to Consultant's review, by Mapei, H.B. Fuller (TEC), Flextile are also acceptable.
- .2 Water: clean and non-staining.
- .3 Portland cement: CAN/CSA-A3001-13.
- .4 Sand: ASTM C144-11.
- .5 High strength mortar: 100% solids epoxy adhesive: Latapoxy 300.
- .6 Floor grout: presanded, coloured latex grout: Laticrete 1500 Series/1776; colours selected by Consultant.
- .7 Transition moulding: stainless steel profile: RENO-U by Schluter, height and configuration to suit flooring condition.

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- .8 Stair nosing: anodized aluminum cover profile with black non-slip insert: Schluter Trep-Tap.
- .9 Aluminum edge trim: Schluter A100ACG.
- .10 Tile:
 - .1 CT.1: nominal 300 x 600 mm porcelain floor tile: Glocal Natural #GC-021224 by Centura; colour 929 Charcoal Grey.
 - .2 CT.2: nominal 200 x 500 mm glazed wall tile: Centura "Design Positive"; up to 2 colours selected by Consultant from manufacturer's full range.
- .11 Cleaning compounds: as recommended by TTMAC and acceptable to tile manufacturer.

2.2 MIXES

- .1 Mortar and grout: mix in accordance with material manufacturer's directions. Wherever possible use latex additive instead of water.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Substrates shall be clean and free of foreign matter and minimum 10°C.
- .2 Clean and prepare substrates as required to produce acceptable surface.
- .3 Remove existing adhesive and other substances which would adversely affect adhesion of new tile.
- .4 In areas of new washrooms prepare existing concrete floor slab to receive new tile floor by removing existing VCT and chipping out top of concrete slab to achieve level flush transition of new tile flooring to existing corridor floor.

3.2 TILE INSTALLATION GENERAL

- .1 Unless otherwise specified, meet applicable requirements of TTMAC Tile Installation Manual 2019 – 2020.
- .2 At floors with floor drains and where required to meet level of adjacent floors provide mortar bed to slope and thickness required.
- .3 Bond porcelain tile to all substrates with high strength mortar. Bond other tiles to substrate in accordance with mortar/adhesive manufacturer's directions and as follows:
 - .1 All locations except where indicated otherwise: thin set mortar.
 - .2 Cementitious board substrate (smooth surface): high strength mortar.
- .4 Finished work shall be level, plumb, or sloped as shown, true, square and free of defective, chipped, broken, discoloured or blemished tiles. Maximum allowable finished surface variation shall be 3 mm in 3 m when measured, in any direction, with a 3 m straightedge.
- .5 Lay out tile patterns symmetrically within each area and to patterns shown. Unless otherwise indicated provide stacked pattern. Provide multi-coloured tile patterns as indicated and/or as directed by Consultant.
- .6 Joints shall be parallel, uniform, neat, straight, square and completely filled. Provide joint width as directed by Consultant.
- .7 Fit tile accurately against and around interruptions, penetrations and abutting dissimilar surfaces. Wherever possible, drill holes for penetrating elements to ensure neat fitting.
- .8 After setting, sound tiles and replace hollow backed tiles.
- .9 Provide tile manufacturer's standard trim pieces at changes in direction and at terminations. Unless

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otherwise indicated provide the following corner and edge conditions:

- .1 Internal horizontal corners: coved.
- .2 External vertical and horizontal corners and edges: bullnose.
- .3 Internal vertical corners and unexposed edges: square butt joint.
- .10 Provide transition moulding where porcelain tile edge would otherwise be exposed.

3.3 GROUTING

- .1 Commence grouting not earlier than 24 hours after setting tiles unless otherwise directed by grout manufacturer.
- .2 Force grout into joint so as to fill them flush, leaving no voids.
- .3 Promptly as work progresses remove excess grout from adjacent tile surfaces before grout establishes tight permanent adhesion.
- .4 Cure grout in accordance with manufacturer's directions.

3.4 CONTROL JOINTS

- .1 Provide control joints at substrate control joint locations, at abutting dissimilar materials at maximum 8 m in tile field and where directed by Consultant.
- .2 Install control joints in accordance with manufacturer's directions. Set control joints slightly lower than adjacent tile.

3.5 CLEANING

- .1 Thoroughly clean tile surfaces in accordance with manufacturer's recommendations.
- .2 Polish after cleaning with clean, dry cloths.
- .3 Remove grout haze from exposed tile surfaces; use acid wash method if required.

END

SECTION 09 51 00 - ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Mechanical fixtures: Division 23
- .2 Electrical fixtures: Division 26 to 28

1.3 QUALITY ASSURANCE

- .1 Comply with applicable requirements of ASTM C636, Intermediate Duty, unless otherwise shown or required.
- .2 Acoustic panel ceilings and their support attachments shall be designed and constructed to resist the effects of seismic motions in accordance with local jurisdiction with applicable regulatory requirements.

1.4 SUBMITTALS

- .1 Submit detailed and complete product data for each product required.
- .2 Submit statement from suspension system manufacturer verifying that suspension system will support light fixtures within deflection criteria contained in referenced standards.
- .3 Samples: Submit two samples of each type of acoustical panel specified; size: 300mm x 300mm. Upon Consultant's request submit samples of suspension system components.
- .4 Maintenance materials: Provide Board with one sealed carton of each type of acoustical panel used. Obtain receipt and submit copy to Consultant.

1.5 PRODUCT STORAGE

- .1 Store material in dry place, keep free of dampness.

1.6 JOB CONDITIONS

- .1 Install ceiling systems after building has been completely enclosed and not before cementitious building elements are complete and cured and humidity levels are acceptable in the opinion of the Consultant.
- .2 Ensure that work to be concealed by ceiling systems has been installed, tested, inspected and approved before starting work.
- .3 Co-ordinate with Divisions 21 to 28 for work to be built into work of this Section.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Acoustic panels (LAP.1): 16 mm thick mineral fibre board, 610 mm x 1220 mm with square edges, colour white: 1729 "Fine Fissured" by Armstrong.
- .2 Suspension system: Standard exposed grid system; DXL Quick Release by CGC, or Prelude by Armstrong and as follows:
 - .1 Main tees: 38 x 24 mm bulb section, minimum 0.4 mm thick cold rolled galvanized steel; one expansion joint per 3.6 m length.

SECTION 09 51 00 - ACOUSTICAL CEILINGS

- .2 Cross tees: 24 mm wide, minimum 0.4 mm thick cold rolled galvanized steel; profile designed to limit deflection to 1/360 of span; designed to have suitable detail to rest on, automatically engage, level and lock to main tee.
 - .3 Wall moulding: pre-finished 22mm exposed face galvanized steel angle shape. Provide special flexible type moulding for use at round columns.
 - .4 Hangers: minimum 2.5 mm (No. 12 SWG) galvanized steel wire.
 - .5 Carrying channels: minimum 1.2 mm thick cold rolled galvanized steel channels 38 x 13 mm.
 - .6 Finish for exposed metal surfaces: satin enamel: colour to match acoustic panels.
- .3 Accessories: Splicers, fasteners, clips as required to provide complete and finished work: manufacturer's standard types.
 - .4 Seismic securement clip: ACMT b CGC or equivalent product by other manufacturers listed.

PART 3 - EXECUTION

3.1 CEILING LAYOUTS

- .1 Lay out ceilings in accordance with reflected ceiling plans and symmetrical within each area to obtain uniform borders. Where layout is not shown install ceilings as directed by Consultant.
- .2 Finished work shall be plumb, level and square with adjoining work.

3.2 SUSPENSION SYSTEM

- .1 Suspend ceilings directly from structural members or from carrying channels supported from structural members. Do not fasten hangers to steel deck.
- .2 Erect suspension systems level with a maximum tolerance of 3 mm over 3 m length.
- .3 Install main tees in accordance with module size. Suspend at maximum 1220 mm o.c.
- .4 Install cross tees perpendicular to main tees in accordance with module size. Interlock with main tees.
- .5 Hangers for suspended ceilings shall support grillage independently of walls, columns, pipes and ducts. Space hangers at maximum 1220 mm o.c. along supporting grillage and not more than 150 mm from ends.
- .6 Make provisions for carrying fixtures occurring on and in suspended ceilings. Install additional hangers and reinforcing to ensure that loads being carried do not compromise integrity of system. Frame around fixtures and openings as required.
- .7 Where ductwork, piping and other elements within ceiling spaces interfere with direct suspension of ceiling from structure, install additional framing securely fastened to main structure to accommodate proper hanging of ceiling.
- .8 Exposed members shall be as long in length as possible to minimize joints. Distribute joints to prevent clustering in one area. Joints shall be made square, tight and flush so that exposed faces of intersecting members are on same plane.
- .9 Joints in suspension system members shall be reinforced with splines or other suitable method.
- .10 Install perimeter moulding at abutting vertical surfaces.
- .11 At all ceilings larger than 13.38 m² (144 sf) provide seismic securement clip at ends of all main and cross tees where they meet the wall mould.

3.3 ACOUSTICAL PANELS

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SECTION 09 51 00 - ACOUSTICAL CEILINGS

- .1 Install panels so that work is clean and unmarked.
- .2 Neatly cut and fit panels as required to suit ceiling layout and to accommodate other work.
- .3 Recessed items shall replace or be centred on panel unless otherwise indicated.

3.4 CLEANING

- .1 After installation, clean and touch up minor surface defects on acoustical panels and gypsum board panels.
- .2 Remove damaged and badly marked units which in the opinion of the Consultant cannot be satisfactorily touched up and replace with new unmarked material.

END

SECTION 09 65 00 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Steel trowel finish of concrete slabs: Section 03 30 00

1.3 SUBMITTALS

- .1 Submit manufacturer's full range of colour samples of each type of flooring and base material specified.
- .2 Submit flooring installation drawing showing location of seams and layout of games lines.
- .3 Submit maintenance instructions with recommended maintenance methods and procedures for inclusion into maintenance manual.
- .4 Maintenance materials: provide Board with one full carton of each type/colour tile (VCT) used. Obtain receipt and send copy to Consultant.

1.4 PRODUCT STORAGE

- .1 Store flooring materials in areas of application for at least 48 hours prior to installation.

1.5 JOB CONDITIONS

- .1 Do not deliver, store, install flooring materials to site until all wet work in building is finished and cured and all overhead work in installation area is complete and until conditions are as required by material manufacturer.
- .2 Ambient temperature in storage area shall be between 15°C and 25°C with a relative humidity of 35% to 65%.
- .3 Ambient temperature in installation area shall be between 20°C and 30°C with relative humidity between 35% and 65% for minimum 7 days prior, during and 3 days after installation.
- .4 Concrete slab shall have cured for minimum 60 days and moisture content shall not exceed 15 lbs/1000 sf/24h.
- .5 Protect installed flooring against damage with heavy paper or plastic coverings. Do not place static loads on newly installed flooring until minimum 7 days after installation.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Altro Quartz Tile (AQT): 610 x 610 mm x 2 mm thick, to ASTM F1700, Class A: Altro Quartz Tile, colour: 9702 Rock Salt.
- .2 Vinyl composition tile (VCT): 300 x 300 mm to ASTM F1066 Class 2, 3 mm thick: Standard Excelon "Imperial Texture" by Armstrong or Azrock by Mannington or equivalent product by Flextile or Amtico; up to 2 colours selected by Consultant.
- .3 Resilient base(R): 3mm thick, 100 mm high, coloured rubber base, flat at carpeted areas, coved elsewhere; by Amtico or Johnsonite, Colours selected by Consultant.

SECTION 09 65 00 - RESILIENT TILE FLOORING

- .4 Vinyl reducing strips: Johnsonite RRS - XX-C; to suit thickness of flooring; colours selected by Consultant.
- .5 Vinyl adaptor: Johnsonite CTA-XX-K; colours selected by Consultant.
- .6 Primers, fillers, adhesives: as recommended by flooring material manufacturer. Adhesive for vinyl composite tile: high strength, clear setting type.
- .7 Cementitious underlayment: Polymer modified quick setting cement based: Flexpatch by Flextile, or other type recommended by flooring material manufacturer.
- .8 Material colours and patterns: unless specific colour/pattern is indicated, Consultant will, for each case select from manufacturer's full range of colours/patterns.
- .9 Cleaning materials: As recommended by flooring material manufacturer.

PART 3 - EXECUTION

3.1 CONDITION OF SUBSTRATES

- .1 Surfaces to receive resilient flooring shall be dry, true, even and smooth, and free of paint, grease and oil.
- .2 Perform moisture tests on concrete substrates where moisture content is uncertain. Perform tests in minimum ambient temperature of 18°C. Do not install materials until test results are satisfactory.
- .3 Concrete slabs shall be at least 28 days old before installation of resilient flooring.

3.2 PREPARATION

- .1 Level depressions, cracks and joints in subfloor with non-shrinking type filler compatible with bonding adhesive.
- .2 If recommended by adhesive or tile manufacturer, prime substrates. Apply primer in accordance with manufacturer's directions.

3.3 UNDERLAYMENT

- .1 Where resilient flooring abuts other flooring of different thickness, provide cementitious underlayment allowing for smooth and level transition between finished floor surfaces.
- .2 Mix, apply and finish underlayment in accordance with manufacturer's recommendations.

3.4 FLOOR INSTALLATION GENERAL

- .1 Install resilient flooring materials to patterns indicated and in accordance with material manufacturer's current printed directions. Keep a copy of manufacturers installation manual on site during execution of work.
- .2 Scribe flooring to walls, columns, cabinets, floor outlets and other appurtenances to produce tight joints. Extend flooring into recesses and closets.
- .3 Locate change to different floor finish or colour centred under doors, except where multi-coloured floor patterns are required.
- .4 Provide vinyl reducing strip where floor covering terminates exposing edge of floor.

3.5 RESILIENT TILE INSTALLATION

SECTION 09 65 00 - RESILIENT TILE FLOORING

- .1 Lay out each area to be tiled symmetrically square with axis of room to provide perimeter tiles as least one half tile in width.
- .2 Distribute tiles having varying shades or pattern evenly over floor area to obtain uniform effect. Abrupt variations will not be permitted. Tile joints shall be flush, uniform, in moderate contact and in straight lines.
- .3 Install tile with joints staggered half tile in one direction and with tile pattern running as directed by the Consultant. Unless directed otherwise, run continuous joint across the short dimension of the space.
- .4 Provide multi-coloured tile patterns as indicated or directed by Consultant.
- .5 Immediately after installation, roll entire floor tile to ensure adhesion in accordance with tile and adhesive manufacturer's recommendations.

3.6 RESILIENT BASE

- .1 Adhesive apply cove base to vertical surfaces so that gaps do not occur behind base, so that front lip of base cove bears firmly and uniformly on floor surfaces and so that good and permanent bond is produced between base and surface to which it is applied.
- .2 Use full length pieces where practicable; accumulated short lengths not permitted. Wrap base around external corners; mitre inside corners; butt intermediate joints flush without gaps.

3.7 CLEANING

- .1 Promptly remove adhesive from surface of resilient materials as work progresses.
- .2 Leave resilient floors vacuum clean, free of building materials, rubbish, paint, adhesives, stains and spills.
- .3 Board will be responsible for final washing and waxing of resilient floors. Board reserves the right to reject resilient flooring work for defects which only become apparent after washing and waxing of floors.

END

SECTION 09 66 39 - TERRAZZO REPAIRS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Selective demolition: Section 02 41 19

1.3 QUALITY ASSURANCE

- .1 Do terrazzo work in accordance with latest recommendations of the Terrazzo, Tile and Marble Association of Canada (TTMAC), except where specified otherwise.
- .2 Installer qualifications: Member of the Terrazzo, Tile and Marble Association of Canada (TTMAC) or approved by the Consultant.

1.4 SAMPLES

- .1 Submit up to four 300 x 300 x 16 mm thick samples of each colour terrazzo required.
- .2 Make adjustments to mix proportions and match colour as directed by Consultant and resubmit samples until accepted.
- .3 Submit duplicate samples of divider strips.

1.5 MAINTENANCE DATA

- .1 Provide maintenance data s set out in TTMAC publication for incorporation into maintenance manual.

1.6 JOB CONDITIONS

- .1 Maintain air temperature and structural base temperature at terrazzo installation area above 10°C for 48 hours before, during and 24 hours after installation.
- .2 Bar traffic from areas receiving terrazzo during installation and for at least 48 hours after.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Epoxy bonding agent: Monobond by MacNaughton Brooks or Epoxy Bonder 930 by Sternson (Sika) or Chemorbond 100 by Chemor.
- .2 Cement: to CAN/CSA A3001-13 grey or white as required to produce matrix matching existing.
- .3 Sand, fine and coarse aggregates to CAN/CSA-A23.1-14.
- .4 Water: potable and non-staining.
- .5 Marble chips: uniform, sound and abrasion resistant. Grade chips in accordance with TTMAC standard. Provide chips matching existing.
- .6 Pigments: non-fading mineral pigments in selected colours.
- .7 Divider strips: angle shaped 4 mm thick solid stock metal to match existing, depth to suit flooring thickness.
- .8 Base caps: match existing.

SECTION 09 66 39 - TERRAZZO REPAIRS

- .9 Cementitious underlayment: as recommended by TTMAC, compatible with epoxy bonding agent.
- .10 Curing compound: as recommended by TTMAC and to manufacturers standard.
- .11 Cleaning compound: to TTMAC Standard Series 1000 and approved by Consultant.
- .12 Sealing compound: to TTMAC Standard Series 2000 and approved by Consultant.
- .13 Finishing compound: to TTMAC Standard 3001.
- .14 Tactile walking surface indicator studs (TWS): ADV-D-1281-BK PVD by Kinesik, or UAS-SS221B by urban Access Solutions: 22 diameter truncated dome shaped meeting requirements of CSA B651

2.2 MIXES

- .1 Use a mechanical mixer for mixing of toppings. Add materials to mixer while mixer is operating. Mix for at least 5 minutes.
- .2 Topping mix: 100 kg chips to 40 kg cement, mixed dry. Use no more than 18L of water per 40 kg bag of cement. Provide mixes to match existing floors and base.
- .3 Use a mechanical mixer for mixing of toppings. Add materials while mixer is operating . Mix for at least 5 minutes.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Repair, fill in, patch, extend existing terrazzo flooring and base where required and where damaged by work of this Contract.
- .2 Remove existing damaged or incomplete terrazzo back to nearest divider strip. Remove existing concrete to depth required by new flooring. Provide cementitious underbed if required.

3.2 REPAIRS OF EXISTING TERRAZZO FLOORS AND BASE

- .1 Thoroughly clean existing floors and remove existing top coatings with heavy duty liquid stripper.
- .2 Replace missing areas with new terrazzo matching existing construction and appearance. Install divider strips, underbeds, topping mixes in accordance with TTMAC recommendations. Use bonding agent where required, to ensure permanent bond to new flooring to existing substrates.
- .3 Replace, fill in, extend terrazzo base where required; match profile of existing base.
- .4 Patch existing cracks. Remove loose and unsound material and clean out cracks. Suitably prepare them to receive grout. Mix grout to match terrazzo matrix and to thin creamy consistency to ensure full penetration of crack. Completely fill cracks flush with floor surface.
- .5 Do grinding, grouting and finishing of patched, replaced areas as specified below.

3.3 FINISHING: GRINDING

- .1 Flood the grinding area with water during grinding.
- .2 Do not grind terrazzo floors until they have developed sufficient strength to prevent chips from pulling out.
- .3 For first grinding, use a 24 to 60 grit carborundum stone; follow immediately with a second grinding using an 80 to 120 grit stone.

SECTION 09 66 39 - TERRAZZO REPAIRS

- .4 After each grinding, thoroughly wash the surface with water and clean residue from holes and recesses. Remove excess water with a vacuum or squeegee.

3.4 FINISHING: GROUTING

- .1 After the second grinding, trowel patching grout onto the surface and work it into voids. Remove excess grout with a trowel. Do not apply dry cement to wet terrazzo.
- .2 When patching grout begins to set, rub surface with burlap or excelsior pads to consolidate grout into voids and to remove excess.
- .3 Cover the entire surface with curing material and allow to cure fully to protect surface from staining.
- .4 Finish surface with 120 grit or finer stone and water generally, with 80 grit stone, when non-slip finish aggregate is used, not sooner than 3 days after grout is applied.
- .5 Install tactile studs at three locations at existing stairs top landings and in pattern required. Unless shown otherwise space studs at 60 mm o.c. in both directions. Obtain spacing template provided by stud manufacturer. Drill holes with 6.3 mm diameter and minimum 20 mm deep. Clean out drilled holes with vacuum cleaner. Apply high strength adhesive to holes or stems of studs. Avoid overfilling; prevent adhesive from squeezing out. three locations at existing stairs top landings

3.5 FINISHING: CLEANING AND SEALING

- .1 Thoroughly clean all terrazzo, existing and new, after final grinding with a solution of the neutral cleaner to remove all dust and fine material; then rinse.
- .2 When the surface is dry, apply two coats of sealer according to the manufacturer's recommendations.
- .3 If directed by the Consultant apply first coat of sealer immediately after cleaning and second coat just prior to takeover of building by Owner. Thoroughly clean surfaces prior to application of second coat.
- .4 Finished terrazzo work shall be free of cracks, discolouration and other defects.

END

SECTION 09 91 00 - PAINTING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Prime painting of structural and miscellaneous steel components: Division 5
- .2 Prime painting of steel doors and frames: Section 08 11 13
- .3 Epoxy coating: Section 09 96 56
- .4 Colour coding of concealed mechanical services: Division 20 to 25
- .5 Prime painting of mechanical and electrical equipment including grilles, panels, cabinets: Division 26 to 28

1.3 QUALITY ASSURANCE

- .1 Comply with provisions of The Master Painters Institute's (MPI) Architectural Painting Specification Manual latest issue, referenced herein as the MPI Manual.
- .2 Work of this Section shall be carried out by qualified workers only, who have a valid Provincial Tradesman Qualification Certificate of Proficiency.

1.4 QUALITY CONTROL

- .1 Work of this Section may be subject to inspection and testing by independent agency in accordance with the MPI "Accredited Quality Assurance Program".

1.5 LIST OF MATERIALS AND SAMPLES

- .1 List of Materials
 - .1 Before ordering materials, submit written request in form acceptable to Consultant for approval of paint materials. List each of the materials proposed and surfaces to be covered. State manufacturer's name and brand name and product code of each material.
 - .2 Do not order material or commence work until list of materials is approved by Consultant.
- .2 Samples
 - .1 Submit two 200 x 250 mm colour draw downs of each paint colour coated with manufacturer's paint system to confirm colour match with colour chips supplied by Consultant.
 - .2 Submit samples of natural and stained finishes on each species and grade of wood to receive such finishes.
 - .3 Prepare full size samples showing each type of door finish.
 - .4 Prepare sample panels of each wall and ceiling paint system specified.
 - .1 Use permanent wall and ceiling areas designated by Consultant.
 - .2 Apply first coat over entire area; second coat over 2/3 of area and third coat over 1/3 of area.
 - .3 Sample panels shall remain until completion of painting at which time they shall be finished with full coats of paint.

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1.6 PRODUCT HANDLING

- .1 Deliver paint materials to site in sealed original labelled containers bearing manufacturer's name, brand name, type of paint and colour designation.
- .2 Store materials in strict accordance with manufacturer's recommendations.
- .3 Do not store paints, stains, varnishes, rags, or equipment inside building. Maintain separate workshop/storage shed for duration of work by this Section.

1.7 JOB CONDITIONS

- .1 Comply with requirements of the MPI Manual and as specified herein.
- .2 Environmental Conditions
 - .1 Maintain temperature in interior areas to receive coatings between 15°C and 25°C for at least 24 hours before, during application and until coatings have cured after application. Apply exterior coatings only when temperature is above 10°C.
 - .2 Adequately ventilate areas where coatings are being applied. Maintain a reasonably dust-free atmosphere for duration of work.
- .3 Protection
 - .1 Protect adjacent surfaces not scheduled to receive coatings from damage.
 - .2 Remove electrical plates, surface hardware, fittings and fastenings prior to painting operations. These items shall be carefully stored, cleaned and replaced on completion of work in each area. No solvent shall be used to clean hardware that will remove permanent lacquer finish on these items.
 - .3 Mask labels and specification plates occurring on equipment to be painted.
 - .4 Post "wet coating" signs and "no smoking" signs while work is in progress and while coatings are curing.
 - .5 Keep oily rags, wastes and other combustible materials in closed metal containers and remove at end of each work day. Take every precaution to avoid spontaneous combustion.
- .4 Work Schedule
 - .1 Unless otherwise permitted, apply coatings only after all other Sections have completed their work.
 - .2 Co-ordinate work of this Section with that of Section 07 92 00 and review order of installation with Consultant where sealants are installed adjacent to painted surfaces.
 - .3 If it becomes necessary for the Board to occupy areas of the building prior to their completion, schedule work of this Section to hours when students and staff have vacated building.

1.8 WARRANTY

- .1 Provide a 2 year MPI Guarantee or a 100% 2 year maintenance bond commencing at date of Substantial Performance in accordance with MPI "Accredited Quality Assurance Program".

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Acceptable products: as per MPI Manual.

SECTION 09 91 00 - PAINTING

- .2 Materials for each paint system shall be from single manufacturer.
- .3 Paints shall be factory mixed unless otherwise specified, except any coating in paste or power form, or to be field-catalyzed shall be fieldmixed in accordance with manufacturer's directions.

2.2 FINISHES

- .1 Paint colours and other finishes will be selected by Consultant. Do not start work until after receiving colour schedule.
- .2 Colours selected by the Consultant will not necessarily be from manufacturer's standard colours.
- .3 A variety of colours may be used. Consultant may select different colours for different elements such as ductwork, bulkheads, exposed decks, slabs and structural steel. Some colours may be deep tone.
- .4 Confirm gloss levels for all surfaces with Consultant before starting work. Unless otherwise directed provide the following:
 - .1 Ceilings: flat
 - .2 Walls: eggshell
 - .3 Trim, doors, frames: semi-gloss

PART 3 - EXECUTION

3.1 CONDITIONS OF SUBSTRATES

- .1 Sound, non-dusting, and free of grease, oil, dirt, and other matter detrimental to adhesion and appearance of coatings.
- .2 Temperature: minimum 12°C.
- .3 Moisture content: maximum 12%. Test for moisture content using moisture meter.
- .4 Alkalinity: test cementitious substrates for alkalinity. Use method recommended by coating manufacturer.

3.2 PREPARATION OF SUBSTRATES

- .1 Prepare substrates in accordance with MPI Manual.
- .2 All substrates: clean as required to produce an acceptable surface. If wood, metal or any other surface to be finished cannot be put in proper condition for finishing by cleaning, sanding and filling as specified, notify Consultant in writing or assume responsibility for and rectify any unsatisfactory finish resulting.
- .3 Bare ferrous metal: remove rust and scale; wash with solvent; chemically clean; apply coat of metal primer.
- .4 Previously primed metal: remove rust, oil, grease and loose shop paint by washing or wire brushing; make good shop coat; feather out edges of touchup.
- .5 Zinc coated metal provide light brush blasting in accordance with SSPC-SP7, or liquid etching treatment acceptable to Consultant.
- .6 Unit masonry & concrete: fill minor cracks, holes and fissures with Polyfilla and smooth to a flush surface. Texture filled areas to match surrounding surface.

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- .7 Gypsum board: fill minor cracks, holes and imperfections with patching plaster; allow to dry and sand smooth; sand taped joints and remove dust.
- .8 Alkaline surfaces: wash and neutralize using proper type of solution compatible with paint to be used.
- .9 Fill joints between different materials, junction of trim pieces and other similar conditions with non-shrinking filler and sand smooth to ensure a tight fit, without holes or cracks.

3.3 BACK PRIMING

- .1 Back prime wood scheduled for paint or enamel finish immediately on arrival at site with interior or exterior primer as applicable.
- .2 Back prime wood scheduled for stain, varnish or natural finish immediately on arrival at site with gloss varnish reduce 25% with mineral spirits.

3.4 APPLICATION OF COATINGS

- .1 Apply paint by industry accepted standards and as referenced in the MPI Manual.
- .2 Spray painting may be permitted where deemed of advantageous and shall be subject to Consultant's approval. When spray painting is permitted, use only airless spray guns. Consultant may prohibit use of spray painting at any time for such reasons as carelessness, poor masking or protective measures, drifting paint fog, disturbance to other trades or failure to obtain a uniform satisfactory finish.
- .3 Applied and cured coatings shall be uniform in of thickness, sheen, colour and texture and free of brush or roller marks, sags, crawls and other defects detrimental to appearance and performance.
- .4 Regardless of the number of coats specified for any surface, apply sufficient paint to completely cover and hide substrate and to produce a solid uniform appearance.
- .5 Thoroughly mix materials before application. Use same brand of paint for primer, intermediate and finish coats.
- .6 Touch up suction spots after application of first coat. Sand lightly between coats with fine sandpaper.
- .7 Each coat of finish shall be dry and hard before succeeding coats are applied with a minimum of 24 hours between coats, to achieve an anchor for required finish. Do not proceed with any coat until the last preceding coat is approved by the Consultant and inspector.

3.5 PATCHING

- .1 Prior to takeover of project by Board, inspect work of this Section and touch-up or refinish damaged finishes and finishes unsatisfactory to Consultant and the inspector.

3.6 SCHEDULE OF FINISHES

- .1 General Requirements
 - .1 Paint exposed surfaces of building materials, services and equipment, except those which are prefinished in factory and except those which are located in areas designed as not requiring painting.
 - .2 Comply with the following requirements except in areas designed as not requiring painting:
 - .1 Paint behind surface mounted fixtures on walls and ceilings with full coats of paint.
 - .2 Paint walls behind wall mounted heating units with full coats of paint.

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- .3 Paint inside surfaces of light covers white.
 - .4 Finish top and bottom edge of doors, trim, projections and other work as specified for surrounding work whether above sight lines or not.
 - .5 Finish edges of doors to match face of door. Refinish edges of doors after fitting.
 - .6 Finish drawers on all sides, inside and outside. Unless otherwise indicated finish drawers with two coats of varnish.
 - .7 Paint tops, bottoms and edges of shelves with full specified coats, whether exposed to view or not.
 - .8 Paint interior of ducts at grilles and diffusers with two coats of flat black paint, so that duct interior is not visible when grilles and diffusers are installed.
 - .9 Paint piping, ducts and conduits in colours matching background wall or ceiling colours, unless otherwise directed by the Consultant. Ducts in mechanical rooms require only one finish coat in addition to primer. Other exposed ductwork to receive two finish coats.
 - .10 Paint gas piping whether exposed to view or not, with high-visibility yellow-orange paint selected by Consultant.
 - .11 Unless specifically indicated on Drawings to be painted, all finish carpentry work shall receive transparent finish.
 - .12 Where finishing formula for surfaces requiring painting is not included herein, follow recommendations of MPI Manual for respective surface (Premium Grade).
- .2 Interior Finishing: System references listed hereunder are based on Chapter 3 – Section 2 of the MPI Manual and shall be MPI Premium Grade unless otherwise indicated.
- .1 Concrete (vertical surfaces): INT3.1A
 - .2 Concrete block: INT 4.2A
 - .3 Metal, prime painted: INT 5.1Q
 - .4 Metal, zinc coated: INT 5.3A
 - .5 Gypsum board (ceilings and bulkheads): INT 9.2A
 - .6 Exposed piping, wrapped: INT 10.1A
 - .7 Exposed piping and conduit, unwrapped: INT 5.3A or 5.1Q or 5.5H
 - .8 Exposed ductwork, insulated: INT 10.1A
 - .9 Concrete floors: INT 3.2B

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 of similar 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

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0.5 m² and check for results.

- .5 Prepare existing surfaces to be repainted as follows:
 - .1 Clean as required to remove dirt, dust, oil, grease, loose 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.
 - .3 Sandy glossy surfaces to uniform dull texture.
 - .4 Treat bare areas as specified for new work.
- .6 Prior to repainting existing surfaces request Consultant's review and acceptance of prepared substrates, existing surfaces repainted without Consultant's review and acceptance may have to be prepared again as directed by Consultant and repainted at no extra cost.

END

SECTION 10 28 00 - WASHROOM ACCESSORIES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Electric hand dryers: Division 26

1.3 SHOP DRAWINGS

- .1 Submit detailed shop drawings of each component required.

1.4 WARRANTY

- .1 At no cost to Board, replace mirrors should defects in silvering occur within a period of five years from date of Substantial Performance.

PART 2 - PRODUCTS

2.1 FABRICATION GENERAL

- .1 Fabricate work true to dimensions, square and plumb.
- .2 Thickness of metals shall be adequate for the various conditions and intended uses.
- .3 Finished work shall be free from warping, open seams, weld marks, rattles and other defects. Drilling shall be reamed and exposed edges finished smooth.
- .4 Fastenings shall be concealed or theftproof type where possible. Exposed fastenings shall be neatly executed and shall be of the same material and finish as the base metal on which they occur.
- .5 Washroom accessories of the same materials, construction and finishes, similar in function, design, appearance and conforming to the standards of those specified, manufactured by the following are considered equal subject to the approval of the Consultant:
 - .1 ASI
 - .2 Bobrick
 - .3 Frost
 - .4 Saferail

2.2 LIST OF COMPONENTS

- .1 Toilet tissue dispenser (TTD): double roll, polished chrome: Frost 150.
- .2 Mirrors (MR): No. 1 quality, 6 mm thick mirror guaranteed against silver spoilage for five years; heavy galvanized steel back; stainless steel frame with mitred corners; tamperproof mounting:
 - .1 Mirror (MR1): tilted, 400 x 760 mm, Bobrick B-293 1630.
 - .2 Mirror (MR2): 450 x 760 mm, Bobrick B-290 1830.
- .3 Grab bars (GB, GBL): 35 mm diameter, stainless steel, peened finish, concealed mounting: Bobrick B-5806-99 x24.
 - .1 Horizontal grab bar (GB): 600 mm long
 - .2 Vertical L-shaped grab bar (GBL): 760 x 900 mm

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- .3 Vertical grab bar (GB2): 760 long
- .4 Vertical grab bar (GB3): 305 long
- .4 Shower seat (SS): folding type; white reinforced vinyl covered 50 mm thick foam pad on 13 mm plywood; frame and mounting: stainless steel, left and right hand condition: Bobrick B-517 and B-518.
- .5 Toilet backrest (BR): Frost 1028
- .6 Safety coat hook (CH): Frost 1150-SS
- .7 Convenience shelf (CS): Bobrick B-298x18.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install components at locations shown on drawings. Where location is not given, install as directed by Consultant.
- .2 Fastenings shall be non-corrosive type.
- .3 Provide mounting and anchorage devices to be built into walls and other construction elements as required to securely anchor components in place.
- .4 Securely anchor components in place. Method of fastening shall ensure that components will be capable of withstanding expected loads without movement.
- .5 Install framed mirrors with concealed wall hangers and lock in place with theftproof screws.
- .6 Insulate accessory surfaces to prevent electrolysis due to contact with dissimilar metal surfaces. Use bituminous paint or other approved means.

3.2 CLEANING AND ADJUSTMENT

- .1 Upon completion of work or when directed, remove all traces of protective coatings or paper.
- .2 Test mechanisms, hinges, locks and latches and where necessary, adjust and lubricate and ensure that accessories are in perfect working order.

END

SECTION 14 24 23 - HYDRAULIC ELEVATOR

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Hoistway: Divisions 3 and 4
- .2 Grouting of hoistway entrance frames: Section 04 22 00
- .3 Hoist beam: Section 05 50 00
- .4 Pit ladder: Section 05 50 00
- .5 Car finish floor: Section 09 30 13
- .6 Heating and ventilation of machine room: Division 15
- .7 Pit floor drain: Division 15
- .8 Sump pits and sump pumps with connections Division 15
- .9 Fused disconnect with auxiliary interlock contact or circuit breaker with auxiliary contact in machine room including conductors to controller: Division 16
- .10 Separate circuits for elevator lighting (including switches and fuses) in machine room, connected to controller: Division 16
- .11 Lighting and convenience outlets in machine room and pit: Division 16
- .12 Handset connection to intercom system: Division 16
- .13 Auxiliary emergency alarm bell in location outside hoistway including wiring to controller: Division 16

1.3 DESCRIPTION OF SYSTEM

- .1 Elevator type: holeless dual jack hydraulic.
- .2 Operation: simplex selective collective automatic and independent service.
- .3 Car size (clear inside): approx. 1445 x 2030 mm.
- .4 Car height (to underside of canopy): 2400 mm.
- .5 Capacity: 1360 kg exclusive of weight of car and cables.
- .6 Speed: 0.50 m/s, up and down.
- .7 Travel: Lower Ground Floor to Upper Ground Floor and Upper Ground Floor to 2nd Floor.
- .8 Stops: 2
- .9 Openings: 2 (in line)
- .10 Doors: 1065 x 2135 mm, single horizontal sliding.

1.4 QUALITY ASSURANCE

- .1 Requirements of Regulatory Agencies:
 - .1 Permits, Inspection and Testing:

SECTION 14 24 23 - HYDRAULIC ELEVATOR

- .1 Arrange and pay for all permits, inspections, tests and test certificates, except operation and ownership licenses required by authorities having jurisdiction. Test as called for by the regulations of governing authorities shall be made in the presence of authorized representatives of such authorities. Do all adjustments as required by test results. Submit test certificates to Consultant.
- .2 Carry out a running speed test upon completion of elevator installation and in the presence of the Consultant. Running speed test shall consist of running elevator with full maximum load on elevator car to determine whether the equipment, as installed, meets speed, capacity and other specification requirements.
- .2 Codes:
 - .1 Conform to regulations of the authorities having jurisdiction, to CAN/CSA-B44-2010 including all amendments and supplements to date and to the Canadian Electrical Code.
 - .2 Electrical equipment shall be approved by the Canadian Standards Association Testing Laboratories and shall bear label of approval.
- .2 Acceptable Products:
 - .1 Thyssen Krupp ISI 3000 lbs.
 - .2 Otis LVM 3000 lbs.
 - .3 Delta 3000 lbs Hydraulic Elevator.
 - .4 Southwestern Elevator 3000 lbs.
- .3 Installers Qualifications:
 - .1 Erection shall be performed by manufacturer's forces. Work shall be carried out by mechanics skilled in installations of elevators.
- .4 Non-proprietary controls:
 - .1 Elevator control equipment shall be non-proprietary, or a site specific service tool which renders the control equipment non-proprietary must be provided with the elevator (i.e. map unit type, diagnostic service tool).
 - .2 The controller interface/service tool shall allow full access to fault codes and maintenance service to be performed by any property licensed and qualified elevator service company.
 - .3 The controller and/or site specific service tool shall come with a user's manual that effectively communicates to a qualified mechanic how to use the controller and/or tool, and defines and explains all respective error codes, including required fixes. The service tool shall remain the property of the building owner.

1.5 SUBMITTALS

- .1 Shop Drawings:
 - .1 Submit detailed shop drawings.
 - .2 Submit fully dimension and detailed shop drawings showing the following:
 - .1 Hoistway plans and cross sections.
 - .2 Machine room plan.
 - .3 Arrangement and location of all equipment.
 - .4 Service requirements and connections.
 - .5 Structural loads and forces.
 - .6 Installation and building details.
 - .7 Cab design and details.
 - .8 Hoistway entrance details.

SECTION 14 24 23 - HYDRAULIC ELEVATOR

- .9 Signal and control equipment.
- .3 Submit shop drawings to authorities having jurisdiction prior to Consultant's final review.
- .2 Samples: Submit two colour samples of all finishing materials and coatings.
- .3 Record and Maintenance Manuals: Upon completion and acceptance of the installation, provide two sets each of the following:
 - .1 As-Built drawings.
 - .2 Wiring diagrams.
 - .3 Parts catalogue.
 - .4 Maintenance and servicing manual.
 - .5 Operating instructions.

1.6 PRODUCT HANDLING

- .1 Delivery and storage: Prevent damage to components during handling. Store materials in allotted storage area in such a manner as to prevent deterioration or loss of their essential properties.

1.7 PROTECTION

- .1 Protect all finishes on doors, entrance, cab and other finishes to be left exposed and maintain such protection until removal is authorized by Consultant. Make good all damage as a result of failure to protect such surfaces to Consultant's approval. Do not use coatings or materials that can become baked on, or whose removal will impair finish.

1.8 OPERATING INSTRUCTIONS

- .1 Upon completion of elevator and after all inspection and testing has occurred and has been approved, a qualified representative of the elevator manufacturer shall visit site and instruct Board's personnel in the proper operation of the elevator system.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND FABRICATION

- .1 General:
 - .1 In all cases where a device, or part of equipment is referred to in singular number, it is intended that such reference shall apply to as many devices or parts as are required to complete the installation.
 - .2 Take necessary site measurements for proper fabrication of work. Assume complete responsibility for their accuracy and completeness. Notify Consultant of any modifications required in building construction or dimensions to accommodate elevator work at earliest possible date. If such modification is not requested, it will be assumed the elevator manufacturer is satisfied with construction provided.
 - .3 All wiring and electrical interconnections shall comply with the governing codes. Insulated wiring shall have flame retardant and moisture-proof outer covering, and shall be run in conduit, tubing or electrical wireways. Travelling cables shall be flexible and suitably suspended to relieve strain on individual conductors.
- .2 Hydraulic Jacks:
 - .1 Provide two hydraulic jack units, mounted either side of the car platform.
 - .1 Jack units shall be located an equal distance from the car guide rail column, and be affixed to the cab by a structural connection mounted at the car crosshead.
 - .2 Jack units shall be synchronized and balanced to provide a smooth car ride, without racking under eccentric loading conditions.
 - .3 Hydraulic system piping to these cylinders shall be evenly split and arranged to ensure a balanced oil flow is provided to each jack unit.

SECTION 14 24 23 - HYDRAULIC ELEVATOR

- .2 Hydraulic pistons shall consist of a seamless steel piston, equipped with a fine polished surface. Where two section pistons are used they shall be equipped with internally threaded couplings. At the piston base, provide mechanical stopping means to prevent it from leaving the cylinder.
- .3 Hydraulic cylinders shall be sized to suit piston length and diameter, allowing sufficient clearance at the base to prevent the piston from striking the cylinder bottom under normal operation.
 - .1 Cylinder shall be fabricated from seamless steel piping, of sufficient thickness to accommodate system pressures.
 - .2 Provide cylinder head with packing and wipers. Equip the cylinder head with an air bleeder valve and two oil drain plugs. The top drain plug shall feed into a collection can, kept in the pit. The second drain plug shall allow for oil used to lubricate the lantern ring and O seals to be siphoned off and returned to the oil reservoir. All oil, returned to the reservoir shall be filtered or strained.
- .4 Provide cylinder supports and firmly affix hydraulic jack unit to pit floor slab structure. Provide all necessary shims to level supporting structure.
- .5 Hydraulic jack units using single or dual inverted cylinders and pistons where the piston head is fastened to the pit floor, or cantilevered car frame construction, or single or dual telescopic jacks, or roped Arucksack≅ piston designs shall not be used, nor will they be considered as acceptable alternatives to the specified design requirements.
- .3 Automatic Terminal Stops: Provide automatic stopping device designed to stop car at terminal landings independent of regular car operating device.
- .4 Automatic Two-Way Levelling: Provide automatic 2-way levelling designed so that landing stops are approached at reduced speed and car levels with an accuracy of 5 mm.
- .5 Car Stall Protective Circuit: In event of car stalling while ascending, provide circuit to stop car and render it inoperative except that it may be returned to bottom terminal landing by means of actuating hall button. Service shall be restored by recycling main line switch.
- .6 Guide Rails:
 - .1 Type: steel tee rails; accurately machined standard sections; substantial machined fishplates at joints.
 - .2 Rail support brackets: heavy steel brackets.
- .7 Roller Guides:
 - .1 Type: rubber tipped ball bearing type; designed to run on 3 finished rail surfaces; designed to run on dry unlubricated guide rails; with adjustable cushioning devices to hold wheels in contact with rail surfaces.
 - .2 Location: provide roller guides on top and bottom of each upright member of car frame.
 - .3 Interchangeable guide shoes are acceptable in lieu of roller guides.
- .8 Pumping Unit:
 - .1 Pumping unit shall be integral design and shall include an electric motor and control valve assembly, storage tank, necessary piping connections and controller, all compactly designed as a single self-contained unit.
 - .2 Pump: shall give smooth operation and be specially designed for elevator service.
 - .3 Motor: alternating current; of a design specially adapted to plunger elevator requirements.
 - .4 Provide for reduced voltage starting. Switch to full voltage not more than 1.5 seconds after interlock circuit is established.
 - .5 Control valve assembly: compact design; suitable for operation under required pressure; containing metered bypass valve, check valve, relief valve, manual lowering valve, metered

SECTION 14 24 23 - HYDRAULIC ELEVATOR

- lowering and levelling valves and pilot valves. Provide isolation seal and coupling device designed to reduce transmission of vibration and noise to elevator care.
- .6 Oil storage tank: construct of welded steel sheets; provide cover, protective vent opening, oil level gauge, filtering screen mounted over suction inlet and drain connection. Tank capacity shall be equal to volume of oil required to lift elevator to top terminal plus a minimum reserve of 45 L. Provide oil supply sufficient for proper operation of elevator.
 - .9 Piping:
 - .1 Provide piping and required fittings between pumping unit and cylinder head; run piping above first floor ceiling, not below slab on grade.
 - .2 Provide gate valve in line to facilities maintaining and adjusting elevator.
 - .3 Muffler: provide blow-out proof muffler to minimize transmission of fluid pulsations in pipeline between pumping unit and cylinder head.
 - .10 Controller:
 - .1 Type: electronic solid state type as required to accomplish operation specified.
 - .2 Overload relay: manual reset type of size suitable for motor.
 - .3 Provide 2 main line switches to avoid possibility of pump churning if one switch should fail.
 - .11 Access and Inspection Devices:
 - .1 At bottom landing and at first landing above bottom provide hoistway unlocking device.
 - .2 At top of car provide emergency stop switch, constant pressure operating push buttons and switch to make top of car controls operative. Provide means to render inoperative automatic levelling, power door operation and normal care and landing operation devices when car is on inspection operation.
 - .3 Provide manual emergency stop switch in pit.
 - .12 Buffers: Adequate spring buffers shall be provided in the pit under the car suitably supported on structural steel channels attached to the cylinder unit or mounted on a pedestal frame from the pit floor.
 - .13 Battery power lowering unit:
 - .1 Except where elevator is connected to building emergency power system provide battery power lowering unit to allow for the controlled operation of elevator, in the event of power failure. Battery unit shall deliver sufficient power to control DOWN lowering valve operation, door operation, as well as cab lighting and alarm bell. Upon loss of normal power, following operation shall occur:
 - .1 Battery powered cab lighting fixture shall illuminate.
 - .2 Elevator located above the bottom terminal shall lower to the bottom landing. Upon arrival at that landing, the car shall come to a level stop, then car doors shall automatically open. Doors shall remain open until normal power is resumed.
 - .3 Elevator sitting at the bottom landing with its door closed, shall automatically open its doors.
 - .4 Elevator sitting at the bottom landing with its doors already open at the time of power outage, shall remain parked with its doors open.
 - .2 Battery power unit shall be provided with a self contained and ventilated housing. It shall be mounted either within the car controller cabinet or be mounted separately within the machine room. Provide all necessary conduit and wiring to allow for its remote location within the machine room.
 - .3 Provide signal circuit and interconnect with signals from the auxiliary contact within the main disconnect switch. This circuit shall automatically prevent operation of the battery unit's lowering function in the event the disconnect is open.

2.2 OPERATION AND SIGNALS

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SECTION 14 24 23 - HYDRAULIC ELEVATOR

- .1 Simplex Selective Collective Automatic Operation:
 - .1 When car or landing push buttons are pushed, car shall start as soon as door interlock circuit is established.
 - .2 When car starts up in answer to one or more car or landing up calls, it shall stop at all floors for which a car or landing up call is registered. These stops shall be made in order in which floors are reached irrespective of order in which push buttons were pressed, provided push button for a given floor is pressed sufficiently in advance of arrival of car to permit stop to be made.
 - .3 Car and landing "down" calls shall have no effect during upward movement of car but landing calls shall remain registered to be answered on next down trip, except that car shall stop in answer to highest down call, if above highest car "up" call.
 - .4 After last passenger travelling in "up" direction has left car or when car has stopped in response to highest landing "down" call, car shall automatically reverse and proceed down; answering car or landing calls in manner similar to that specified for up calls.
 - .5 Car and landing "up" calls shall have no effect during downward movement of car, but landing calls shall remain registered to be answered on next up trip, except that car shall stop in answer to lowest "up" call, if below lowest car "down" call.
 - .6 Car or landing calls for direction in which car is moving placed too late to be answered on that trip shall remain registered to be answered on next trip in that direction.
 - .7 Car and hoistway doors shall open automatically upon arrival of car at landing. Provide a time limit relay designed to hold car at landing for predetermined period of time to permit passengers to enter or leave car. Time delay shall be cancelled, car and hoistway doors shall close immediately, and car shall start when a car is registered before expiration of time delay period.
 - .8 Activation of emergency stop button shall not cancel registered calls. After button is released, car shall answer registered calls.
 - .9 In case of fire alarm, elevators shall continue to next floor in direction of travel, park and open doors.
- .2 Independent Service Operation:
 - .1 Control: shall be by means of two position key operated switch marked "Independent Service On-Off" located in car control station.
 - .2 Operation: when switch is in "on" position, car shall operate from car buttons only, independent of hall buttons.
- .3 Firefighter's Emergency Operation:
 - .1 Make provisions for firefighter's emergency operation in accordance with CSA B44-07.
- .4 Signals and Controls:
 - .1 Elevator controls shall be accessible from a wheelchair. Comply with recommendations of the National Elevator Industry Inc. (NEII).
 - .2 Provide audio signals for the visually impaired.
 - .3 Control buttons, signal devices and switches shall be electrically connected to elevator equipment so as to perform required operations and functions.
 - .4 Control buttons and signal devices shall be electrical illuminated type, suitably inscribed, so as to effect visual signalling.
 - .5 Switches shall be identified as to function.
 - .6 Flush mount control buttons, signal devices and switches in stainless steel face plates and frames.
 - .7 Car Control Station: incorporate the following in car station:

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- .1 Push buttons numbered to correspond to landings served.
- .2 Emergency stop switch; maximum 915 mm above floor.
- .3 Door open push button with alarm bell on the car.
- .4 Alarm push button, connected to emergency signal bell; maximum 915 mm above floor.
- .5 Key operated independent service switch.
- .6 Key operated light switch.
- .7 Key operated exhaust fan switch.
- .8 Handsfree telephone for emergency use.
- .9 Provide Braille symbols beside each control button and on telephone cabinet door.
- .8 Car Position Indicator:
 - .1 Type: Horizontal type, located over door.
 - .2 Indicator shall show landing at which car is stopping.
 - .3 Provide audible signal at ground floor and second floor landings.
- .9 Car Direction Indicator.
 - .1 Type: arrow type indicator incorporated into entrance door jamb.
- .10 Hall Station:
 - .1 Type: illuminated push button.
 - .2 Provide security lockout key switches to disable hall buttons.
 - .3 Provide Braille symbol beside control button/key at each hall station.
- .11 Emergency generator operation:
 - .1 Provide indicator light showing emergency generator powered elevator operation in Corridor 120 area, exact location to be determined by Consultant.
 - .2 Provide stainless steel wall plate, suitably identified with engraved painted lettering.

2.3 ELEVATOR CARS AND ENTRANCES

- .1 Fire Protection Requirements
 - .1 Hoistway entrance doors and frames shall have Class B, 1 ½ hour fire endurance rating and shall bear fire rating agency label.
 - .2 Car wall, and ceiling finishes shall not exceed the following fire hazard classification requirements: a flame spread rating of 25; floor finish shall not exceed a flame spread rating of 150.
- .2 Materials
 - .1 Exposed sheet steel: cold rolled with stretcher level degree of flatness.
 - .2 Exposed carbon sheet steel: Furniture grade.
 - .3 Stainless steel: AISI Type 302.
 - .4 Baking enamel: synthetic type, providing good flexibility, adhesion, hardness and resistance to marring.
 - .5 Prime paint: corrosion resistant type.
 - .6 Plastic Laminate:
 - .1 Meet requirements of ANSI/NEMA LD3-2005, FR grade.
 - .2 Colour & texture: selected by Consultant.

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- .3 Metal Finishes
 - .1 Stainless Steel: AISI No. 4 finish.
 - .2 Steel, baked primer finish: Thoroughly clean and suitably pretreat metal. Apply 1 coat of primer and bake on.
 - .3 Steel, baked enamel finish: in addition to baked on primer, apply 2 coats of baking enamel, each coat baked on. Finish shall be smooth, uniform, solid colour, eggshell gloss level.
 - .4 Unexposed metal components: unless otherwise specified, finish with prime paint.
- .4 Car Doors
 - .1 Type: flush seamless hollow metal type.
 - .2 Construction: sheet steel faces; internal steel reinforcement; sound deadened core; mortised, drilled tapped and reinforced as required for hardware.
 - .3 Guides: equip door with guides to operate in grooved sill.
 - .4 Sill: extruded aluminum; anti-slip wearing surface; minimum clearance door guide grooves.
- .5 Hoistway Entrance Doors and Frames
 - .1 General: Provide all items required for complete installation of hoistway entrance doors and frames. This includes, but is not necessarily limited to: doors, frames, structural supporting angles, headers, facias, toe guards, hangers, sills and sill supports.
 - .2 Doors
 - .1 Type: flush seamless hollow metal type.
 - .2 Material: stainless steel; door faces minimum 1.5 mm thick.
 - .3 Construction: sheet steel faces; internal steel reinforcement; sound deadened core; mortised, drilled, tapped and reinforced as required for hardware.
 - .4 Guides: Equip doors with guides to operate in grooved sill.
 - .5 Finish: AISI No.4
 - .3 Frames
 - .1 Type: welded or bolted one piece assembly.
 - .2 Material: Stainless steel
 - .3 Installation: bolt to sill or sill extension at bottom; secure to header at top.
 - .4 Finish: AISI No.4
 - .4 Header and Sill
 - .1 Header: 2.5 mm thick steel; reinforce to provide support for hangers; bolt to support angles.
 - .2 Sill: extruded aluminum; anti-slip wearing surface; maximum clearance door guide grooves.
 - .3 Sill Supports: provide sill support brackets and shims; fasten brackets to structure; provide concrete grout under sills as required, up to a maximum of 60 mm thick.
 - .5 Fascias
 - .1 Material: 1.5 mm thick sheet steel.
 - .2 Location and extent: full width of opening plus width of frame flanges; from header to sill above on consecutive floors; from sill to pit floor on lower terminal floors.

SECTION 14 24 23 - HYDRAULIC ELEVATOR

- .6 Car and Hoistway Door Operation
 - .1 Hangers and Tracks
 - .1 Support horizontally sliding doors by means of hanger and track assemblies.
 - .2 Hangers shall be sheave type arranges for 2 point suspension of doors.
 - .3 Provide adjustable ball bearing rollers to take up-thrust of doors.
 - .2 Operator
 - .1 Car doors and hoistway landing doors shall be operated quietly and smoothly by an electric operator which shall open and close car and hoistway doors simultaneously.
 - .2 Provide electric contact for car door to prevent elevator movement away from landing unless door is in closed position.
 - .3 Equip each hoistway door with positive electromagnetical interlock and auxiliary door closing device so that elevator can be operated only after interlock circuit is established.
 - .4 Doors shall open automatically as elevator is levelling and close either after expiration of time interval or the moment a car button is registered. If desired, it shall be possible to stop or reverse the doors. In case of power interruption or failure of operator, it shall be possible to open doors manually from within car.
 - .3 Safety Devices:
 - .1 Provide infrared light curtain door protection system.
 - .2 Equip leading edges of car doors with concealed transmitter and receiver infrared beam devices which detect the presence of an object in the process of passing through the hoistway entrance and car doorway.
 - .3 The device shall use multibeam scanning to detect obstructions in the door opening without any moving parts.
 - .4 The detector device shall prevent the doors from closing, or if they have already started closing, shall cause the doors to reopen and remain open while the object is within the detection zone.
 - .5 Close doors at reduced speed, independent of detection devices if prevented from closing longer than present time. While doors are closing at reduced speed sound loud buzzer in car.
 - .4 Car Frame and Shell:
 - .1 Frame: rigid framing construction of structural steel sections. Provide buffer striking plates on underside of platform.
 - .2 Floor: suitably framed and supported to provide sufficient support to prevent cracking of finish flooring. Cover underside of platform with sheet steel. Car floor shall be rigidly framed and stiffened as required to provide suitable substrate and bearing for specified floor finish.
 - .5 Car Enclosure:
 - .1 Doors, car side: stainless steel.
 - .2 Side columns and header: stainless steel.
 - .3 Walls: lined with 12 mm thick plate wood panels, plastic laminate covered, removable from within car. Baked enamel steel between panels and at base.
 - .4 Flooring: Porcelain tile by Section 09310.
 - .5 Canopy: steel, baked enamel finish, off-white.
 - .6 Ceiling:
 - .1 Suspended aluminum or steel eggcrate louvre type 12 mm square cube.

SECTION 14 24 23 - HYDRAULIC ELEVATOR

- .2 Suspension system: aluminum or steel components; continuous angle around perimeter; intermediate tee sections. Finish: baked enamel.
- .7 Lighting: overall fluorescent lighting located above suspended ceiling.
- .8 Ventilation:
 - .1 Concealed overhead exhaust fan, automatically controlled.
 - .2 Provide ventilation through concealed openings at base.
- .9 Provide fire resistant protective pads and hooks.
- .10 Handrail: provide stainless tubular rail, minimum 100 mm high, mounted 850 mm above car floor, on side walls.
- .11 Provide emergency exit in top of car.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Examine work upon which work of this Section depends.
- .2 Do not apply work of this Section, until work which is to receive it, and site conditions are satisfactory.

3.2 INSTALLATION

- .1 Install elevator machinery, jacks, car, guides, control and entrances by mechanics skilled in elevator work to provide a quiet, smoothly operating installation free from site sway vibration.
- .2 Install guide rails continuously with no gaps at joints. Provide support brackets at required spacing.
- .3 Set entrances in perfect alignment with car openings and true with plumb hatch lines.
- .4 Erect sills, headers and frames prior to erection of rough walls. Install doors, fascias and toe guards after walls are finished.
- .5 Except where submersible pump is provided, mount pump unit minimum 1 m above finish floor; also raise level of tank if required by higher pump location.
- .6 Supply and install hoist beam, if required.

3.3 CLEANING

- .1 Prior to final acceptance, remove protection from exposed surfaces, clean and polish surfaces, with due regard to type of material.

3.4 MAINTENANCE

- .1 Furnish maintenance on elevator installation for a period of 36 months from date of Substantial Performance. Maintenance shall include regular twice monthly examination, adjustment, lubrication, repairs and needed supplied to maintain equipment in proper operating condition. New parts, if required, shall be genuine standard parts produced by manufacturer of equipment concerned.
- .2 Maintenance shall be performed by competent personnel under supervision and in direct employ of elevator manufacturer. Maintenance shall not be assigned or transferred to any agent or subcontractor. Maintenance shall be done during regular working hours and days of elevator manufacturer. Emergency call back service shall be available at all time within 24 hours of notification.
- .3 Verify to Consultant's satisfaction that:
 - .1 Competent personnel with proven successful experience in elevator maintenance is available.
 - .2 Adequate supply of replacement parts is stocked and readily available.

SECTION 14 24 23 - HYDRAULIC ELEVATOR

- .3 Repairs necessitated by reason of negligence or misuse of equipment or by reason of any other cause beyond Contractor's control, except ordinary wear and tear, shall not be the responsibility of Contractor.

END

SECTION 31 23 23 - EXCAVATION AND FILL

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Subdrainage: Section 33 46 00

1.3 QUALITY CONTROL

- .1 Board may arrange, and pay for inspection and testing by independent agency out of cash allowance included in Section 01 21 00.
- .2 Testing agency may do any or all of the following as directed by the Consultant in accordance with requirements of Section 01400:
 - .1 Determine at what depth existing soil is capable of supporting foundations, floor slabs and superimposed loads without deleterious settlement.
 - .2 Carry out grain size analysis on samples of each type of granular fill to ensure that proper material is being placed.
 - .3 Determine the quantity of water to be added to or removed from each type of fill to attain correct moisture content for compaction and maximum density.
 - .4 Determine the in-situ density and moisture content of compacted fills.

1.4 EXAMINATION

- .1 Visit and examine the site and note all characteristics and features affecting the work of this Section. No allowance will be made for difficulties encountered or expense incurred resulting from conditions known or visible at the time of tendering.

1.5 PROTECTION

- .1 Protect excavations in accordance with applicable regulations. Provide and maintain in safe condition lining, bracing and shoring required.
- .2 Prevent damage to existing structures and buried services. Make good any damage caused.
- .3 Protect bottoms and sides of all excavations from exposure to wet weather, snow and frost, and from drying out; prevent softening or weathering of any bearing surface. Take special care when excavating for footings.

1.6 JOB CONDITIONS

- .1 If excavation reveals unexpected subsurface conditions, advise Consultant immediately.
- .2 Do not place fill material when temperature is at or below 0°C, nor while either fill material or subgrade is frozen.
- .3 Stockpile each type of fill material separately to prevent integration. Stockpile granular materials so as to prevent segregation.
- .4 As much as possible schedule excavation and backfilling operations during dry periods only.
- .5 Minimize deterioration of subgrade, particularly when operating during unfavourable weather conditions or when working in wet soil.

SECTION 31 23 23 - EXCAVATION AND FILL

1.7 BASIS OF EXCAVATION

- .1 Estimate excavation using excavation levels specified and shown on Drawings as a basis.
- .2 If, upon excavation, load bearing conditions are fulfilled at levels different from those shown on Drawings, excavation levels will be adjusted as required. Consultant will decide whether adjustment in level is required.
- .3 Additional excavation and backfill work authorized by Consultant will be reimbursed based on in situ quantities determined by Consultant.
- .4 Should footing excavations be carried deeper than required, they shall be filled with concrete at Contractor's expense as directed by Consultant.

PART 2 - PRODUCTS

2.1 FILL MATERIAL

- .1 Fill type 1: Clean, hard, durable, crushed rock or stone, free of shale, clay, organic matter or other deleterious substances: Granular 'A', OPSS 1010.
- .2 Fill type 2: Clean, hard, durable aggregate free of shale, clay, organic matter or other deleterious substances: Granular 'B', Type 1, OPSS 1010, fill used below slabs on grade shall be modified to ensure that 100% passes 50 mm sieve.
- .3 Fill type 3: Native selected soil and/or existing engineered fill, provided moisture content of fill is controlled (maximum 2%) and provided fill is capable of being compacted to required density; free of organic matter, roots, debris, stones larger than 50 mm diameter and free of other deleterious matter.
- .4 Moisture content of fill shall be within 2% of the Optimum Moisture Density Test (ASTM D698).
- .5 Obtain all fill materials from sources approved by Consultant.

PART 3 - EXECUTION

3.1 EXCAVATION

- .1 Carry out excavation to the extent, and depth required for the construction of the work, and for a sufficient distance beyond to permit proper construction, shoring, curing and inspection of work.
- .2 Do all excavation required for work of this project, unless it is specifically covered in other Sections.
- .3 Excavate loose fill organics and soils containing organics.
- .4 Remove where encountered existing inactive underground services, structures, boulders.
- .5 Take precautions when excavating adjacent to buried services; use hand tools only in locating services.
- .6 Excavate for foundations to competent bearing substrate (undisturbed native soil). Unless otherwise indicated excavate for exterior footings to minimum 1200 mm below new finish grade.
- .7 Where excavation is carried below the required depth use approved concrete fill and in any instances where piping is laid closer than 45 degree line from the underside of a footing or supporting structure, provide approved solid concrete underpinning.

SECTION 31 23 23 - EXCAVATION AND FILL

- .8 After completion of excavation and prior to forms being erected, concrete placed, or piping installed, notify the Consultant for inspection of exposed surfaces. If any soft or spongy areas are located, notify Consultant at once. If the Consultant so directs, carry down the excavations to a greater depth until a suitable bearing is obtained.
- .9 Ensure that the bottoms of all excavations upon which any footings, walls or piers are to be built are accurately levelled by cutting only and properly stepped at all changes in elevation.
- .10 If the removal of earth causes displacement of adjacent earth, remove the earth so disturbed at no additional cost to the Board.

3.2 FILL

- .1 Fill areas where required.
- .2 Do not place filling until all bearing surfaces, subgrades and all work to be covered has been inspected and approved by the Consultant.
- .3 Strip surficial deleterious materials and proofroll exposed subgrade under floor slab base course in presence of independent testing agency. Use suitable heavy roller and compact to minimum 98% Standard Proctor Maximum Dry Density (SPMDD). Subexcavate loose, excessively wet or soft areas, and areas containing organic matter, and backfill with suitable fill capable of being compacted to required density.
- .4 Remove all debris, rubbish and temporary shoring before commencing backfilling.
- .5 Take care to avoid damage to or displacement of walls and other work. Wherever temporary unbalanced earth pressures are liable to develop in walls, provide and place the necessary shoring and bracing to counteract the imbalance, and leave shoring/bracing members in place until their removal is approved by the Consultant. Make good, at no cost to the Board, any damages caused due to inadequate bracing.
- .6 Provide the following fill materials:
 - .1 Below slab on grade base course: Type 2 or 3.
 - .2 Slab on grade base course: Type 1, minimum 200 mm thick (compacted).
- .7 Place fill material in layers not exceeding 200 mm uncompacted thickness and compact each layer providing the following minimum densities:
 - .1 Below slab on grade base course: 98% SPMDD.
 - .2 Slab on grade base course: 100% SPMDD.
- .8 Remove and replace fill until compaction test reports by the independent inspection agency are satisfactory to the Consultant.

3.3 COMPLETION

- .1 Upon completion, remove all surplus excavated and graded materials from the site, and leave site clean and tidy.

END

SECTION 33 46 00 - SUBDRAINAGE

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Comply with requirements of Division 1.

1.2 RELATED WORK

- .1 Excavation and fill: Section 31 23 23
- .2 Storm drainage system: Division 33

1.3 SUBMITTALS

- .1 Submit complete and detailed product data for each product to be used.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Rigid plastic pipe and fittings: CSA B1800-18 perforated and unperforated. Nominal pipe diameter 100 mm unless otherwise indicated.
- .2 Drainage course aggregate: screened pea gravel 6 to 13 mm or 19 mm clear stone.
- .3 Filter mat: non-clogging type: Terrafix 270 R by Terrafix, or equivalent product by other manufacturer approved by Consultant.
- .4 Panel drains: nominally 10 mm thick dimpled high density polyethylene or polystyrene sheet with a factory laminated non-woven polypropylene geotextile suitable for both vertical and horizontal application, one of the following products:
 - .1 TerraDrain 600 x Terrafix.
 - .2 CCW Miradrain by Carlisle.
 - .3 MelDrain by W.R. Meadows.
 - .4 Equivalent product by Tremco W.R. Grace or CETCO.
- .5 Adhesive for securement of panel drains: as recommended by panel drain manufacturer.

PART 3 - EXECUTION

3.1 LAYOUT

- .1 Establish grades and inverts from appropriate bench marks. Lay out lines as shown.
- .2 Slope drainage pipes at least 1%.
- .3 Lay pipe in straight lines; turn corners using 45° bends.

3.2 INSTALLATION: GENERAL

- .1 Coordinate work of this Section with Section 31 23 23.
- .2 Do not place pipe in direct contact with rigid materials such as rock, brick, wood. Do not use grade stakes, stones, masonry or concrete fragments or any type of shim under pipe.
- .3 Join pipe sections by means of couplings. Provide end plugs on open ends of pipe runs at high points.

SECTION 33 46 00 - SUBDRAINAGE

Provide fittings such as elbows, bends, tees, adapters, reducers, as required to form a complete drainage system. Carefully tap tapered fittings into pipe; do not overdrive.

- .4 Install perforated pipe with holes and coupling slots facing down.
- .5 Aggregate materials shall be damp when placed. If necessary, spray with water using fog nozzle to assist hydraulic consolidation.
- .6 Place aggregate materials by hand around and above pipe in successive 150 mm lifts. Consolidate each lift by tamping moderately; prevent damage to pipes.
- .7 Do not cover drainage pipes and panel drains until reviewed by Consultant.
- .8 Connect subdrains to storm drainage system at sump pits or catch basins as indicated.

3.3 ELEVATOR PIT DRAINAGE

- .1 Provide perimeter drainage at outside of elevator shaft, consisting of the following:
 - .1 Panel drains at outside perimeter of elevator pit foundation walls.
 - .2 Perforated pipe drain at bottom perimeter of pit foundation.
 - .3 Unperforated collector drain pipe, connecting to sump pit.
- .2 Panel drains:
 - .1 Place panels with filter fabric facing soil. Secure panels with adhesive to prevent movement, dislocation during backfilling operations.
 - .2 Wrap open ends of panels with filter fabric.
 - .3 Extend panels to top of perimeter drains.
- .3 Perforated pipe drain:
 - .1 Place filter fabric into prepared excavation. Size filter fabric to completely wrap drainage course, lapping at joints minimum 300 mm.
 - .2 Place minimum 150 mm drainage course aggregate on filter fabric and consolidate.
 - .3 Lay rigid drainage pipe to layout shown. Unless other size is indicated, provide 100 mm diameter perforated pipe. Connect to storm drainage system as indicated.
 - .4 Provide minimum 150 mm thick drainage course aggregate at sides and top of drainage pipe.
 - .5 Close filter fabric over top of drainage course and secure lap in place. Lap filter fabric minimum 300 mm.

END

1.1 ROOM FINISH SCHEDULE - TABLE OF CONTENTS

.1	Notes on Schedule Items	Page 1
.2	List of Materials	Pages 1-2
.3	Finish Notes	Page 2-3
.4	General Notes	Page 3
.5	Room Finish Schedule	Page 4

1.2 NOTES ON SCHEDULE ITEMS

- .1 Room Finish Schedule shall be read in conjunction with list of materials, finish notes, general notes, specification and the drawings.
- .2 The floor material indicated in this schedule is the exposed surface - refer to drawings and details for substrate materials.
- .3 The wall material column does not indicate doors, windows, screens, etc. Refer to door schedule, specifications and drawings for these items.
- .4 The material types in the floor finish column indicates the floor finish first/and the base material (e.g., CPT/R denotes carpet floor finish with a resilient base).
- .5 Where no base is indicated on the schedule the wall material and finish shall extend to the floor.
- .6 The letters N, S, W or E may be used to designate north, south, west or east walls, where different materials or colours are to be used.
- .7 The ceiling material column on the schedule indicates the material and the finish on it, if any. If a colour selection is not given, it will be issued at a later date. The ceiling elevation is the clear height from the finish floor level to the underside of the ceiling system or material indicated. Where no ceiling height is indicated, the specified material is to be secured or applied directly to the structure above. Where no ceiling is indicated, the finish indicated is to be applied to the underside of the structure above, including all framing members.
- .8 An asterisk (*) in any column indicates a reference to a note in the Remarks column to the right.
- .9 Refer to the floor plans, general finish notes and details for extent of accent colours and paint finishes.

1.3 PAINT FINISHING

In addition to the paint finishing indicated on the Schedule, paint other materials, as specified in Section 09 91 00.

1.4 LIST OF MATERIALS

AL - aluminum

BH	-	bulkhead
C	-	concrete
CB	-	concrete block
CT	-	ceramic tile (see Specification Section 09 30 13) CT.1 CT.2
EC	-	epoxy coating
EXIST	-	existing
GB	-	gypsum board
HM	-	hollow metal
INSUL	-	insulation
METL	-	metal
P	-	paint
R	-	resilient base
SFP	-	spray fireproofing
TERR	-	terrazzo
U/S	-	underside
VCT	-	vinyl composite tile

1.5 **FINISH NOTES**

Note: the following requirements apply throughout the entire project unless specifically noted otherwise.

- .1 Room Finish Schedule (RFS) shall be read in conjunction with list of materials, general notes, specifications and drawings. Colour selection will be made by Consultant at a later date.
- .2 Refer to drawings for extent and location of all bulkheads.
- .3 Heating units, recessed convectors, forced flow heaters, fire extinguisher cabinets, grilles, door grilles, access panels, wall fins, exposed pipes and hangers, miscellaneous metal (other than BE/FP or stainless steel) shall be painted to match the surface on which they occur, unless noted otherwise.
- .4 Guard rails, ladders and miscellaneous metal in areas called to be unfinished or not covered by Room Finish Schedule shall be painted.

- .5 Painted exposed metal in stairs, steel columns and miscellaneous steel elements.
- .6 Paint interior HM doors and screen frames to match PLAM doors unless noted otherwise on Door Schedule. Paint all grilles in PLAM and HM doors to match colour of door.
- .7 Paint interior of coves and valances matte white.
- .8 Paint plywood backboards.
- .9 Caulking colour(s) as selected by Consultant.
- .10 Exterior metal work such as preformed metal flashing, metal trim, exposed vents, flues and roof mounted equipment (i.e., Mechanical A.H.U.'s, roof top condenser units, exhaust fans, etc.) to match colour of exterior windows.
- .11 Exterior miscellaneous metal i.e., ladders, grilles, handrails, light standards to be painted.

1.6 GENERAL NOTES

- .1 Ceiling elevation to be maximum possible (minimum ceiling elevation not less than 2400 mm above finished floor, unless indicated otherwise).

END

	ROOM NO.	FLOOR FINISH/ FLOOR BASE	WALL MATERIAL	WALL FINISH	CEILING MATERIAL	CEILING ELEVATION	REMARKS
GROUND FLOOR							
Existing Foyer	E101	EXIST* TERR/TERR**	EXIST* CB EXIST BRICK* EXIST GYP.BD	EXIST* P	EXIST* LAP	EXIST 2700	*Restore all affected existing finishes at floor, wall, and ceiling after lockers removal and new HM doors installation and installation of new sanitary drain line ** Restore terrazzo floor and base in all affected areas; match existing colour, cove base, control joint layout
Elevator	101	CT.1/R*	CB	P**	-	-	*In the elevator cabin **All visible walls of shaft
Elevator Machine Room	102	VCT/R	CB	P	LAP	2800	
Workroom	103	VCT/R	EXIST* CB CB	P P	LAP	2800	*Restore all affected existing finishes at floor, walls, and ceiling after demolition. Finish after HM screen and door re-installation
Existing Corridor	E104	EXIST* TERR/TERR**	EXIST* CB EXIST BRICK* EXIST GYP.BD	EXIST* P	EXIST* LAP	EXIST	*Restore all affected existing finishes at floor, wall, and ceiling after lockers removal and new HM doors installation and installation of new sanitary drain line ** Restore terrazzo floor and base in all affected areas; match existing colour, cove base, control joint layout
Existing Music Room	E105	EXIST* VCT/R**	EXIST* CB*	P*	EXIST	EXIST	*Restore all affected existing finishes at floor and walls and ceiling after installation of drain connection
Existing Storage	E106	VCT/R*	CB	P	EXIST	EXIST	*Restore all affected existing finishes at floor and walls after installation of drain connection

	ROOM NO.	FLOOR FINISH/ FLOOR BASE	WALL MATERIAL	WALL FINISH	CEILING MATERIAL	CEILING ELEVATION	REMARKS
SECOND FLOOR							
Elevator	201	CT.1/R*	CB	P**	-	-	*In the elevator cabin **All visible walls of shaft
New Washroom	202	CT.1*	CB	CT.2**	GB/P	2800	*Prepare subfloor, see demolition notes. **Wall tiles full height of walls
Existing Corridor	E202	EXIST* TERR/TERR**	EXIST* CB EXIST BRICK*	P	EXIST LAP	2800	**Restore all affected existing finishes at floor and walls and ceiling **Repair affected by demolition terrazzo floor and cove base

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DOOR SCHEDULE - TABLE OF CONTENTS

.1	Door Schedule Notes	Pages 1-2
.2	Door Types	Page DS-1
.3	Door Frame Types	Page DS-2
.4	Door Schedule	Page 1

1.2 NOTES ON SCHEDULE ITEMS

- .1 Door Schedule (DS) to be read in conjunction with room finish schedule (RFS), Drawings and Specifications.
- .2 Door number: The prefix "X" in front of the door number designates an exterior door. The door number is the room number. Where two doors exist in the same room the letter "A" or "B" differentiates between the two doors.
- .3 Door type and size: The door type, width and material are indicated by the following code: (all doors in HM frames are 45 mm thick, 950 mm wide and 2150 mm high, unless noted otherwise).
e.g., 2A1000HM:
2A - Door type (see "Door Types" in this schedule). A prefix "2" indicates a pair of doors of equal width.
1000 - Rebate width, in mm (X height, in mm - if indicated).
HM - Door material (see list of abbreviations).
- .4 All frames shall be Hollow Metal, unless noted otherwise.
- .5 Door grilles cannot be installed in fire doors - where 2 numbers are indicated, they refer to the sizes of the door grille required (in mm, height first). For a pair of doors, a grille is required in each leaf.
- .6 An hour rating ("HR") or letters A, B, C indicate the required fire label on the door and frame. Note: (FS) indicates a fire separation only is required (labeled construction only is required).
- .7 For details of hardware, see Specification Section 08 71 00.
- .8 An asterisk (*) in any column indicates a reference to a note in the Remarks column to the right.
- .9 Refer to room finish schedule - 1.4 List of Materials for P (Paint), PLAM finishes and colours indicated in the door and frame finish columns.

1.3 LIST OF ABBREVIATIONS

2206

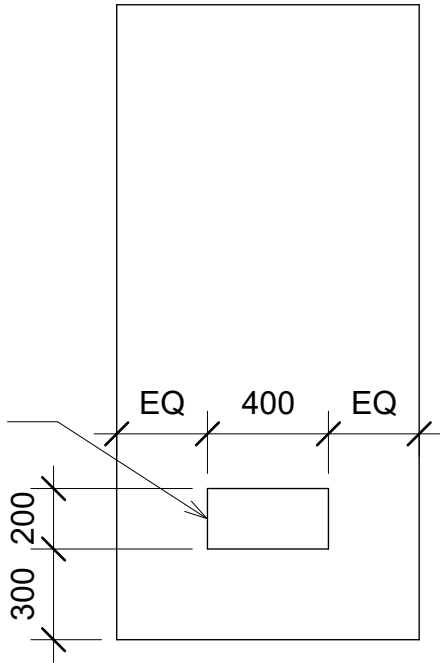
DOOR SCHEDULE

AL - aluminum
CG - concrete block
EXIST - existing
HM - hollow metal
MTL - metal
P - paint
GL - glass
TG - tempered glass

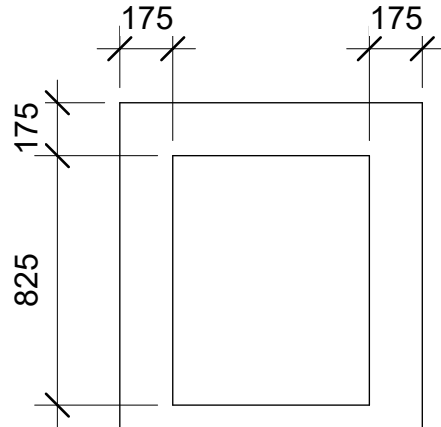
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DOOR
GRILLE
WHERE
SHOWN



TYPE A



TYPE B



5650 Hurontario Street
Mississauga, Ont., L5R 1C6
Tel: (905) 890-1099
Fax: (905) 890-9453

2206 TECUMSEH PUBLIC SCHOOL

ALTERATIONS 2026

Mississauga

Ontario

MG Architects Inc.

18 Kuhl Ave, Toronto, Ontario M5B 5X9, Canada T/F 416-239-1933

DOOR TYPES

Scale
AS NOTED

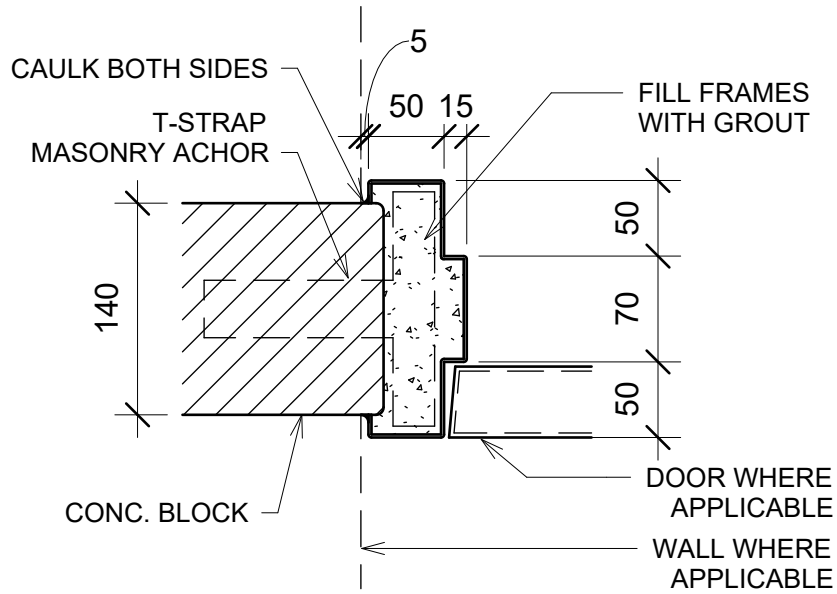
Drawn by
AG - AL

Date
MARCH 2026

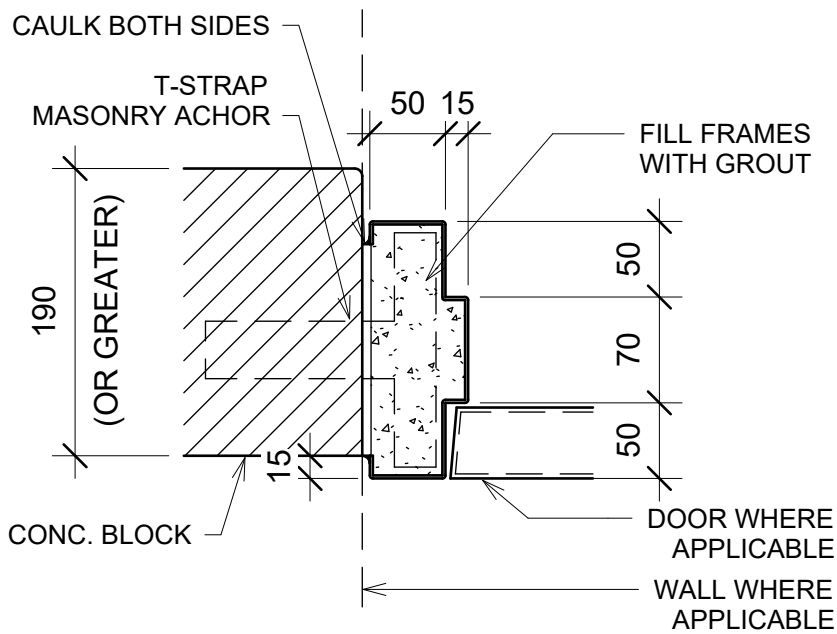
Checked by
MG

Project No.
2206

Drawing No.
DS-1



1 TYPE 1 (140 CONC. BLOCK)
1 : 5



2 TYPE 2 (190 CONC. BLOCK OR GREATER)
1 : 5



5650 Hurontario Street
Mississauga, Ont., L5R 1C6
Tel: (905) 890-1099
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2206 TECUMSEH PUBLIC SCHOOL
ALTERATIONS 2026

Mississauga

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DOOR FRAME TYPES

Scale
AS NOTED

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AG - AL

Date
MARCH 2026

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Project No.
2206

Drawing No.
DS-2

OPENING No.	DOOR TYPE AND SIZE	DOOR FINISH	FIRE LABEL OR GRILLE	GLASS TYPE	FRAME TYPE	FRAME FINISH	REMARKS
GROUND FLOOR							
101	ELEVATOR DOORS AND FRAMES BY SPECIFICATION SECTION 14410						
102	A1000HM*	P	¾ HR	-	1	P	* High traffic door
103	EXIST HM DOOR*	P	-	TEMP	EXIST GLAZED HM SCREEN 2**	P	*Exist door with two lights to be reused *Exist HM screen to be removed and prepared for reinstallation. Glass to be replaced if damaged during screen removal
SECOND FLOOR							
201	ELEVATOR DOORS AND FRAMES BY SPECIFICATION SECTION 14410						
203E	A950HM*	P	-	-	2**	P	* New frame in opening cut in exist block wall
202	A1000HM*	P	-	-	2**	P	*High traffic door **New frame in opening cut in exist block wall

ARCHITECTURAL

A1 - LOCATION MAP, SITE PLAN, KEY PLAN, WORK AREA
A2 - GROUND FLOOR PLANS
A3 - SECOND FLOOR PLANS
A4 - PLANS, SECTIONS, INTERIOR ELEVATION DETAILS

STRUCTURAL

S1 - FOUNDATION PLANS AND DETAILS
S2 - SECOND FLOOR FRAMING PLAN
S3 - ROOF FRAMING PLAN
S4 - SECOND FLOOR DETAILS
S5 - ROOF DETAILS
S6 - TYPICAL DETAILS AND GENERAL NOTES

MECHANICAL

PD1 - KEY PLAN
PD2 - PLUMBING AND DRAINAGE PART GROUND FLOOR PLANS – DEMOLITION AND NEW WORK
PD3 - PLUMBING AND DRAINAGE DETAILS
PD4 - PLUMBING AND DRAINAGE SPECIFICATIONS AND LEGENDS
M1 HVAC - KEY PLAN & SPECIFICATIONS
M2 HVAC - PARTIAL FLOOR PLANS - DEMOLITION
M3 HVAC - PARTIAL FLOOR PLANS - NEW WORK
M4 HVAC - SCHEDULES, DETAILS AND LEGEND

ELECTRICAL

E1 - ELECTRICAL LEGEND OF SYMBOLS, DETAILS AND NOTES
E2 - ELECTRICAL OVERALL KEY PLAN
E3 - ELECTRICAL DETAILS
E4 - ELECTRICAL PART GROUND FLOOR AND SECOND FLOOR DEMOLITION LAYOUT
E5 - ELECTRICAL PART GROUND FLOOR AND SECOND FLOOR LIGHTING LAYOUT
E6 - ELECTRICAL PART GROUND FLOOR AND SECOND FLOOR POWER LAYOUT
E7 - ELECTRICAL PART GROUND FLOOR AND SECOND FLOOR F.A. AND SECURITY LAYOUT
E8 - ELECTRICAL RISER DIAGRAM
E9 - ELECTRICAL SPECIFICATIONS

END

**PRE-RENOVATION
HAZARDOUS BUILDING MATERIALS SURVEY**

**Renovation Project
Tecumseh Public School**
1480 Chriseden Drive
Mississauga, Ontario
L5H 1V4

Presented to:

Peel District School Board
933 Central Parkway West
Mississauga, Ontario
L5M 5H6



January 2026

OHE Project No.: 31844

Submitted by:

OHE Consultants
Occupational Hygiene & Engineering
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Mississauga, Ontario
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APPENDIX C:	Laboratory Analysis Reports
APPENDIX D:	Site Photographs
APPENDIX E:	Background Information on Designated Substances
APPENDIX F:	Summary of Applicable Regulations and Guidelines
APPENDIX G:	Methodologies
APPENDIX H:	Limitations of the Project
APPENDIX I:	Historical Data

OHE Consultants (OHE) was retained by Peel District School Board (PDSB) to conduct a Hazardous Building Materials Survey (HBMS) as part of the Renovation Project at Tecumseh Public School located at 1480 Chriseden Drive, Mississauga, Ontario (herein referred to as the “Subject Location”).

The field work was carried out on January 14, 2026 by Sriram Muthuvel, Junior Project Specialist, of OHE. The survey consisted of a visual inspection for the presence of hazardous building materials, including designated substances, and testing and sampling of materials suspected to contain hazardous building materials, particularly asbestos and lead.

The survey was limited to the areas associated with the Renovation Project, as per the document provided by PDSB.

Should suspect hazardous materials be discovered in any of the areas which could not be accessed (as part of the survey) during renovation and demolition activities, the work shall stop until such materials are assessed and sampled to determine the next course of action.

A summary of the hazardous building materials survey findings is presented below:

Asbestos

- Mechanical System Insulation (MSI) in 1964 building addition
- Primer in 1964 building addition

Lead

- May be present in: wiring connectors
electric cable sheathing
solder joints on copper piping.

Mercury

- Presumed present: as vapour in fluorescent light bulbs
in mercury-vapour lamps
as a component in electrical equipment, such as
silent, position-dependent switches.

Silica

- Presumed present: as fillers for paints and mastic
in bricks, ceramics, masonry, concrete and mortar.

Hazardous building materials may be present in areas not accessible for view and identification. In situations where hazardous building materials extend into a non-accessible area, the materials were assumed to also be present in those areas and have been reported as such. Contractors and maintenance personnel should be warned of the possibility of undisclosed hazardous building materials in enclosed areas. All hazardous building materials discovered in these areas should be treated as such until proven otherwise as per all applicable regulations and guidelines.

Hazardous building materials including asbestos are also assumed to be present in various building materials which were not sampled as part of the survey since they were excluded from the scope of work due to inaccessibility. These materials include, but are not limited to, fire-rated doors; elevator and lift brakes; high voltage wiring, transformers and associated equipment; mechanical packing, gaskets; and refractory materials within boilers and furnaces. All excluded materials shall be assumed asbestos-containing until proven otherwise by bulk sampling and analysis.

OHE's recommendations, based on the findings of the survey, are as follows:

- Provide a copy of this report to contractors bidding on or performing work within the Subject Location.
- Remove all asbestos-containing materials that are likely to be disturbed during renovation or demolition activities in accordance with all applicable guidelines and regulations.
- Renovations and/or demolition operations that are likely to generate lead-containing dust shall be carried out in accordance with all applicable guidelines and regulations.
- Renovations and/or demolition operations that are likely to disturb mercury-containing materials or equipment shall be carried out in accordance with all applicable guidelines and regulations.
- Renovations and/or demolition operations that are likely to generate silica-containing dust shall be carried out in accordance with all applicable guidelines and regulations.
- Disposal of hazardous building materials shall be completed as per all applicable guidelines and regulations.

- Should suspect hazardous building materials be discovered during any demolition or renovation work in the Subject Location, the contractor shall stop all work in the vicinity of the suspect hazardous material and immediately notify personnel from both Peel District School Board and OHE Consultants.

This executive summary provides a brief overview of the survey findings. It is not intended to substitute for the complete survey report, nor does it discuss specific issues documented in the report. The executive summary should not be used as a substitute to reading the complete report.

This report is not a scope of work/specifications document for the abatement/remediation of hazardous materials and shall not be used for such purposes.

1. INTRODUCTION

OHE Consultants (OHE) was retained by Peel District School Board (PDSB) to conduct a Hazardous Building Materials Survey (HBMS) as part of the Renovation Project at Tecumseh Public School located at 1480 Chriseden Drive, Mississauga, Ontario (herein referred to as the “Subject Location”).

In accordance with Section 30 of the Ontario Occupational Health and Safety Act, Designated Substances and other potentially hazardous building materials must be identified prior to construction or demolition that may disturb such materials. The following is a list of designated substances:

Asbestos	Benzene
Lead	Acrylonitrile
Mercury	Coke Oven Emissions
Silica	Arsenic
Isocyanates	Ethylene Oxide
Vinyl Chloride	

The field work was carried out on January 14, 2206 by Sriram Muthuvel, Junior Project Specialist, of OHE.

The asbestos bulk samples were analyzed by EMC Scientific Incorporated, an independent and NVLAP accredited laboratory.

The lead bulk samples were analyzed by EMSL Canada Inc., an independent and ELLAP accredited laboratory.

1.1 Scope of Work

The scope of work of the survey consisted of the following:

1. A review of previous environmental reports for the Subject Location (if provided prior to conducting the field work);
2. Meeting with key on-site personnel (if provided by the Client) to obtain information about the various operations and processes carried out at the Subject Location in the past;
3. Room-by-room inspection of accessible areas including spaces above suspended ceilings, access hatches, mechanical chases, or similar type locations. Minor demolition of walls, ceilings, floors, etc. to investigate concealed conditions was not part of the scope of work;
4. Bulk sampling and analysis of suspect materials for the presence of asbestos following the requirements of Ontario Regulation 278/05;
5. Sampling of accessible painted surfaces for lead content. The lead survey also included an inventory of paint that is peeling off and require remediation;
6. Visual inspection for the presence of the other hazardous building materials listed above. If identified, such materials were reported as suspected until tested. Testing of these materials was not part of the scope of this survey; and
7. Preparation and provision of this report which includes the methodologies, drawings (if they were initially provided by the Client), results, findings, conclusions, recommendations and site photographs.

This report is not a scope of work/specifications document for the abatement/remediation of hazardous materials and shall not be used for such purposes.

1.2 Appendices Outline

The following is an outline of the appendices included in the report:

- Drawings showing sampling locations and the locations of asbestos-containing materials (if identified) are presented in Appendix A;
- The **results** of the survey for asbestos and lead in the form of summary tables for each of the materials are presented in Appendix B;
- The laboratory analysis reports are presented in Appendix C;
- Select site photographs are presented in Appendix D;
- Background information on hazardous building materials, including a brief discussion of the properties, uses, and hazards associated with exposure, is attached in Appendix E;
- A summary of applicable provincial regulations and guidelines pertaining to hazardous building materials is attached in Appendix F;
- Survey methodology including bulk samples analysis methodology and assessment of hazardous building materials methodology is attached in Appendix G;
- Limitations of the project are attached in Appendix H; and
- Historical data (if applicable) is attached in Appendix I.

1.3 Building(s) Description

	Building 1
Name	Tecumseh Public School
Address	1480 Chriseden Drive, Mississauga, Ontario
Current usage	School
Square footage	Unknown
Number of Floors	Two
Number of Units	One
Year Built	1954 and additions in 1964 and 1968
Roof Mechanical penthouse (yes/no)	NA
Number of underground levels	NA
General interior finishes	Block walls, Suspended Ceiling Tiles (SCTs), Vinyl Floor Tiles (VFTs), drywall, plaster, etc.

NA = Not Applicable

2. FINDINGS AND DISCUSSION

2.1 ACMs

Material Description	Observed (yes/no)	Sample(s) Numbers	Asbestos % And Type	Friable/ Non-Friable	Condition	Location
Brick mortar, Grey	Yes	31844-1A-1C	ND			Walls, Ceiling space, Library 219, Health Room 405 and Room 409, 1 st and 2 nd floors, 1964 building addition
Block mortar, Grey	Yes	31844-2A-2C	ND			Walls, Library 219, Health Room 405 and Classroom 111, 1 st and 2 nd floors, 1964 building addition
Primer	Yes	31844-3A-3C	ND			Walls, Library 219, Health Room 405 and Classroom 111, 1 st and 2 nd floors, 1964 building addition
Mastic, Brown	Yes	31844-4A-4C	ND			Behind baseboard, Walls, Library 219, Health Room 405 and Classroom 111, 1 st and 2 nd floors, 1964 building addition
Suspended Ceiling Tiles (SCTs), 2'x4', Fissures and pinholes	Yes	31844-5A-5C	ND			Ceiling, Principal's Office 126A, Health Room 405 and Library 219, 1 st and 2 nd floors, 1964 building addition
SCTs, 2'x4', Big and small pinholes	Yes	31844-6A-6C	ND			Ceiling, Library 219, 2 nd floor, 1964 building addition
Vinyl Floor Tiles (VFTs), 12"x12", Green with black and white streaks	Yes	31844-7A-7C	ND			Floor, Library 219, 2 nd floor, 1964 building addition

Hazardous Building Materials Survey
Renovation Project, Tecumseh Public School, 1480 Chriseden Drive, Mississauga, Ontario
OHE Project No.: 31844
January 2026

Material Description	Observed (yes/no)	Sample(s) Numbers	Asbestos % And Type	Friable/ Non-Friable	Condition	Location
VFTs, 12"x12", Dark beige with white and black streaks	Yes	31844-8A-8C	ND			Floor, Library 219, 2 nd floor, 1964 building addition
Mastic, Black	Yes	31844-9A-9C	ND			Under green and dark beige VFTs, Floor, Library 219, 2 nd floor, 1964 building addition
Mastic, Yellow	Yes	31844-9A-9C	ND			Under green and dark beige VFTs, Floor, Library 219, 2 nd floor, 1964 building addition
Plaster, White	Yes	31844-10A-10C	ND			West wall chase in Library 219 and South wall in General Office 126 and Vice Principal's Office 126B, 1 st and 2 nd floors, 1964 building addition
Plaster, Grey	Yes	31844-10A-10C	ND			West wall chase in Library 219 and South wall in General Office 126 and Vice Principal's Office 126B, 1 st and 2 nd floors, 1964 building addition
Tar paper, Black	Yes	31844-11A-11C	ND			On the fiberglass ductwork insulation, Ceiling space, Room 409, 1 st floor, 1964 building addition
Mesh plaster, Light grey	Yes	31844-12A-12C	ND			Baffle walls, Room 409, Principal Office 126A and Vice Principal Office 126B, 1 st floor, 1964 building addition

Material Description	Observed (yes/no)	Sample(s) Numbers	Asbestos % And Type	Friable/ Non-Friable	Condition	Location
VFTs, 12"x12", Cream with white and beige streaks	Yes	31844-13A-13C	ND			Floor, Health Room 405, 1 st floor, 1964 building addition
Mastic, Black	Yes	31844-13A-13C	ND			Floor, Health Room 405, 1 st floor, 1964 building addition
Mechanical System Insulation (MSI), in the form of parging cement	Yes	Previously tested	65% Chrysotile	Friable	Good	On the mechanical pipe fittings, Ceiling space, Room 409, 1st floor, 1964 building addition
Primer	Yes	Previously tested	1-2% Chrysotile	Non-Friable	Good	Walls throughout the 1964 building addition

ND – None Detected

*Not considered asbestos-containing

A summary of the analysis of the bulk samples is presented in Table B.1 found in Appendix B.

ACMs were noted to be in good condition. Refer to the Table above for condition and location details.

Where ACMs are in good condition and will remain in place, an AMP is required.

2.2 Lead

Lead-containing paint was not identified at the Subject Location. A detailed description of the colours and locations is presented in Table B.2 found in Appendix B. It is assumed that the results presented apply to all paint(s) of the same colour.

Lead may be present in wiring connectors and electric cable sheathing, in lead piping, in solder joints on copper piping, in ceramic building products such as floor or wall tiles.

Prior to disturbance of lead-containing materials, the materials must be abated in accordance with applicable guidelines and regulations.

Where lead has been identified to be in fair condition, the materials should be repaired or removed in accordance with applicable guidelines and regulations.

2.3 Mercury

Mercury is presumed to be present as a vapour in fluorescent light bulbs and mercury-vapour lamps.

Mercury is presumed to be present as a component in electrical equipment, such as silent, position dependent switches.

2.4 Silica

Silica is presumed to be present in materials such as fillers for paints and mastic and in bricks, ceramics, masonry, concrete and mortar.

Silica-containing materials should be handled in accordance with applicable guidelines and regulations

2.5 Isocyanates

The material was not identified at the site and is not expected to be found.

2.6 Vinyl Chloride

The material was not identified at the site and is not expected to be found.

2.7 Benzene

The material was not identified at the site and is not expected to be found.

2.8 Acrylonitrile

The material was not identified at the site and is not expected to be found.

2.9 Coke Oven Emissions

The material was not identified at the site and is not expected to be found.

2.10 Arsenic

The material was not identified at the site and is not expected to be found.

2.11 Ethylene Oxide

The material was not identified at the site and is not expected to be found.

Hazardous building materials may be present in areas not accessible for view and identification. In situations where hazardous building materials extend into a non-accessible area, the materials were assumed to also be present in those areas and have been reported as such. Contractors and maintenance personnel should be warned of the possibility of undisclosed hazardous building materials in enclosed areas. All hazardous building materials discovered in these areas should be treated as such until proven otherwise as per all applicable regulations and guidelines.

3. RECOMMENDATIONS

OHE's recommendations, based on the findings of the survey, are as follows:

- Provide a copy of this report to contractors bidding on or performing work within the Subject Location.
- Remove all asbestos-containing materials that are likely to be disturbed during renovations or demolitions activities in accordance with the following regulations:
 - Ontario Regulation 278/05 (as amended) – “Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations” (O. Reg. 278/05);
 - Ontario Regulation 490/09 (as amended) – “Designated Substances” (O. Reg. 490/09);
 - Ontario Regulation 213/91 (as amended) – "Construction Projects" (O. Reg. 213/91);
 - Ontario Regulation 347/90 (as amended) – "General - Waste Management" (O. Reg. 347/90); and
 - The regulations respecting the Handling and Offering for Transport and Transporting of Dangerous Goods.
- Removal of the asbestos-containing MSI will require removal operation procedures as specified in O. Reg. 278/05 (Type 2 Glove Bag Operation).
- Removal of the asbestos-containing primer will require removal operation procedures as specified in O. Reg. 278/05 (Type 1 or Type 2 Operations depending on method of removal).
- Renovations and/or demolition operations that are likely to generate lead-containing dust shall be carried out in accordance with the following guidelines and regulations:
 - Ontario Ministry of Labour Guideline: Lead on Construction Projects;
 - Designated Substances Regulation, O. Reg. 490/09;
 - Regulation for Construction Projects, O. Reg. 213/91; and
 - General – Waste Management Regulation, O. Reg. 347/90.

- Renovations and/or demolition operations that are likely to generate silica-containing dust shall be carried out in accordance with the following guidelines and regulations:
 - Ontario Ministry of Labour Guideline: Silica on Construction Projects;
 - Designated Substances Regulation, O. Reg. 490/09;
 - Regulation for Construction Projects, O. Reg. 213/91; and
 - General – Waste Management Regulation, O. Reg. 347/90.

- Renovations and/or demolition operations that are likely to disturb mercury-containing materials or equipment shall be carried out in accordance with the following guidelines and regulations:
 - Designated Substances Regulation, O. Reg. 490/09;
 - Regulation for Construction Projects, O. Reg. 213/91; and
 - General – Waste Management Regulation, O. Reg. 347/90.

- Disposal of hazardous materials shall be conducted in accordance with all applicable regulations and guidelines.

- Should suspect hazardous building materials be discovered during any demolition or renovation work in the above mentioned location, the contractor shall stop all work and immediately notify personnel from the Peel District School Board and OHE.

4. GENERAL STATEMENT OF LIMITATIONS

The information and opinions rendered in this report are for use exclusively by the Client and is subject to the terms, conditions and limitations as set out in the proposal/scope of work. OHE Consultants reserves the right to review and comment on any interpretation of the data or conclusions derived by the Client. OHE Consultants will not provide this report or other associated information to any party other than the Client unless the disclosure of the information is required by law or is requested in writing by the Client. Any required notifications (internal or external) about information contained in this report shall be the sole responsibility of the Client.

Nothing under the agreement (written or verbal) with the Client shall be construed to give any other rights or benefits to anyone other than the Client and OHE Consultants, and all duties and responsibilities undertaken pursuant to the agreement will be for the sole and exclusive benefit of the Client and OHE Consultants and not for the benefit of any other party. Client agrees not to disclose to any third party data, reports or information provided by OHE Consultants without prior written consent, and OHE Consultants shall have no liability to the Client for claims resulting from such disclosure. However, the Client may use the written report and associated documents to indicate the status of the property to current owners or government requiring the report.

OHE Consultants collected the information provided in this report for the benefit of its Client. OHE Consultants' Client may upon authorization release the information to third parties, who may use and rely upon this report to their discretion. Any use of, or reliance upon, the information by a party other than the Client shall be solely at the risk of the third party and without legal recourse against OHE Consultants.

The scope of this report is limited to possible hazardous building materials found within (or part of) the subject spaces included in the survey only. The survey only considered issues of the building structure, mechanical equipment, and their finishes. The survey did not consider current or past use of the property or occupant articles within the building (i.e. furniture, stock items, etc.), nor does it report on possible contaminants in the soil and groundwater of the site, vessels, drums, underground storage tanks, etc. The survey consisted of accessible areas only; samples were not collected if accessibility was restricted.

OHE Consultants exercised normal skills of a reasonably qualified environmental consultant as part of obtaining the information presented in this report. The findings and conclusions contained herein have been made in accordance with generally accepted evaluation methods in the industry at the time of the performance of the work utilizing trained technical staff and professionals.

The information are only representative of the time period when the actual work was carried out. It is possible, due to the nature of building construction, that conditions may exist which could not be reasonably identified within the scope of the assessment or which were not apparent during the site investigation.

The information presented in the report shall not be construed as legal opinion. In addition, the information shall not be used to evaluate health risks of building occupants associated with exposure to identified hazardous building materials – such evaluations shall be carried out by a licensed medical professional who specializes in such evaluations. Over time, the regulations, standards and guidelines which are outlined in the report could be amended/updated, and accordingly may not apply at a future date.

No representation, warranties or guaranties, expressed or implied, are made with respect to any goods or services provided as part of this assessment/report, and any implied warranties or guaranties for a particular purpose are expressly disclaimed.

January 2026

OHE Consultants

Occupational Hygiene & Engineering

Original Signed by:

Original Signed by:

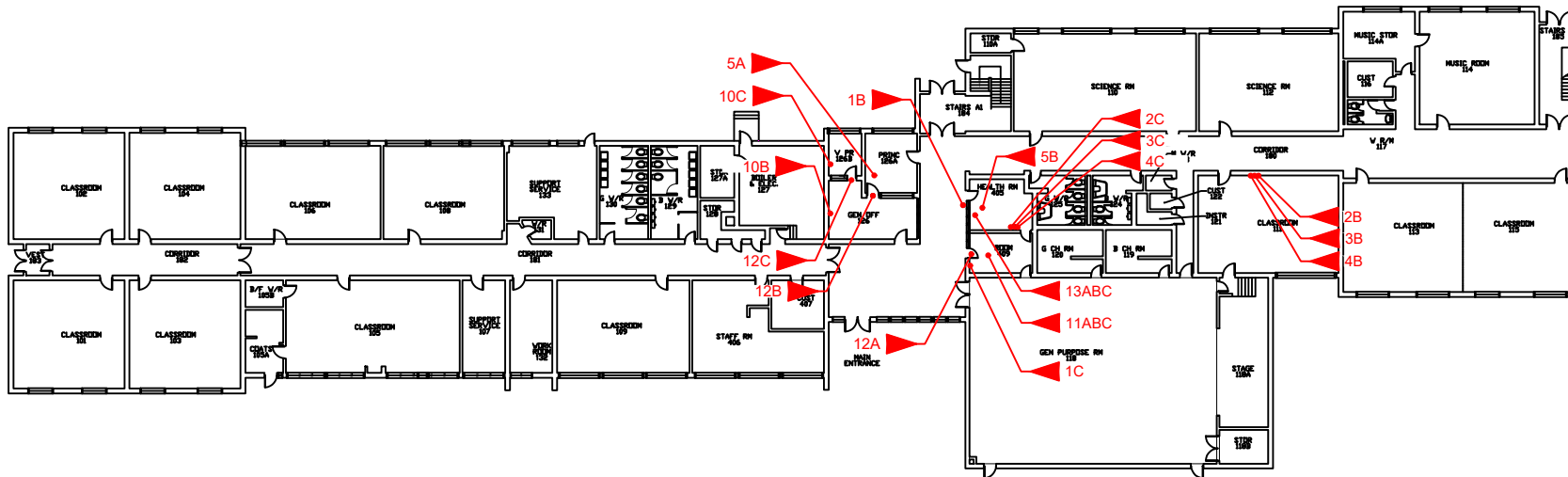
Prepared by:
Sriram Muthuvel, M.Eng.
Junior Project Specialist

Reviewed by:
Darren Kim
Project Manager

Original Signed by:

Reviewed by:
Michal Zitnik, M.H.Sc., ROH, CIH
Vice President

DRAWINGS



Legend:
 x▶ Asbestos Bulk Sample Location

Notes:
 Locations of site features are approximate and may vary from that shown.

Drawing Title:
 Asbestos Bulk Sample Locations

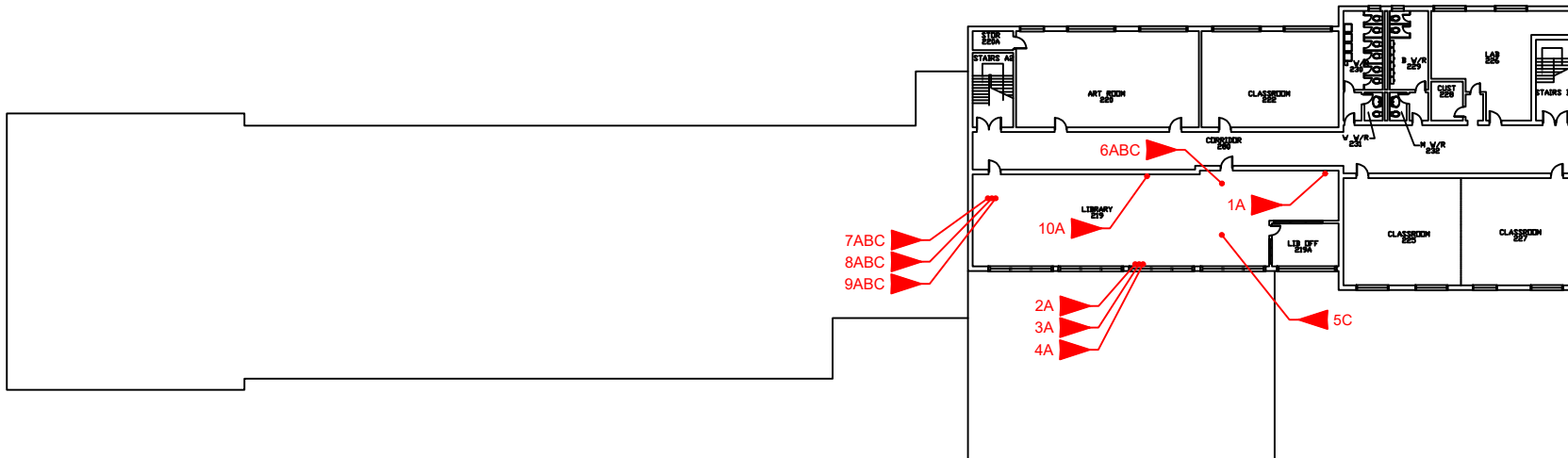
Client Address:
 Peel District School Board
 933 Central Parkway West
 Mississauga, Ontario

Project Location:
 First Floor
 Tecumseh Public School
 1480 Chrisden Drive
 Mississauga, Ontario

Project No: 31844

Date: Jan.2026	Drawing No: 1.1
Scale: NTS	
Drawn By: AB	
Approved By: MZ	





Legend:

xx ▶ Asbestos Bulk Sample Location

Notes:
Locations of site features are approximate and may vary from that shown.

Drawing Title:
Asbestos Bulk Sample Locations

Client Address:
Peel District School Board
933 Central Parkway West
Mississauga, Ontario

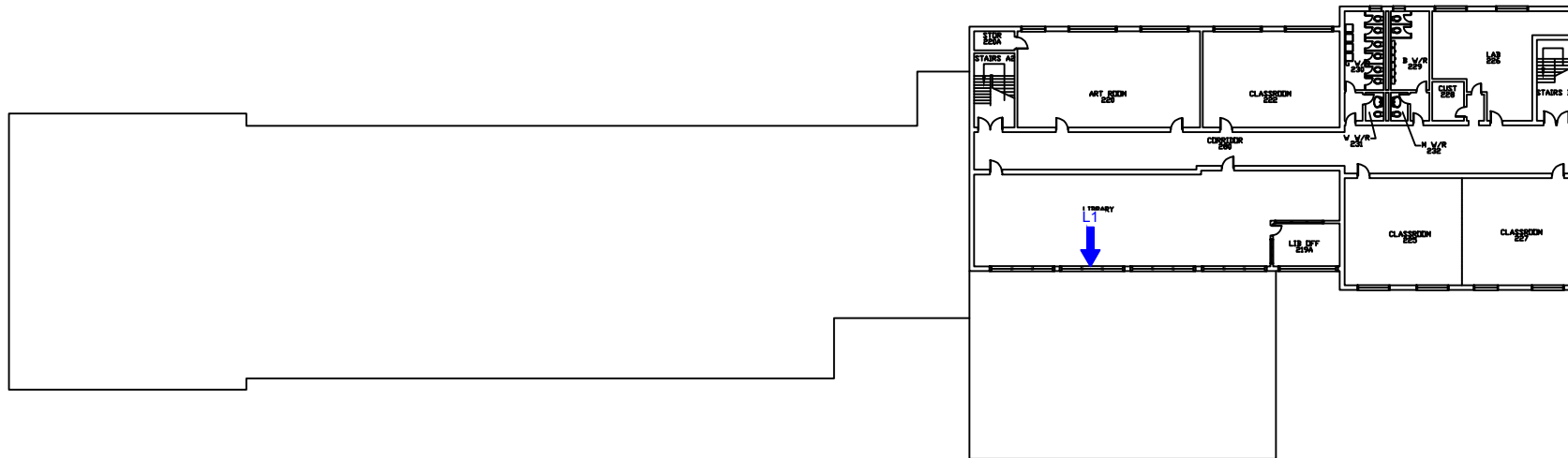
Project Location:
Second Floor
Tecumseh Public School
1480 Chrisden Drive
Mississauga, Ontario

Project No: 31844



Date: Jan.2026	Drawing No: 1.2
Scale: NTS	
Drawn By: AB	
Approved By: MZ	






Legend:
 ux → Lead Bulk Sample Location

Notes:
 Locations of site features are approximate and may vary from that shown.

Drawing Title:
 Lead Bulk Sample Locations

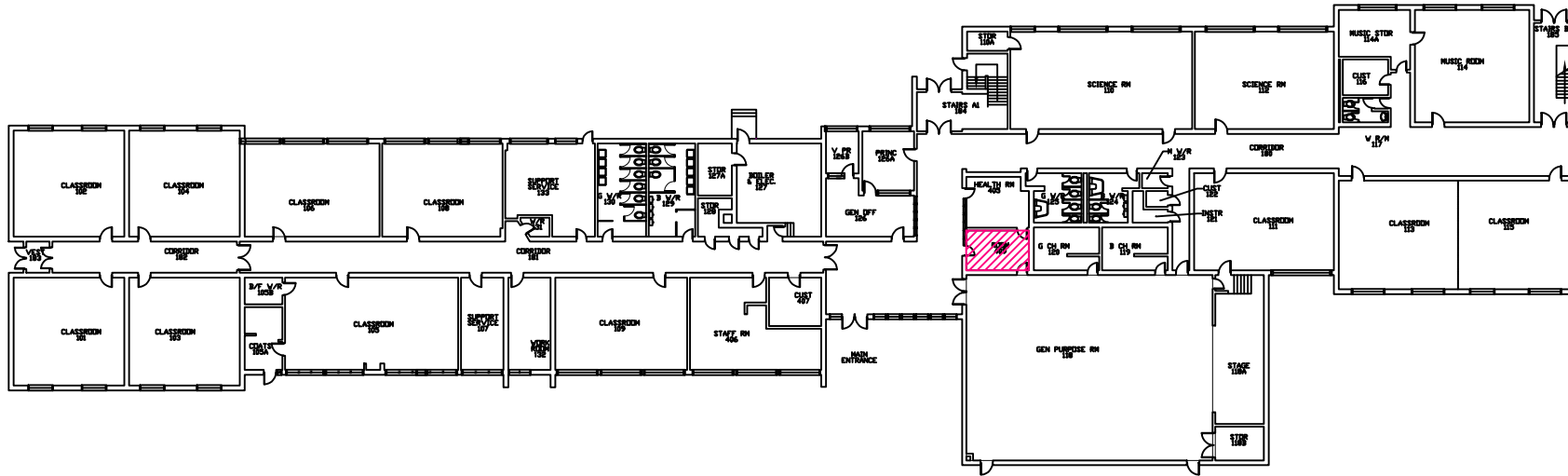
Client Address:
 Peel District School Board
 933 Central Parkway West
 Mississauga, Ontario


Project Location:
 Second Floor
 Tecumseh Public School
 1480 Chrisden Drive
 Mississauga, Ontario

Project No: 31844 

Date: Jan.2026	Drawing No: 2.1
Scale: NTS	
Drawn By: AB	
Approved By: MZ	






Legend:
 Mechanical Systems Insulation (MSI)

Notes:
 Locations of site features are approximate and may vary from that shown.

Drawing Title:
Friable Asbestos-Containing Materials

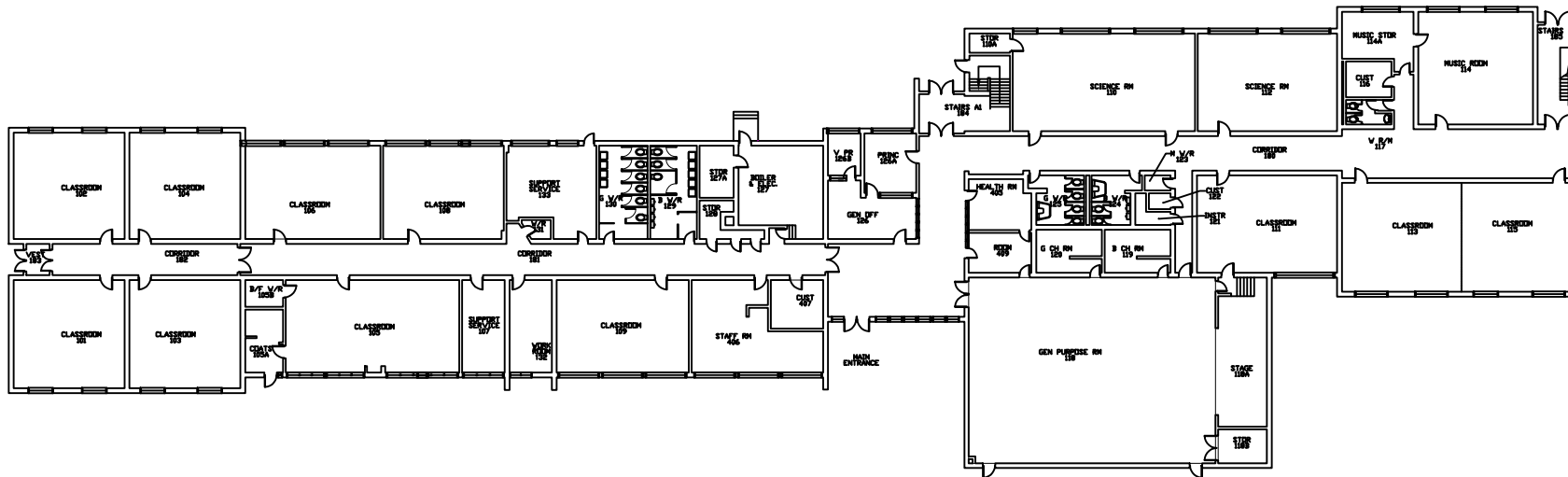
Client Address:
 Peel District School Board
 933 Central Parkway West
 Mississauga, Ontario

Project Location:
 First Floor
 Tecumseh Public School
 1480 Chrisden Drive
 Mississauga, Ontario

Project No: 31844 

Date: Jan.2026	Drawing No: 3.1
Scale: NTS	
Drawn By: AB	
Approved By: MZ	





Legend:


Notes:
 Asbestos-Containing Primer
 was identified on the walls in
 1964 Building addition.

Notes:
 Locations of site features are
 approximate and may vary from that
 shown.

Drawing Title:
 Non-Friable Asbestos-Containing
 Materials

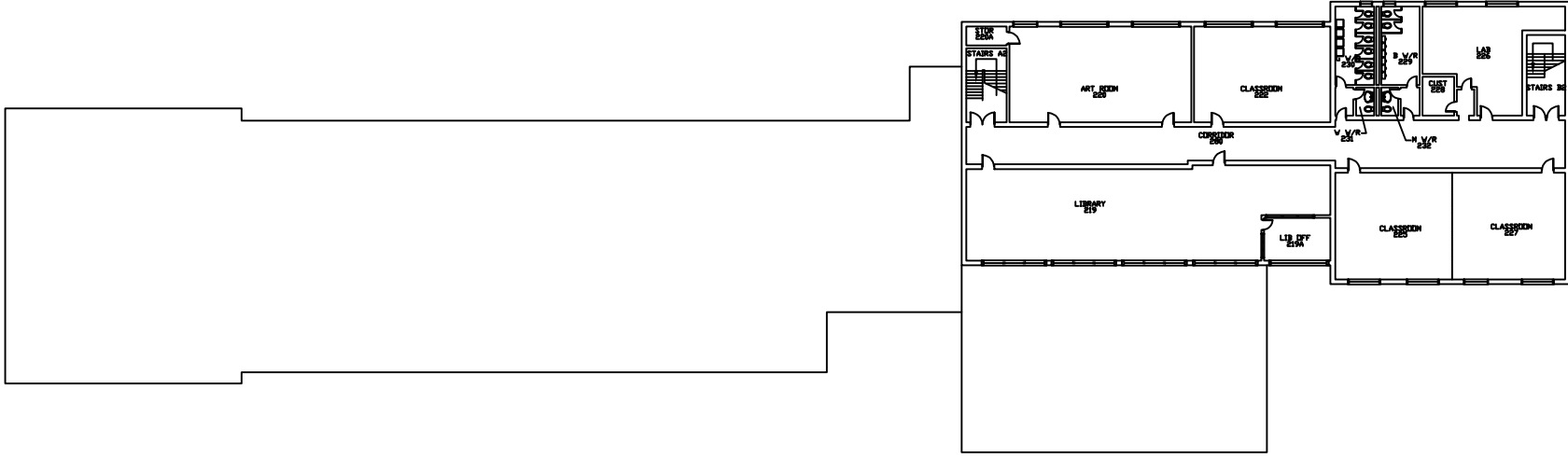
Client Address:
 Peel District School Board
 933 Central Parkway West
 Mississauga, Ontario

Project Location:
 First Floor
 Tecumseh Public School
 1480 Chrisden Drive
 Mississauga, Ontario

Project No: 31844 

Date: Jan.2026	4.1
Scale: NTS	
Drawn By: AB	
Approved By: MZ	





Legend:


Notes:
Asbestos-Containing Primer
was identified on the walls in
1964 Building addition.

Notes:
 Locations of site features are approximate and may vary from that shown.

Drawing Title:
Non-Friable Asbestos-Containing Materials

Client Address:
 Peel District School Board
 933 Central Parkway West
 Mississauga, Ontario

Project Location:
 Second Floor
 Tecumseh Public School
 1480 Chrisden Drive
 Mississauga, Ontario

Project No: 31844 

Date: Jan.2026	Drawing No: 4.2
Scale: NTS	
Drawn By: AB	
Approved By: MZ	



RESULTS

Table B.1

Summary of Bulk Sample Analysis Results for the Presence of Asbestos by Polarized Light Microscopy (PLM) with Dispersion Staining

Collected on January 14, 2026

OHE Sample Number	Sample Description	Sample Location	Analysis Results (% and Type of Asbestos)
31844-1A	Brick mortar, Grey	West baffle wall, Ceiling space, Library 291, 2 nd floor, 1964 building addition	None Detected
31844-1B	Brick mortar, Grey	South baffle wall, Ceiling space, Health Room 405, 1 st floor, 1964 building addition	None Detected
31844-1C	Brick mortar, Grey	South baffle wall, Ceiling space, Room 409, 1 st floor, 1964 building addition	None Detected
31844-2A	Block mortar, Grey	East wall, Library 219, 2 nd floor, 1964 building addition	None Detected
31844-2B	Block mortar, Grey	West wall, Classroom 111, 1 st floor, 1964 building addition	None Detected
31844-2C	Block mortar, Grey	East wall, Health Room 405, 1 st floor, 1964 building addition	None Detected
31844-3A	Primer	East wall, Library 291, 2 nd floor, 1964 building addition	None Detected
31844-3B	Primer	West wall, Classroom 111, 1 st floor, 1964 building addition	None Detected
31844-3C	Primer	East wall, Health Room 405, 1 st floor, 1964 building addition	None Detected
31844-4A	Mastic, Brown	Behind baseboard, East wall, Library 291, 2 nd floor, 1964 building addition	None Detected
31844-4B	Mastic, Brown	Behind baseboard, West wall, Classroom 111, 1 st floor, 1964 building addition	None Detected
31844-4C	Mastic, Brown	Behind baseboard, East wall, Health Room 405, 1 st floor, 1964 building addition	None Detected
31844-5A	Suspended Ceiling Tiles (SCTs), 2'x4', Fissures and pinholes	Ceiling, Principal's Office 126A, 1 st floor, 1964 building addition	None Detected

OHE Sample Number	Sample Description	Sample Location	Analysis Results (% and Type of Asbestos)
31844-5B	SCTs, 2'x4', Fissures and pinholes	Ceiling, Health Room 405, 1 st floor, 1964 building addition	None Detected
31844-5C	SCTs, 2'x4', Fissures and pinholes	Ceiling, Library 219, 2 nd floor, 1964 building addition	None Detected
31844-6A	SCTs, 2'x4', Big and small pinholes	Ceiling, Library 219, 2 nd floor, 1964 building addition	None Detected
31844-6B	SCTs, 2'x4', Big and small pinholes	Ceiling, Library 219, 2 nd floor, 1964 building addition	None Detected
31844-6C	SCTs, 2'x4', Big and small pinholes	Ceiling, Library 219, 2 nd floor, 1964 building addition	None Detected
31844-7A	Vinyl Floor Tiles (VFTs), 12"x12", Green with black and white streaks	Floor, Library 219, 2 nd floor, 1964 building addition	None Detected
31844-7B	VFTs, 12"x12", Green with black and white streaks	Floor, Library 219, 2 nd floor, 1964 building addition	None Detected
31844-7C	VFTs, 12"x12", Green with black and white streaks	Floor, Library 219, 2 nd floor, 1964 building addition	None Detected
31844-8A	VFTs, 12"x12", Dark beige with white and black streaks	Floor, Library 219, 2 nd floor, 1964 building addition	None Detected
31844-8B	VFTs, 12"x12", Dark beige with white and black streaks	Floor, Library 219, 2 nd floor, 1964 building addition	None Detected
31844-8C	VFTs, 12"x12", Dark beige with white and black streaks	Floor, Library 219, 2 nd floor, 1964 building addition	None Detected
31844-9A	Mastic, Black	Under green with black and white streaks VFT, Floor, Library 219, 2 nd floor, 1964 building addition	None Detected
	Mastic, Yellow	Under green with black and white streaks VFT, Floor, Library 219, 2 nd floor, 1964 building addition	None Detected

OHE Sample Number	Sample Description	Sample Location	Analysis Results (% and Type of Asbestos)
31844-9B	Mastic, Black	Under dark beige with white and black streaks VFT, Floor, Library 219, 2 nd floor, 1964 building addition	None Detected
	Mastic, Yellow	Under green with black and white streaks VFT, Floor, Library 219, 2 nd floor, 1964 building addition	None Detected
31844-9C	Mastic, Black	Under dark beige with white and black streaks VFT, Floor, Library 219, 2 nd floor, 1964 building addition	None Detected
	Mastic, Yellow	Under green with black and white streaks VFT, Floor, Library 219, 2 nd floor, 1964 building addition	None Detected
31844-10A	Plaster, White	West wall chase, Library 219, 2 nd floor, 1964 building addition	None Detected
	Plaster, Light grey	West wall chase, Library 219, 2 nd floor, 1964 building addition	None Detected
31844-10B	Plaster, White	South wall, General Office 126, 1 st floor, 1954 original building	None Detected
	Plaster, Light grey	South wall, General Office 126, 1 st floor, 1954 original building	None Detected
31844-10C	Plaster, White	South wall, Vice Principal Office 126B, 1 st floor, 1954 original building	None Detected
	Plaster, Light grey	South wall, Vice Principal Office 126B, 1 st floor, 1954 original building	None Detected
31844-11A	Tar paper, Black	On fiberglass ductwork insulation, Ceiling space, Room 409, 1 st floor, 1964 building addition	None Detected
31844-11B	Tar paper, Black	On fiberglass ductwork insulation, Ceiling space, Room 409, 1 st floor, 1964 building addition	None Detected
31844-11C	Tar paper, Black	On fiberglass ductwork insulation, Ceiling space, Room 409, 1 st floor, 1964 building addition	None Detected
31844-12A	Mesh plaster, Light grey	South baffle wall, Room 409, 1 st floor, 1964 building addition	None Detected

OHE Sample Number	Sample Description	Sample Location	Analysis Results (% and Type of Asbestos)
31844-12B	Mesh plaster, Light grey	West baffle wall, Outside Principal's Office 126A, 1 st floor, 1954 original building	None Detected
31844-12C	Mesh plaster, Light grey	West baffle wall, Outside Vice Principal's Office 126B, 1 st floor, 1954 original building	None Detected
31844-13A	VFTs, 12"x12", Cream with white and beige streaks	Floor, Health Room 405, 1 st floor, 1964 building addition	None Detected
	Mastic, Black	Floor, Health Room 405, 1 st floor, 1964 building addition	None Detected
31844-13B	VFTs, 12"x12", Cream with white and beige streaks	Floor, Health Room 405, 1 st floor, 1964 building addition	None Detected
	Mastic, Black	Floor, Health Room 405, 1 st floor, 1964 building addition	None Detected
31844-13C	VFTs, 12"x12", Cream with white and beige streaks	Floor, Health Room 405, 1 st floor, 1964 building addition	None Detected
	Mastic, Black	Floor, Health Room 405, 1 st floor, 1964 building addition	None Detected

Table B.2

Summary of Bulk Samples Analysis Results for the Presence of Lead by Flame Atomic Absorption Spectrometry (AAS)

Collected on January 14, 2026

OHE Sample Number	Sample Description	Sample Location	Contains Lead by weight (%)
31844-L1	Cream paint	East wall, Library 219, 2 nd floor, 1964 building addition	<0.0064

LABORATORY ANALYSIS REPORTS

Laboratory Analysis Report

To:

Fred Atrash
 OHE Consultants Inc.
 311 Matheson Boulevard East
 Mississauga, Ontario
 L4Z 1X8

EMC LAB REPORT NUMBER: A129433
Job/Project Name:
Analysis Method: Polarized Light Microscopy – EPA 600
Date Received: Jan 15/26 **Date Analyzed:** Jan 19/26
Analyst: Fabio Anunciacao
Reviewed By: Chengming Li *Chengming Li*

No. of Phases Analyzed: 50
Job No: 31844
Number of Samples: 39
Date Reported: Jan 19/26

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)		
				Asbestos Fibres	Non-asbestos Fibres	Non-fibrous Material
31844-1A	A129433-1	Brick mortar, Grey/West baffle wall, Ceiling space, Library 291, 2nd floor	Grey, cementitious material	ND		100
31844-1B	A129433-2	Brick mortar, Grey/South baffle wall, Ceiling space, Health Room 405, 1st floor	Grey, cementitious material	ND		100
31844-1C	A129433-3	Brick mortar, Grey/South baffle wall, Ceiling space, Room 409, 1st floor	Grey, cementitious material	ND		100
31844-2A	A129433-4	Block mortar, Grey/East wall, Library 219, 2nd floor	Grey, cementitious material	ND		100
31844-2B	A129433-5	Block mortar, Grey/West wall, Classroom 111, 1st floor	Grey, cementitious material	ND		100
31844-2C	A129433-6	Block mortar, Grey/East wall, Health Room 405, 1st floor	Grey, cementitious material	ND		100
31844-3A	A129433-7	Primer/East wall, Library 291, 2nd floor	White, primer	ND		100
31844-3B	A129433-8	Primer/West wall, Classroom 111, 1st floor	White, primer	ND		100
31844-3C	A129433-9	Primer/East wall, Health Room 405, 1st floor	White, primer	ND		100
31844-4A	A129433-10	Mastic, Brown/Behind baseboard, East wall, Library 291, 2nd floor	Brown, mastic	ND		100
31844-4B	A129433-11	Mastic, Brown/Behind baseboard, West wall, Classroom 111, 1st floor	Brown, mastic	ND		100

EMC LAB REPORT NUMBER: A129433

Client's Job/Project Name/No.: 31844

Analyst: Fabio Anunciacao

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)		
				Asbestos Fibres	Non-asbestos Fibres	Non-fibrous Material
31844-4C	A129433-12	Mastic, Brown/Behind baseboard, East wall, Health Room 405, 1st floor	Brown, mastic	ND		100
31844-5A	A129433-13	Suspended Ceiling Tiles (SCTs), 2'x4', Fissures and pinholes/Ceiling, Principal Office 126A, 1st floor	Grey, ceiling tile	ND	75	25
31844-5B	A129433-14	SCTs, 2'x4', Fissures and pinholes/Ceiling, Health Room 405, 1st floor	Grey, ceiling tile	ND	75	25
31844-5C	A129433-15	SCTs, 2'x4', Fissures and pinholes/Ceiling, Library 219, 2nd floor	Grey, ceiling tile	ND	75	25
31844-6A	A129433-16	SCTs, 2'x4', Big and small pinholes/Ceiling, Library 219, 2nd floor	Grey, ceiling tile	ND	75	25
31844-6B	A129433-17	SCTs, 2'x4', Big and small pinholes/Ceiling, Library 219, 2nd floor	Grey, ceiling tile	ND	75	25
31844-6C	A129433-18	SCTs, 2'x4', Big and small pinholes/Ceiling, Library 219, 2nd floor	Grey, ceiling tile	ND	75	25
31844-7A	A129433-19	Vinyl Floor Tiles (VFTs), 12"x12", Green with black and white streaks/Floor, Library 219, 2nd floor	Green, vinyl floor tile	ND		100
31844-7B	A129433-20	VFTs, 12"x12", Green with black and white streaks/Floor, Library	Green, vinyl floor tile	ND		100

EMC LAB REPORT NUMBER: A129433

Client's Job/Project Name/No.: 31844

Analyst: Fabio Anunciacao

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)		
				Asbestos Fibres	Non-asbestos Fibres	Non-fibrous Material
		219, 2nd floor				
31844-7C	A129433-21	VFTs, 12"x12", Green with black and white streaks/Floor, Library 219, 2nd floor	Green, vinyl floor tile	ND		100
31844-8A	A129433-22	VFTs, 12"x12", Dark beige with white and black streaks/Floor, Library 219, 2nd floor	Beige, vinyl floor tile	ND		100
31844-8B	A129433-23	VFTs, 12"x12", Dark beige with white and black streaks/Floor, Library 219, 2nd floor	Beige, vinyl floor tile	ND		100
31844-8C	A129433-24	VFTs, 12"x12", Dark beige with white and black streaks/Floor, Library 219, 2nd floor	Beige, vinyl floor tile	ND		100
31844-9A	A129433-25	Mastic, Dark yellow/Under green with black and white streaks VFT, Floor, Library 219, 2nd floor	2 Phases: a) Black, mastic b) Yellow, mastic	ND ND		100 100
31844-9B	A129433-26	Mastic, Dark yellow/Under dark beige with white and black streaks VFT, Floor, Library 219, 2nd floor	2 Phases: a) Black, mastic b) Yellow, mastic	ND ND		100 100
31844-9C	A129433-27	Mastic, Dark yellow/Under dark beige with white and black streaks VFT, Floor, Library 219, 2nd floor	2 Phases: a) Black, mastic b) Yellow, mastic	ND ND		100 100
31844-10A	A129433-28	Plaster/West wall chase, Library 219, 2nd floor	2 Phases: a) White, plaster b) Light grey, plaster	ND ND		100 100

EMC LAB REPORT NUMBER: A129433

Client's Job/Project Name/No.: 31844

Analyst: Fabio Anunciacao

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)		
				Asbestos Fibres	Non-asbestos Fibres	Non-fibrous Material
31844-10B	A129433-29	Plaster/South wall, General Office 126, 1st floor	2 Phases: a) White, plaster b) Light grey, plaster	ND ND		100 100
31844-10C	A129433-30	Plaster/South wall, Vice Principal Office 126B, 1st floor	2 Phases: a) White, plaster b) Light grey, plaster	ND ND		100 100
31844-11A	A129433-31	Tar paper, Black/On fiberglass ductwork insulation, Ceiling space, Room 409, 1st floor	Black, tar	ND		100
31844-11B	A129433-32	Tar paper, Black/On fiberglass ductwork insulation, Ceiling space, Room 409, 1st floor	Black, tar	ND		100
31844-11C	A129433-33	Tar paper, Black/On fiberglass ductwork insulation, Ceiling space, Room 409, 1st floor	Black, tar	ND		100
31844-12A	A129433-34	Mesh plaster/South baffle wall, Room 409, 1st floor	Light grey, textured plaster	ND		100
31844-12B	A129433-35	Mesh plaster/West baffle wall, Outside Principal Office 126A, 1st floor	Light grey, textured plaster	ND		100
31844-12C	A129433-36	Mesh plaster/West baffle wall, Outside Vice Principal Office 126B, 1st floor	Light grey, textured plaster	ND		100
31844-13A	A129433-37	VFTs, 12"x12", Cream with white and beige streaks/Floor, Health Room 405, 1st floor	3 Phases: a) Off white, vinyl floor tile b) Black, mastic	ND ND		100 100

EMC LAB REPORT NUMBER: A129433

Client's Job/Project Name/No.: 31844

Analyst: Fabio Anunciacao

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)		
				Asbestos Fibres	Non-asbestos Fibres	Non-fibrous Material
			c) Brown, cementitious material	ND		100
31844-13B	A129433-38	VFTs, 12"x12", Cream with white and beige streaks/Floor, Health Room 405, 1st floor	3 Phases: a) Off white, vinyl floor tile b) Black, mastic c) Brown, cementitious material	ND ND ND		100 100 100
31844-13C	A129433-39	VFTs, 12"x12", Cream with white and beige streaks/Floor, Health Room 405, 1st floor	2 Phases: a) Off white, vinyl floor tile b) Black, mastic	ND ND		100 100

Note:

1. Bulk samples are analyzed using Polarized Light Microscopy (PLM) and dispersion staining techniques. The analytical procedures are in accordance with EPA 600/R-93/116 method.
2. The results are only related to the samples analyzed. **ND** = None Detected (no asbestos fibres were observed), **NA** = Not Analyzed (analysis stopped due to a previous positive result).
3. This report may not be reproduced, except in full without the written approval of EMC Scientific Inc. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
4. The Ontario Regulatory Threshold for asbestos is 0.5%. The limit of quantification (LOQ) is 0.5%.



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EMSL Canada Or	552600705
CustomerID:	55OHE193
CustomerPO:	31844
ProjectID:	

Attn: **Fred Atrash**
OHE Consultants
311 Matheson Blvd. East
Mississauga, ON L4Z 1X8

Phone: (905) 890-9000
Fax: (905) 890-9005
Received: 1/15/2026 12:45 PM
Collected: 1/14/2026

Project: 31844

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

<i>Client SampleDescription</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Weight</i>	<i>RDL</i>	<i>Lead Concentration</i>
31844-L1 552600705-0001	1/14/2026	1/15/2026	0.2516 g	0.0064 % wt	<0.0064 % wt
Site: Cream paint, East wall, Library 219, 2nd floor					

Rowena Fanto, Lead Supervisor
or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. * Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.0064% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.

Samples analyzed by EMSL Canada Inc. Mississauga, ON AIHA LAP, LLC-ELLAP Accredited #196142

Initial report from 01/19/2026 09:11:07

SITE PHOTOGRAPHS

Site Photographs
OHE Project No.: 31844

Photograph 1: View of the asbestos-containing MSI in the form of parging cement on the pipe fittings in the ceiling space of Room 409 at the Subject Location.



Photograph 2: View of the asbestos-containing primer on the walls in Classroom 111 at the Subject Location.



**BACKGROUND INFORMATION ON
HAZARDOUS BUILDING MATERIALS**

ASBESTOS

Asbestos is a term applied to a family of fibrous minerals divided into two geological groups, serpentine and amphibole. These minerals are naturally occurring and are found in every mountain formation throughout the world. Only six forms of asbestos were used commercially. These are chrysotile, the only serpentine asbestos type, and amosite, crocidolite, anthophyllite, tremolite and actinolite which are the amphibole asbestos type.

There are over 3,000 separate uses of asbestos identified in existing literature. Uses are dependent upon the physical and chemical properties of a particular asbestos type. The desirable properties of asbestos fibres differ with each type of asbestos and include:

Fire retardance	Resistance to acids and alkalis	High tensile strength
Filter action	Thermal insulating qualities	Friction and wear resistance
Cohesion	Reinforcement	Filler

Asbestos is rarely found in pure form in a product and all products are divided into two broad categories: "friable materials" and "non-friable materials or manufactured products". "Friable materials" are defined as materials that, when dry, can be crumbled, pulverized or powdered by hand pressure. This classification includes materials such as sprayed fireproofing, thermal insulation applications, acoustical texturized material and refractory or non-friable materials that have been made to become friable through degradation.

"Non-friable materials" are generally hard and do not readily release fibres. Most asbestos-containing materials (ACMs) are found in this category and are typically included in materials such as cement products, felts, cloths, floor and roof coverings, friction products and ceiling tiles.

Asbestos fibres, when inhaled, may cause various respiratory diseases primarily including Asbestosis, Mesothelioma and Lung Cancer which all can cause an early death. Based on the health effects of exposure to asbestos fibres, the use of asbestos has become regulated across Canada and some products are now prohibited. Essentially, the location of ACMs must be identified and a written report kept and maintained of the ACMs locations so that work undertaken on these materials is conducted in a safe manner and any damaged ACMs or debris is repaired or removed.

LEAD

For thousands of years lead has been used industrially because of its poor conductive property. Lead has been commonly used for electric storage batteries, pigments, paints, and rubber compounds.

Health effects associated with lead exposure can result in damage to the kidneys, gastrointestinal system, nervous system and reproductive system. Symptoms range from vomiting, and abdominal cramps to pains in joints and muscles.

SILICA

Silica can be found naturally in two forms, crystalline or amorphous material. Crystalline silica is regulated due to its significant toxicity over the amorphous silica. The three most common forms of crystalline silica in the workplace are: quartz, cristobalite and tridymite. The physical properties of silica make it a valuable substance for use in a variety of different industries and processes such as an abrasive and scouring compound, fillers for paint and mastic and optical equipment. Health effects resulting from exposure to crystalline silica range from eye and skin irritation, coughing and sneezing to silicosis, a progressive lung disease.

**SUMMARY OF APPLICABLE
REGULATIONS AND GUIDELINES**

APPLICABLE REGULATIONS AND GUIDELINES

The following is a list of applicable regulations and guidelines:

Designated Substances

A Designated Substances report is completed to fulfil the Owner's requirements under Section 30 of the Ontario Occupational Health and Safety Act. A copy of the report must be provided to the general contractor who in turn must submit the report to all subcontractors prior to the commencement of demolition, construction or renovations.

Ontario Regulation 490/09 "Designated Substances" (O. Reg. 490/09) provides guidance on exposure monitoring, permissible exposure levels, medical monitoring, etc. for all Designated Substances in an industrial setting. There are no specific Ministry of Labour (MOL) regulations for control of the Designated Substances, with the exception of asbestos, on construction projects; however, the MOL actively enforces the general duty clause of the OHS Act to take all reasonable precautions in the circumstances of protection of a worker. It is important to note that Ontario Regulation 213/91 "Construction Projects" (O. Reg. 213/91) applies to construction projects and provides instruction on general requirements, safe work practices, reporting, etc.

ASBESTOS

Three regulations govern the control, handling, transport and disposal of asbestos in Ontario:

- Ontario Regulation 278/05 "Asbestos on Construction Projects and in Buildings and Repair Operations" made under OHS Act (O. Reg. 278/05);
- Ontario Regulation 347/90 "General – Waste Management" (as amended) made under the Environmental Protection Act (O. Reg. 347/90); and
- The regulations respecting "The Handling and Offering for Transport and Transporting of Dangerous Goods".

Ontario Regulation 278/05

Ontario Regulation 278/05 applies to buildings with regards to maintenance, renovations or demolition work where Asbestos-Containing Materials (ACMs) are or may be disturbed.

Under O. Reg. 278/05 a building owner must instate an Asbestos Management Program (AMP) for the building. The major requirements for the AMP including the following:

- Preparation and maintenance of a record of the location of asbestos-containing materials in the building;
- Notification of the building's tenants of the location of such material;
- Establishment of a training program for those employees of the owner who may work in close proximity to and disturb the material;
- Periodic inspection of the material to determine its condition;
- Remedial action on material that has deteriorated following the precautions and procedures prescribed by the regulation as Type 1, Type 2 and Type 3; and
- Removal of asbestos-containing materials to the extent practicable prior to demolition of a building or part thereof.

The regulation prescribes work to be conducted according to three procedure types. The procedure to be followed depends on the type of material and the regulation provides instruction on how the work must be performed.

Ontario Regulation 347/90

Ontario Regulation 347/90 applies to the disposal of all hazardous materials, including asbestos waste, from the location of generation to a landfill site. The regulation also prescribes procedures on how the asbestos waste is to be buried at the landfill site.

The major requirements to the building owner are to ensure that:

- The waste is appropriately packaged and labelled;
- The transport vehicle has an appropriate placard;
- The asbestos waste is transported on the same day as received by the landfill site; and
- The route of travel is the most direct.

The building owners are held responsible for their asbestos waste as prescribed in the regulation until it is accepted by the waste disposal site.

The regulations respecting the Handling and Offering for Transport and Transporting of Dangerous Goods.

These regulations govern the packaging mode of transport labelling, placards and documentation of waste while in transport. The labelling requirements differ from O. Reg. 347/90.

The major requirement to the building owner is to ensure the waste meets the packaging requirements and that a bill of lading accompanies the shipment.

LEAD

As stated previously there are no specific regulations regarding lead on construction projects; however, the MOL published a guideline entitled “Lead on Construction Projects” to raise the awareness of employers and workers to the hazards posed by lead in construction and the measures and procedures that should be taken to control those hazards.

The document provides information on the following:

- Health effects associated with lead exposure;
- Methods for controlling the lead hazard;
- Classification of work; and
- Measure and procedures for working with lead.

The guideline classifies operations involving lead-containing materials into three groups, Type 1, Type 2 and Type 3 operations. The procedure to be followed depends on the anticipated airborne concentration of lead generated during the operation, which is dependent on the type of work performed. The guideline also provides instruction on how the work must be performed.

SILICA

Again, there are no specific regulations regarding silica on construction projects; however, the MOL published a guideline entitled “Silica on Construction Projects” to raise the awareness of employers and workers to the hazards posed by silica in construction and the measures and procedures that should be taken to control those hazards.

- Health effects associated with silica exposure;
- Methods for controlling the silica hazard;
- Classification of work; and
- Measure and procedures for working with silica.

The guideline classifies operations involving silica-containing materials into three groups, Type 1, Type 2 and Type 3 operations. The procedure to be followed depends on the anticipated airborne concentration of silica generated during the operation, which is dependent on the type of work performed. The guideline also provides instruction on how the work must be performed.

METHODOLOGY

GENERAL SURVEY METHODOLOGY

The survey consisted of an extensive examination of accessible areas of the building to identify hazardous building materials. Suspected hazardous building materials were assessed based on the surveyor's knowledge regarding the historical use of hazardous building materials in buildings, through published data and through previous experiences.

Accessible is defined as an area above a suspended ceiling tile, within an access hatch or behind a closed door, not impeded by any structure, article or thing. An area enclosed by cement block, plaster, solid lumber, etc., where minor demolition is required to gain entry is considered non-accessible. The walkthrough survey was augmented with layout drawings where available.

OHE's surveyors completed a Room by Room sheet which details the findings in each room entered. The Room by Room sheet details the room number and/or room description including the materials observed in the room and the condition of the material. The Room by Room sheet also records sampling information, quantity of the material(s), accessibility of the material(s) and the recommended control action.

OHE's approach to the work followed accepted industry procedures as well as our own in-house protocols. The examination of materials was largely performed visually with some occasion where physical contact was necessary to assess the condition or examine for underlying layers.

ASBESTOS SURVEY METHODOLOGY

This following information summarizes the bulk sampling methodology, analysis methodology and the methodology used for the assessment of the condition of Asbestos-Containing Materials (ACMs).

Bulk Sampling Methodology

Bulk samples were collected for subsequent analysis during the building survey. A small volume of material (approximately one teaspoon full) was removed either from a damaged section of suspect material or cut out of intact material and then temporarily repaired by sealing with tape to prevent fibre release. Tools used in sample collection were washed after each use to prevent cross-contamination. Collected samples were placed in sealed plastic bags and shipped to an independent laboratory for analysis.

Bulk Sample Analysis Methodology

Bulk samples of suspect ACMs were analyzed in accordance with a US EPA method for the determination of asbestos content in bulk materials, EPA Method 600/R-93/116 as per requirements of O. Reg. 278 which specifies this method be used to establish

whether a material is considered to be an ACM (i.e., contains $\geq 0.5\%$ asbestos by dry weight) and for establishing its asbestos content and the type of asbestos.

The EPA Method requires that the samples be analyzed using the Polarized Light Microscopy (PLM) technique. The percentage of asbestos in the sample is measured as perceived by the analyst in comparison to standard area projections and is greatly influenced by the analyst's experience. The method is useful for the qualitative identification of asbestos (type) and the semi-quantitative (% estimates) determination of asbestos content in bulk samples.

The asbestos bulk samples were analyzed by an independent and NVLAP accredited laboratory. To ensure quality results, the independent laboratory chosen must successfully participate in an "Asbestos Proficiency Analytical Testing Program" and as such, this laboratory is responsible for their findings.

ASSESSMENT OF ACMS METHODOLOGY

The assessment of ACMs involves the evaluation of a number of factors by the surveyor including:

- Asbestos content
- Condition of the material
- Accessibility
- Water damage
- Activity and vibration
- Presence in air plenum/direct air stream

Where ACMs are found to be in good condition, firmly bound and not likely to deteriorate or fall, the recommended procedure is to evaluate the condition of the material on a periodic basis (which should be at least once every twelve-month period as required by O. Reg. 278/05 unless specified more frequently) in order to detect gradual deterioration. This process is referred to as an "Operation and Maintenance Program".

Damaged material is identified by surface crumbling, blistering, water stains, gouges, marring or being otherwise abraded. The accumulation of powder dust or debris similar in appearance to the suspect material can be used as confirmatory evidence.

In situations where the ACMs are found to have deteriorated or likely to fall, the following are the four abatement options that may be specified in this report:

Cleaning

The cleaning of asbestos-containing debris may be performed using a High Efficiency Particulate Air (HEPA) filter vacuum cleaner or by damp wiping techniques. All fallen asbestos material must be cleaned upon discovery. In situations where the material will

continue to fall due to deterioration, damage or abrasion, additional corrective work is required, i.e., the material must be repaired, permanently enclosed or removed.

Repairs

This option is usually selected in situations where damage to the ACMs are of a minor nature and is not likely to reoccur due to accessibility or activity. This method of repair is chosen in situations where performing the repair activities will not cause significant disturbance to the underlying material. Typical repairs include the repair of thermal insulation by the application of mastic (paint adhesive) to lagging (canvas cloth). The repair of sprayed fireproofing or acoustical texturized material can involve the application of an encapsulant to limited areas of abraded or damaged material. If this option is followed, the sprayed material must be capable of supporting the additional weight of the encapsulant.

Enclosure

An enclosure consists of the construction of a physical barrier, typically constructed from drywall or metal sheeting. This option is applicable in situations where the removal of materials with asbestos is not practicable, is of a high financial cost, or where damage is likely to occur without a protective barrier. Where the installation of the barrier is likely to disturb the ACMs, the work must be performed in isolation from the building's normal environment.

Removal

This option is recommended in situations where the ACMs are damaged beyond repair and the material is highly likely to be damaged due to nearby activities, by renovation or during demolition. The precautions employed may vary depending on the volume of the material to be removed and whether the material is friable or not. Typical programs can include the use of glove bags for limited amounts of thermal pipe insulation or minor amounts of fireproofing may be removed within a small polyethylene lined enclosure. For larger amounts of asbestos, more stringent protocols are used and consist of attached shower facilities, the establishment of a negative pressure differential, a filtration system for the air and monitoring for exposure to asbestos fibres.

LEAD-IN PAINT SURVEY METHODOLOGY

This following information summarizes the sampling and analysis methodology used during the survey for lead in paint.

Bulk Sampling Methodology

Bulk samples were collected for subsequent analysis during the building survey. A small volume of material (approximately one teaspoon full) was removed either from a damaged section of suspect material or removed from an inconspicuous area using clean hand tools. The collected samples were placed in sealed plastic bags and transported to an independent laboratory for analysis.

Bulk Sample Analysis Methodology

Bulk samples of suspect lead-containing materials were analyzed in accordance with a US EPA method for the determination of lead content in bulk materials, EPA Method (SW 846 3050B/7000B). The EPA Method requires that the samples be analyzed using the Flame Atomic Absorption Spectrometry (SW 846 3050B/7000B) technique. This method may be used determine trace elements in solution.

PROJECT LIMITATIONS

PROJECT LIMITATIONS

Hazardous building materials may be present in areas not accessible for view and identification. In situations where hazardous building materials extend into a non-accessible area, the materials were assumed to also be present in those areas and have been reported as such. Contractors and maintenance personnel must be warned of the possibility of undisclosed hazardous building materials in enclosed areas. All hazardous building materials discovered in these areas must be treated as a hazardous building material until proven otherwise by sampling and analysis as per all applicable regulations and guidelines.

Asbestos is assumed to be present in various building materials which were not sampled as part of the survey since they were excluded from the scope of work. These materials include, but are not limited to vermiculite in solid block walls; materials located above solid ceilings and in manufactured wall panels; elevator and lift brakes; high voltage wiring; mechanical packing, ropes and gaskets; exterior cladding, soffit and fascia boards on building; roofing materials,; caulking and mastic material; and paper and refractory materials within boilers. In cases of demolition and/or renovation, all excluded materials (i.e., suspected ACMs) shall be assumed asbestos-containing until proven otherwise by bulk sampling and analysis.

In cases where asbestos was identified in some but not all samples of similar materials, all such material was assumed and reported to contain asbestos. When a renovation is planned, we recommend a detailed sampling of suspected asbestos-containing material to confirm the presence of asbestos. Materials that are removed through renovations must be replaced with non-asbestos-containing materials only. This must be documented. Confirmatory sampling will not be required on any new products if the manufacturer supplies written confirmation that these materials are asbestos-free.

Mould impacted and water damaged building materials was not observed in specified locations at the Subject Location. The locations detailed in this report are based on the observations noted at the time of the site visit and can change over time and if the source of water intrusion is not corrected if site conditions change.

HISTORICAL DATA

