Engineers

Eva's Satellite

PHASE 1 RENOVATION

25 Canterbury Place, North York, ON M2N 0E3

BID DOCUMENTS, TECHNICAL SPECIFICATIONS, AND DRAWINGS

Prepared for:
City of Toronto, Facilities Management
Project Management Office
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Design Discipline

Documents prepared by the respective Consultants are designated by the following discipline symbols:

- Architect (A)
- Abatement Consultant (HAZ)
- Envelope Consultant (EC)
- Hardware Consultant (H)
- Structural Consultant (S)
- Owner (O)

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

Document	Title	Discipline	Pages
	Cover Page	A	1
00 01 10	Table of Contents	A	4
00 31 00	Information Available to Bidders	A	2

DIVISION 01 - GENERAL REQUIREMENTS

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01 11 00	Summary of Work	A	8
01 21 00	Allowances	A	3
01 25 00	Substitution Procedures	A	4
01 25 00.01	Request for Substitution Form	A	2
01 26 00	Contract Modification Procedures	A	5
01 26 15	Requests for Interpretation	A	2
01 26 17	Request for Interpretation Form	A	1
01 29 00	Payment Procedures	A	2
01 31 00	Coordination	A	4
01 31 19	Project Meetings	A	1
01 32 00	Construction Progress Documentation	A	6
01 33 00	Submittal Procedures	A	9
01 35 25	Safety	A	4
01 40 00	Quality Requirements	A	6
01 41 00	Regulatory Requirements	A	5
01 50 00	Temporary Controls and Facilities	A	13
01 57 16	Pest Control	A	2
01 60 00	Products Requirements	A	11
01 71 00	Examination and Preparation	A	3
01 73 29	Cutting and Patching	A	4
01 74 00	Cleaning and Waste Management	A	4
01 77 00	Closeout Procedures	A	4
01 78 00	Closeout Submittals	A	6

DIVISION 02 - EXISTING CONDITIONS

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02 41 13	Selective Demolition	S	4
02 81 00.01	Hazardous Materials Abatement General Provisions	HAZ	14
02 87 13.14	Mould Abatement - Level 2 Precautions	HAZ	7
	- Dwg MR-01 - Basement	HAZ	1

DIVISION 03 - CONCRETE

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03 01 29	Concrete Restoration - Pre-Packaged Material	S	13
03 01 31	Shoring	S	4
03 01 32	Concrete Removal - Percussive	S	4
03 01 35	Concrete Reinforcement Preparation	S	5
03 51 13	Cementitious Topping	A	4

DIVISION 04 - MASONRY

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04 20 00	Unit Masonry	A	15

DIVISION 05 - METALS

Section	Title	Discipline	Pages
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05 50 00	Miscellaneous and Metal Fabrications	A	9

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

Section	Title	Discipline	Pages
06 05 73.13	Fire-Retardant Wood Treatment	A	2
06 10 00	Rough Carpentry	S	6
06 20 00	Finish Carpentry	A	8

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

Section	Title	Discipline	Pages
07 19 00	Water Repellent Sealer	A	4
07 21 00	Thermal Insulation	A	3
07 26 00	Vapour Retarders	A	2

07 46 47	Fibre Concrete Panel Cladding	A	4
07 52 16	SBS Modified Bituminous Membrane Roofing	EC	17
07 62 00	Metal Flashing and Trim	EC	5
07 81 23	Intumescent Fireproof Coating	A	5
07 85 00	Firestopping and Smoke Seals	A	7
07 92 00	Sealants	A	6

DIVISION 08 - OPENINGS

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08 11 13	Metal Doors and Frames	A	6
08 44 00	Aluminum Work	A	12
08 70 00	Finish Hardware	A	5
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08 80 00	Glazing	A	9

DIVISION 09 - FINISHES

Section	Title	Discipline	Pages
09 21 16	Gypsum Board	A	12
09 30 00	Tile	A	10
09 30 27	Detectable/Tactile Tiles	A	4
09 65 16	Resilient Sheet Flooring	A	6
09 65 19	Resilient Tile Flooring	A	5
09 83 00	Acoustical Panels	A	4
09 91 00	Painting	A	9

DIVISION 10 - SPECIALTIES

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10 28 13	Washroom Accessories	A	6
10 80 00	Miscellaneous Specialties	A	4

DIVISION 11 - EQUIPMENT

Section	Title	Discipline	Pages
11 31 13	Appliances and Equipment	A	4
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DIVISION 12 - FURNISHINGS

Section	Title	Discipline	Pages
12 21 23	Window Coverings	A	4

DIVISION 22 - PLUMBING

Section	Title	Discipline	Pages
Refer to Mechanical Drawings for Mechanical Specifications.		M	

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING

Section	Title	Discipline	Pages
Refer to Mechanical Drawings for Mechanical Specifications.		M	

DIVISION 26 - ELECTRICAL

Section	Title	Discipline	Pages
Refer to Electrical Drawings for Electrical Specifications.		E	

DIVISION 25 - INTEGRATED AUTOMATION (Separate Price Item)

Section	Title	Discipline	Pages
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25 00 00	General Requirements	M	18
25 11 00	Basic Materials, Interface Devices and Sensors	M	36
25 11 09	Operator Interfaces	M	5
25 14 00	Field Panels	M	8
25 15 00	Software and Programming	M	13
25 30 00	Communication Devices	M	4
25 90 00	Sequences of Operation	M	8

APPENDICES

	Title	Discipline	Pages
	- Designated Substances and Hazardous Materials Report	O	33
	- Assessment Letter for Asbestos Management Program	O	1
	- Investigation of Mould Growth	O	29
	- Mould Remediation	O	95

END OF DOCUMENT

1 **REPORT(S)**

1.1 A copy of the following reports are appended at the end of this Document under 'Appendices'.

.1 **Designated Substances and Hazardous Materials Report**
Annual Survey for Designated Substances and Hazardous Materials
Eva Satellite - Youth Centre
25 Canterbury Place
Toronto, Ontario
Prepared by ECOH Management Inc.
Project No.: 16608-B141
Dated: August 31, 2016
33 pages

.2 **Assessment Letter for Asbestos Management Program**
Asbestos Management Program - 2016
Eva's Satellite - Youth Shelter
25 Canterbury Place
Toronto, Ontario
Prepared by ECOH Management Inc.
Project No.: 16608-B141
Dated: January 10, 2017
1 page

.3 **Investigation of Mould Growth**
Eva's Youth Shelter
25 Canterbury Place
Toronto, Ontario
Prepared by Pinchin Ltd.
Project No.: 316954
Dated: February 10, 2023
29 pages

.4 **Mould Remediation**
Eva's Youth Shelter
25 Canterbury Place
Toronto, Ontario
Prepared by Pinchin Ltd.
Project No.: 316954.004
Dated: October 17, 2023
95 pages

1.2 The report(s), by their nature, cannot reveal all conditions that exist or can occur on the site. Should conditions be found to vary substantially from the report, immediately notify Consultant in writing and await instructions.

1.3 Contractor shall not be entitled to extra payment or extension of Contract Time for work which is required and which is reasonably inferable in the report(s) as being necessary.

END OF DOCUMENT

1 GENERAL

1.1 Requirements of the Articles of Agreement, Conditions of the Contract, and Division 1 apply to and form all Sections of the Contract Documents and the Work.

1.2 Work in this Specification is divided into descriptive sections which are not intended to identify absolute contractual limits between Subcontractors, nor between the Contractor and their Subcontractors. Contractor is solely responsible for organizing division of labour and supply of materials essential to complete the Work. The Consultant and Owner assume no liability to act as an arbiter to establish Subcontract limits between Sections or Divisions of Work.

1.3 It is intended that Work supplied under these Contract Documents shall be complete and fully operational in every detail for the purpose required. 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.

1.4 Mention in the specifications or indication on the drawings of materials, Products, operations, or methods, requires that the Contractor provide each item mentioned or indicated of the quality or subject to the qualifications noted; perform according to the conditions stated in each operation prescribed; and provide labour, materials, Products, equipment and services to complete the Work.

1.5 Specifications, Schedules and Drawings are complementary and items mentioned or indicated on one may not be mentioned or indicated on the others. What is required by any one shall be as binding as if required by all.

1.6 Discrepancies, ambiguities or omissions:

.1 Contractors finding discrepancies or ambiguities in, or omissions from the Drawings, Specifications or other Contract Documents, or having doubt as to the meaning and intent of any part thereof shall contact the Consultant for clarification.

.2 If there are discrepancies or conflicts between Sections or between Contract Documents, then the most stringent requirements shall govern and there shall be no additional costs to the Owner.

.3 Omissions, discrepancies or ambiguities shall not include lack of reference on the Drawings or in the Specifications, or lack of reference to labour and/or Products that are required or normally recognized within respective trade practices as being necessary for the complete execution of the Work.

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

2 **SPECIFICATION LANGUAGE, STYLE, AND DEFINITIONS**

2.1 These specifications are written in the imperative mood and in streamlined form. The imperative language is directed to Contractor, unless stated otherwise.

2.2 Complete sentences by reading "shall", " Contractor shall", "shall be", and similar phrases by inference. Where a colon (:) is used within sentences and phrases, read the words "shall be" by inference.

2.3 Fulfill and perform all indicated requirements whether stated imperatively or otherwise.

2.4 Where the singular or masculine is used in the Contract Documents, it shall be read and construed as if the plural, feminine or neuter had been used when the context or the statement so requires and as required to complete the Work, and the rest of the sentence, clause, paragraph, or Article shall be construed as if all changes in grammar, gender or terminology thereby rendered necessary had been made.

2.5 Work designated as "N.I.C." is not included in this Contract.

.1 For clarity, the words "by others" when used in the Specifications or indicated on the Drawings, shall not mean by someone other than Contractor. Only means by which something shown or specified shall be indicated as not being included in Contract is by use of initials "NIC" or words "Not in (the) Contract".

2.6 When used in the context of a Product, it shall be understood the word "Provide" to mean supply, install, and connect as applicable, complete and in place including accessaries, finishes, tests, and services required for a complete installation ready for its intended use.

2.7 The terms “approved”, “review”, “reviewed”, “accepted”, “acceptance”, “acceptable”, “satisfactory”, “selected”, “directed”, “instructed”, “required”, “submit”, “permitted”, “approved alternative”, “approved equal”, or similar words or phases are used in standards or elsewhere in Contract Documents, it shall be understood, that words “by (to) the Consultant” follow, unless context provides otherwise.

2.8 The term ‘or approved equal’ following a list of Products, systems, or manufacturers used in the Contract Documents shall be construed to mean approved by Consultant. Specified products to be Base Bid. Contractor to follow ‘Substitution’ procedures specified in Section 01 25 00 for submitting proposed Products, systems, and manufacturers and obtain Consultant’s approval of the same prior to proceeding with ordering proposed Products and systems or engaging manufacturers. Contractors who purchase Products and systems or engage manufacturers prior to Consultant’s review and acceptance do so at their own risk.

2.9 Where the words 'submit', 'acceptable' and 'satisfactory' are used in the Contract Documents, they shall be considered to be followed by the words 'to the Consultant' unless the context provides otherwise.

2.10 The terms “exposed” or “exposed to view” refers to surfaces that are within the line of vision of persons from any accessible viewpoint, both within and without the building. Where any part of a surface is exposed to view, all other portions of that surface shall also be considered as exposed to view.

3 CONTRACT DOCUMENTS FOR CONSTRUCTION PURPOSES

3.1 Owner will supply Contractor with a complete set of Contract Documents in electronic format before commencement of the Work. Contractor may print hard copies for construction purposes as required.

4 DOCUMENTS AT THE SITE

4.1 Keep the following documents at Place of the Work, stored securely and in good order and available to Owner and Consultant, in electronic form:

.1 Current Contract Documents, including Drawings, Specifications, and addenda.

.2 Change Orders, Change Directives, and Supplementary Instructions.

.3 Reviewed Shop Drawings, Product data, and samples.

.4 Field test reports and records.

.5 Construction progress schedule.

.6 Meeting minutes.

.7 Manufacturer's certifications.

.8 Permits, inspection certificates and other documents required by authorities having jurisdiction.

.9 Current as-built drawings.

.10 Material Safety Data Sheets (MSDS) for all controlled Products.

.11 Daily log including:
- .1 Weather conditions.
- .2 Start and finish date of each Trade Contractor.
- .3 Dates and quantities and particulars of roof repair work.
- .4 Visits to the Site by Owner, Consultants, Jurisdictional Authorities, Testing and Inspection companies, and material and equipment supplier representatives.

5 EXISTING SITE CONDITIONS

5.1 Make a careful examination of the site, and investigate and be satisfied as to all matters relating to the nature of the Work to be undertaken, as to the means of access and egress thereto and therefrom, as to the obstacles to be met with, as to the extent of the Work to be performed, any limitations under which the work has to be executed, and any and all matters which are referred to in the Contract Documents. Claims for additional costs will not be entertained with respect to conditions which could reasonably have been ascertained by an inspection prior to Tender closing.

5.2 If the Contractor believes that the conditions of the Place of the Work differ materially from those reasonably anticipated, differ materially from those indicated in the Contract Documents or were concealed from discovery prior to the Tender closing, it shall notify the Owner and Consultant in writing no later than five (5) Working Days after the first observation of such conditions.

5.3 Report any inconsistencies, ambiguities, discrepancies, omissions, and errors between Site conditions and Contract Documents to the Consultant prior to the commencement of Work. If inconsistencies, ambiguities, discrepancies, omissions, and errors are not reported and clarified, the most stringent requirement shall govern, as determined by the Consultant. Ensure that each Subcontractor performing work related to the site conditions has examined it so that all are fully informed on all particulars which affect the Work thereon in order that construction proceeds competently and expeditiously.

5.4 Before commencing the Work of any Section or trade, carefully examine the Work of other Sections and trades upon which it may depend, examine substrate surfaces, and report in writing to the Consultant, defects which might affect new Work. Commencement of Work shall constitute acceptance of conditions and Work of other sections, trades, and Other Contractors upon which the new Work depends. If repair of surfaces is required after commencement of specific work it shall be included in the work of the trade providing the specific system or finish.

5.5 Work shown on Drawings, Schedules and Specifications may or may not be all work required to be done in existing building. Make good and perform all necessary Work including incidentals to make a complete job of alterations work. It shall be understood that the Contractor understands the existing conditions, extent of demolition, extent and nature of the Work and interfacing with existing, including extent of patching and making good required, reasonably inferable and/or good industry practice.

6 CONTRACTOR'S USE OF SITE

6.1 Except as otherwise specified, Contractor has unrestricted use of Place of the Work from time of Contract award until Ready-for-Takeover.

6.2 Accept full responsibility for the Work and storage areas from the time of Contract award until Ready-for-Takeover.

6.3 Confine Construction Equipment, Temporary Work, storage of Products, waste products and debris, and all other construction operations to limits required by laws, ordinances, permits, and Contract Documents, whichever is most restrictive. Do not unreasonably encumber Place of the Work.

6.4 Check means of access and egress, rights and interests which may be interfered with. Do not block lanes, roadways, entrances of exits or adjacent driveways. Direct construction traffic and locate access to site as directed by municipality.

6.5 Where encroachment beyond property limits is necessary make arrangements with respective property owners.

6.6 Before vehicles or equipment enter the Site, obtain permission from the Owner/Consultant for storage and appropriate access route. Appropriately barricade, stake off, or snow fence access route and storage area and around construction area in order to minimize damage to buildings, grounds, planting, turf, and surrounding facilities at the Site, and to restrict unauthorized persons from entering the construction area. Be responsible for making good any/all damages caused by operations at the Site. Restoration of such damages shall be to original condition and to the satisfaction of the Owner.

6.7 Cost of providing temporary protection, roads and services, including removal of same at completion of the Work and restoration of the involved areas to original state, shall be included in the Contract Price.

6.8 Maintain the exterior of the building during performance of the work. provide proper housekeeping measures to maintain a neat and orderly site to eliminate any complaints from surrounding neighbours.

7 ACCESS/PROPERTY CONSTRAINTS

7.1 Provide and maintain access facilities as may be required for access to the Work.

7.2 Confine Work and operations of employees to limits indicated by the Contract Documents. Do not unreasonably encumber the premises with products.

7.3 Organize delivery of materials/equipment to and removal of debris and equipment from place of Work to permit continual progress of work.

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

7.5 Make provisions and arrangements and provide allowances if times for loading and unloading allowed by the City of Toronto are other than regular working hours.

7.6 All Products, materials and equipment required on Site shall be portable and/or size suitable for access and movement on Site and without causing damage to buildings.

7.7 The Work shall be confined to the area defined on the drawings and by the property lines except that services connections and certain portions of landscaping, hard paving and curb work shall be executed on Municipal property under regulation of authorities.

7.8 Provide locked doors in barriers, permit access by Owner and Consultant to Work areas and to areas Contractor is responsible for.

7.9 Workers shall not enter existing building beyond construction areas except where required for connection or modification to existing services or other such work.

7.10 Personnel access and material deliveries to the Site shall be only by routes designated by the Owner. Owner's equipment such as trucks, bins, dollies, and other such equipment/facilities shall not be used by Contractors. Arrangements for handling items weighty or bulky enough to require special treatment must be made and reviewed with the Owner.

7.11 Advise the Owner 48 hours in advance of large or cumbersome item deliveries. Give particulars of item size and weight, protection to existing surfaces to be provided and safety precautions during movement.

8 CONTINUITY OF LIFE SAFETY SYSTEMS

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

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

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

9 CONTINUITY OF EXISTING SERVICES

9.1 Shutdowns and planning of operations that may affect Owner’s use of services shall be coordinated with, approved by, and in accordance with the Owner’s written directions. Provide advanced notice for all required interruptions to utility, heating, cooling, mechanical, electrical, and life safety systems.

9.2 Coordinate and provide necessary services, access, exiting and other facilities as required.

9.3 Make written requests for shutdown at least 5 working days in advance, unless specifically stated herein or as otherwise instructed by the Owner.

9.4 Shutdowns shall be scheduled in advance with Owner and shutdown period shall be minimized to Owner's convenience. Facilities in existing adjacent areas will be occupied during the Work.

9.5 Major shutdowns shall take place on weekends or at night by prior arrangement with and at no additional cost to the Owner.

9.6 Tag and mark switches and valves used by the Contractor to isolate services with name of Contractor, tradesman's name, date and time of shut-off, and date and time to be turned back on.

9.7 Arrange work so that physical access to existing adjacent facilities is not unduly interrupted at any one time except as approved by the Owner.

9.8 Protect existing work to remain at the commencement of each work shift in occupied areas, as completely as possible to hold the replacing of damaged work to a minimum. Provide covering and other protection material. Include protection for access routes and temporary storage areas. Make good damage to existing surfaces caused by lack of adequate protection. Protection in such areas shall be removed at the end of each work shift.

9.9 All areas shall be cleaned and left in condition suitable for use by Owner and building operations before commencement of their work day.

9.10 Minimize disruption, noisy work, vibration, and dust to the function of existing building.

9.11 These requirements are for security reasons and for the consideration of the Owner. Requirements shall not be construed as cause for elimination or restriction of Contractor's working schedule, claims for delay or work, nor additional cost.

10 **SECURITY**

10.1 Be responsible for security of all areas affected by Work of this Contract until taken over by Owner. Take steps to prevent entry to the Work by unauthorized persons and guard against theft, fire and damage by any cause. Provide safe and secure access to and egress from existing premises at all times.

10.2 Provide suitable surveillance equipment and /or employ guard services, as required to adequately protect the work.

10.3 Take acceptable precautions to guard Work site, premises, materials and the public during and after working hours due to the Work of this Contract.

10.4 A regular full time watchman is generally not required on Site, however, if in the opinion of the Consultant the Work is not adequately protected, the Owner may request that a watchman be employed by the Contractor at no extra cost to the Contract.

10.5 Any security service provided by the Owner is for the protection of the Owner's interest in the Work on the Site and shall not relieve the Contractor of the responsibility to protect the Site and the Work of the Contract.

11 **WEATHER**

11.1 Incorporate into the Contract Schedule allowances for the number of working days lost due to inclement weather, which can be anticipated, on the basis of analysis of information available from Environment Canada, for weather conditions on and near the Site, over the last ten (10) years. The Contractor may be entitled to a schedule extension for those activities on the critical path which are delayed on account of inclement weather, assessed on a quarterly basis, by the number of days in excess of the anticipated number of working days for the quarter in question by more than 20%. No additional payment will be made on account of any such schedule extension.

11.2 For the purpose of this clause the quarters are defined as January 1 to March 31, April 1 to June 30, July 1 to September 30, and October 1 to December 31.

END OF SECTION

1 GENERAL

1.1 Allowances included herein are for items of Work which could not be fully quantified prior to Bidding.

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

1.3 A schedule and scope of work shall be prepared jointly by the Consultant and Contractor to show when items called for under allowances must be authorized by the Consultant for ordering purposes so that the progress of the Work will not be delayed.

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

2 EXPENDITURE OF CASH ALLOWANCE(S)

2.1 Owner, through Consultant, will provide Contractor with documentation required to permit pricing of a cash allowance item.

2.2 Where a Cash Allowance is for work performed under a Subcontract, Owner, through Consultant, will request Contractor to identify potential Suppliers and Subcontractors, as applicable, and to obtain at least three competitive prices for each cash allowance item.

2.3 Contractor will provide to the Owner and Consultant bids, quotations, and other price related information received from potential Suppliers and Subcontractors complete with Contractor's recommendations for approval.

2.4 Owner, through Consultant, will determine by whom and for what amount each cash allowance item will be performed. Obtain Owner's prior written approval in the form of a Change Order before entering into a subcontract, amending an existing subcontract, or performing own forces work included in a cash allowance. Upon issuance of the Change Order, the Contractor's responsibilities for a cash allowance item shall be the same as for other work of the Contract.

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

2.6 Amount of each cash allowance does not include Contractor's overhead and profit, and other related costs, which shall be included in the Contract Price and not in the cash allowance.

3 CASH ALLOWANCE(S)

3.1 Cash allowances, unless otherwise specified, cover the net cost to Contractor of services, Products, supply, construction machinery and equipment, freight, delivery, handling, unloading, storage, installation where indicated, all related costs, and other authorized expenses incurred in performing the Work.

3.2 Cash allowances shall not be included by a Subcontractor in the amount for their Subcontract work.

3.3 Supply only allowances shall include:

.1 Net cost of Products as invoiced by Supplier.
.2 Delivery to Site.
.3 Applicable taxes and duties, excluding HST.

3.4 Supply and install allowances shall include:

.1 Net cost of Products.
.2 Subcontractor's overhead and profits related to the Cash Allowance.
.3 Delivery, unloading, storing, handling or Products on Site.
.4 Installation, finishing and commissioning of Products.
.5 Applicable taxes and duties, excluding HST.

3.5 Inspection and testing allowances shall include:

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

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

3.7 Include in the Bid Price the amount of each cash allowance:

.1	Testing and inspection:	$10, 000
.2	Interior room, door and wayfinding signage:	$17, 500
.3	Furniture: Beds and bedroom storage lockers (33 each):	$35, 000
.4	Furniture: All else (including but not limited to office and common area furnishings, and similar items):	$115, 000
.5	Appliances:	$30, 000
.6	Unforeseen repairs to existing floor joists and subfloor (not visible or identified in base scope at time of tender):	$25, 000

.7 Unforeseen firestopping (including fire dampers) of existing conditions not already required by the Contract Documents. (For clarity, does not include firestopping of new work): $25, 000

END OF SECTION

1.1 **DEFINITION**

.1 In this Section “Substitution” means a Product, a manufacturer, or both, not originally specified in Contract Documents by proprietary name but proposed for use by Contractor in place of a Product, a manufacturer, or both, specified by proprietary name.

1.2 **SUBSTITUTION PROCEDURES**

.1 Requests for Substitutions will not be accepted prior to the Notification of Award.

.2 Contractor may only propose a Substitution wherever a Product or manufacturer is specified by proprietary name(s) and accompanied by language such as "or approved equal", or other similar words. Do not construe such language as an invitation to unilaterally provide a Substitution without Consultant’s prior acceptance in writing. Do not order or install any Substitution without a Supplemental Instruction or Change Order. If the above wording is not indicated, no Substitution of a Product or manufacturer will be accepted.

.3 Provided a proposed Substitution submission includes all of the information specified in this Section and information in a completed Substitution Form. Consultant will promptly review and accept or reject the proposed Substitution within 10 working days of a complete submission.

.4 Substitutions must indicate the change in Contract Price, inclusive of fees for drawing changes, schedule impact, detailed difference in specified and substitute Products and confirmation the Contractor has reviewed all possible impacts of the change.

.5 Substitutions will not be considered if:
- .1 They do not meet the requirements of this Section.
- .2 They are indicated or implied on Shop Drawings or Product data without Consultant’s acceptance.
- .3 Acceptance with require substantial revisions to the Specifications and Contract Drawings.

.6 Consultant may accept a Substitution if satisfied that:
- .1 the proposed substitute Product is the same type as, is capable of performing the same functions as, interfaces with adjacent work the same as, and meets or exceeds the standard of quality, performance and, if applicable, appearance and maintenance considerations, of the specified Product,
- .2 the proposed substitute manufacturer has capabilities comparable to the specified manufacturer, and
- .3 the Substitution provides a benefit to Owner.

.7 If Contractor fails to order a specified Product or order a Product by a specified manufacturer in adequate time to meet Contractor's construction schedule, Consultant will not consider that a valid reason to accept a Substitution.

.8 If Consultant accepts a Substitution and subject to Owner's agreement, the change in the Work will be documented in the form of either a Supplemental Instruction or Change Order as specified in Section 01 26 00.

.9 Substitutions shall not be used until authorized in writing by the Consultant.

.10 If a Substitution is accepted in the form of a Supplemental Instruction or Change Order, Contractor shall not revert to an originally specified Product or manufacturer without Consultant's prior written acceptance.

.11 Ensure that substituted Products do not require changes to other Products and space requirements and do not exceed space allotted to specified Products. Installation of the accepted substitution is coordinated into the Work and that full responsibility is assumed when substitutions affect other work. Make any necessary changes required to complete the Work. Revisions to the drawings for incorporation of the substitutions shall be made by the Consultant and all costs associated with the revisions shall be borne by the Contractor.

.12 Approved substituted Products shall be subject to the Consultant's inspection and testing procedures. Approved substituted Products shall only be installed after receipt of the Consultant's written approval.

.13 All claims are waived for additional costs related to the substitution which may subsequently arise, including but not limited to costs for additional Products and labour, redesign fees or for delays due to acceptance of substitutions are the responsibility of the Contractor.

1.3 **SUBMISSION REQUIREMENTS FOR PROPOSED SUBSTITUTIONS**

.1 Include with each proposed Substitution the following information:

- .1 Reason(s) for proposing the Substitution and the proposed substitutions has been investigated and complete information and data as specified in this Section is submitted. Consultant will only review information and data submitted. Incomplete data will be grounds for non-acceptance.
- .2 Identification of the Substitution, including product name and manufacturer's name, address, telephone numbers, and web site.
- .3 Data and a statement verifying that the proposed Substitution will not affect the Contract Price and Contract Time, unless the proposed Substitution results in a decrease in the Contract Price and Contract Time.
- .4 Submit data and relevant information in Request for Substitution Form appended to this Section.

.5 Same warranty or better is given for the substitution as for the original Product specified.

.6 A statement verifying that the Substitution will not affect the performance or warranty of other parts of the Work, including verification that it does not exceed space allotted to specified Products.

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

.8 Product samples as applicable or requested.

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

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

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

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

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

1.4 **SUBSTITUTIONS TO METHODS AND PROCESSES**

.1 Substitutions to methods or processes described in the Specifications or drawings, may be proposed for the consideration of the Consultant. Ensure that such substitutions are in accordance with the following requirements:

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

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

.3 Be responsible for substitutions to methods or processes concerning such Work and ensure that the warranty covering all parts of the Work will not be affected.

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

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

END OF SECTION

1 **General Information**

Project Name: _____

Project #: _____ Date: _____

General Contractor: _____

Product Specified: _____ Division and Section: _____

Product Substitute: _____ Manufacturer Contact: _____

2 **Proposed Substitutions**

Accepted proposed substitutions will be incorporated into the Contract via a Change Order and the Contract Price will be adjusted accordingly. Proposed substitutions may be accepted or rejected at the Owner's discretion.

Provide the appropriate data for comparison showing conformance to specified standards, dimensions, fabrication, colour, quality assurance, warranty, execution etc. as necessary for the Consultant to confirm the Substituted Product meets or exceeds the specifications. At the time of this submittal, provide the Consultant with the relevant Architectural details which prove conformance with the design intent and coordination with and installation by affected trades.

Complete the following chart, so a proper comparison can be made between specified and proposed Product/assembly. Submit a separate sheet for each proposed substitution. Do not submit manufacturer's MDSD sheets as they will not be reviewed.

Specified Product	**Proposed Substitution**
Specification Section:	Specification Section:
Detail Description:	Detail Description:
	Reason for Substitution: Rationale for substitution: Schedule impact: Cost impact:

Significant qualities of specified Product as applicable: Size/thickness: Durability: Performance: Visual Effect: Warranty Duration:	Significant qualities of proposed substitution as applicable: Size/thickness: Durability: Performance: Visual Effect: Warranty Duration: (Include correlating modifications required to other work.)
	Has item been used in a similar application: Y / N Describe application:
	Changes required, if any, in other elements of the Work to accommodate proposed substitution:
	Include attached as applicable to proposed substitution: Drawings: Product Data: Samples: Reports: Other:

END OF FORM

1.1 SCHEDULE OF LABOUR RATES

.1 Prior to the first application for payment, submit for the Consultant's review a schedule of labour rates for all trades and classifications of trades, such as journeymen, apprentices, and foremen that will be employed in the Work. Provide a breakdown of payroll burden component of labour rates.

.2 Labour rates shall reflect the salaries, wages, and benefits paid to personnel in the direct employ of the Contractor, Subcontractors, and sub-Subcontractors, stated as hourly rates, that will be used when:
.1 Preparing price quotations for Change Orders, and
.2 Determining the cost of work attributable to Change Directives.

.3 Labour rates stated in the schedule of labour rates shall be consistent with rates that will actually be paid, and payroll burden costs that will actually be incurred, in the normal performance of the Work, during regular working hours. Labour rates shall not include any additional overhead and profit component.

.4 Where collective agreements apply, the labour rates shall not exceed those established by collective agreement.

.5 Obtain the Owner's written acceptance of the schedule of labour rates before submitting the first Change Order quotation.

.6 Accepted schedule of labour rates will be used solely for evaluating Change Order quotations and cost of performing work attributable to Change Directives.

.7 The Contractor may request amendments to the accepted schedule of labour rates if changes in the labour rates that will actually be paid, or payroll burden cost that will actually be incurred, in the normal performance of the Work can be demonstrated. Obtain the Owner's written acceptance of such changes.

1.2 SCHEDULE OF EQUIPMENT RATES

.1 Equipment rates shall reflect the rates that will be used when:
.1 Preparing price quotations for Change Orders, and
.2 Determining the cost of work attributable to Change Directives.

.2 Equipment rates stated in the schedule shall be consistent with local equipment rental market rates and shall not include any additional overhead and profit component.

.3 Obtain the Owner's written acceptance of the schedule of equipment rates before submitting the first Change Order quotation.

.4 Accepted schedule of equipment rates will be used solely for evaluating Change Order quotations and cost of performing work attributable to Change Directives.

.5 The Contractor may request amendments to the accepted schedule of equipment rates if changes in local equipment rental market rates can be demonstrated. Obtain the Owner's written acceptance of such changes.

1.3 **METHOD OF CONTRACT PRICE ADJUSTMENT - CHANGE ORDERS**

.1 Unless otherwise agreed, the adjustment of the Contract Price on account of a proposed change in the Work shall be based on a quotation for a fixed price increase or decrease to the Contract Price regardless of the Contractor's actual expenditures and savings.

1.4 **CHANGE ORDER PROCEDURES**

.1 Upon issuance by the Consultant to the Contractor of a proposed change in the Work, and unless otherwise requested in the proposed change or unless otherwise agreed:

.1 Submit to the Consultant a fixed price quotation for the proposed change in the Work within 5 days after receipt of the proposed change in the Work.

.2 If requested in the proposed change, provide a detailed breakdown of the price quotation including the following to the extent applicable, with appropriate supporting documentation:

.1 Estimated labour costs, including hours and applicable hourly rates based on the accepted schedule of labour rates.

.2 Estimated Product costs, including Supplier quotations and estimated quantities.

.3 Estimated Construction Equipment costs.

.4 Enumeration of all other estimated costs included in the price quotation.

.5 Estimated credit amounts for labour and Products not required on account of the proposed change.

.6 Fees, not exceeding the applicable percentages for overhead and profit as specified in this Section.

.7 Where applicable, Subcontractor quotations, also including a detailed breakdown of all of the above.

.3 Include in the quotation the increase or decrease to the Contract Time, if any, for the proposed change, stated in number of days.

.4 Include in the quotation the number of days for which the quotation is valid.

.5 The quotation will be evaluated by the Consultant and the Owner and, if accepted by the Owner, be documented in the form of a signed Change Order.

1.5 FEES FOR OVERHEAD AND PROFIT – CHANGE ORDERS

.1 The Consultant shall have 10 working days for review of a complete quotation. If revisions, clarifications or additional information is required, the Contractor shall provide the same within 5 working days.

.2 Except unless otherwise noted in the Contract, where the Contractor's price quotation for a Change Order results in a net increase to the Contract Price, the Contractor's entitlement to a fee for overhead and profit in the quotation shall be as follows, as applicable:

.1 For work to be performed by the Contractor's own forces, 10 % of the Contractor's price quotation before the Contractor's fee is applied.

.2 For work to be performed by a Subcontractor, 5 % of the Subcontractor's price quotation including the Subcontractor's fee.

.3 Where a Subcontractor's price quotation for a Change Order results in a net increase to the Subcontractor's contract price, the Subcontractor's entitlement to a fee for overhead and profit in the quotation shall be as follows, as applicable:

.1 For work to be performed by the Subcontractor's own forces, 10 % of the Subcontractor's price quotation before the Subcontractor's fee is applied.

.2 For work to be performed by a sub-Subcontractor, 5 % of the sub-Subcontractor's price quotation including the sub-Subcontractor's fee.

.3 Where the Contractor's or a Subcontractor's price quotation for a Change Order results in a net decrease in price before adjustment for fees for overhead and profit, such a price quotation shall be for the net decrease without any adjustment for fees for overhead and profit.

1.6 METHOD OF CONTRACT PRICE ADJUSTMENT - CHANGE DIRECTIVES

.1 Unless the Owner and the Contractor reach an earlier agreement on the adjustment to the Contract Price by means of a Change Order that cancels the Change Directive, the adjustment in the Contract Price for change carried out by way of a Change Directive shall be determined as specified in the General Conditions of Contract after the change in the Work is completed.

1.7 CHANGE DIRECTIVE PROCEDURES

.1 Pending determination of the value of a Change Directive, the value of the work performed as a result of the Change Directive is not eligible to be included in progress payments, except by way of a Change Order.

.2 If a Change Directive is issued for a change in the Work for which a proposed change was previously issued, but no Change Order has yet been signed, the Change Directive shall cancel the proposed change and any Contractor quotations related to that change in the Work.

.3 When proceeding with a change in the Work under a Change Directive, keep accurate records of daily time sheets for labour and Construction Equipment, and invoices for Product and Construction Equipment costs. Submit such records to the Consultant daily, until the Change Order superseding the Change Directive is issued.

1.8 FEES FOR OVERHEAD AND PROFIT – CHANGE DIRECTIVES

.1 Except unless otherwise noted in the Contract, the Contractor's entitlement to a fee for overhead and profit on the Contractor's expenditures and savings attributable to a Change Directive shall be as follows, as applicable:

.1 For work performed by the Contractor's own forces, 10 % of the Contractor's net increase in costs.

.2 For work performed by a Subcontractor, 5 % of the sum of the Subcontractor's net increase in costs plus the Subcontractor's fee.

.2 A Subcontractor's entitlement to a fee for overhead and profit on the Subcontractor's expenditures and savings attributable to a Change Directive shall be as follows, as applicable:

.1 For work performed by the Subcontractor's own forces, 10 % of the Subcontractor's net increase in costs.

.2 For work performed by a Sub-subcontractor, 5 % of the sum of the Sub-subcontractor's net increase in costs plus the Sub-subcontractor's fee.

.3 Where a Change Directive results in net savings on account of work not required to be performed and a net decrease in the Contractor's or Subcontractor's cost, the net savings to the Contractor or Subcontractor shall be calculated without any adjustment for fees for overhead and profit.

.4 When a Change Directive is ultimately recorded as a Change Order, there shall be no additional entitlement to fees for overhead and profit beyond those specified in this article.

1.9 **SUPPLEMENTAL INSTRUCTIONS**

.1 The Consultant may issue Supplemental Instructions to provide clarifications to the Contract Documents, provide additional information, or make minor variations in the Work not involving adjustment in the Contract Price or Contract Time.

.2 If the Contractor considers a Supplemental Instruction to require an adjustment in Contract Price or Contract Time, the Contractor shall promptly notify the Consultant and the Owner in writing with 5 working days and shall not proceed with any work related to the Supplemental Instruction pending receipt of a Change Order, a Change Directive, or, in accordance with the dispute resolution provisions of the General Conditions of Contract, a Notice in Writing of a dispute and instructions to proceed. Proceeding with the work or failure to furnish a notice in writing constitutes agreement the work does not involve adjustment to Contract Price or Contract Time.

END OF SECTION

1.1 REQUEST FOR INTERPRETATION (RFI)

.1 A Request for Interpretation (RFI) is a formal process used during the Work to obtain an interpretation of the Contract Documents or to obtain additional information.

.2 An RFI shall not constitute notice of claim for a delay.

1.2 SUBMITTAL PROCEDURES

.1 Number RFIs consecutively in one sequence in order submitted, in numbering system as established by the Contractor and agreed to by the Consultant.

.2 Submit one distinct subject per RFI form. Do not combine unrelated items on one form.

.3 Each individual RFI query to be answered is to be separately numbered.

.4 RFI form:

.1 Submit RFIs to the Contractor on "Request for Interpretation" form, appended to this Section. The Consultant shall not respond to an RFI except as submitted on this form.

.2 Where RFI form does not have sufficient space to provide complete information thereon, attach additional sheets as required.

.3 Submit with RFI form all necessary supporting documentation.

.5 RFI log:

.1 Maintain log of RFIs sent to and responses received from the Consultant, complete with corresponding dates.

.2 Submit updated log of RFIs with each application for payment submission.

.6 Submit RFIs sufficiently in advance of affected parts of the Work so as not to cause delay in the performance of the Work. Costs resulting from failure to do so will not be paid by the Owner.

.7 Only the Contractor shall submit RFIs to the Consultant.

.8 RFIs submitted by Subcontractors or Suppliers directly to the Consultant shall not be accepted.

1.3 SCREENING OF RFIs

.1 Subcontractor and Contractor shall satisfy themselves that an RFI is warranted by undertaking a thorough review of the Contract Documents to determine that the claim, dispute, or other matters in question relating to the performance of the Work or the Interpretation of the Contract Documents cannot be resolved by direct reference to the Contract Documents.

.2 Contractor shall describe in detail this review on the RFI form as part of the RFI submission. RFI submittals that lack such detailed review description, or where the detail provided is, in the opinion of the Consultant, insufficient, shall not be reviewed by the Consultant and shall be rejected.

1.4 **RESPONSE TO RFI**

.1 Consultant shall review RFIs from the Contractor submitted in accordance with this Section with the following understandings:

.1 Consultant's response shall not be considered as a Change Order or Change Directive, nor does it authorize changes in the Contract Price or Contract Time or changes in the Work.

.2 Only the Consultant shall respond to RFIs. Responses to RFIs received from entities other than the Consultant shall not be considered valid.

1.5 **RESPONSE TIMING**

.1 Allow 5 Working Days for review of each RFI by the Consultant.

.2 Consultant's review of RFI commences on date of receipt of RFI submission by the Consultant from Contractor and extends to date RFI returned by Consultant.

.3 When the RFI submission is received by Consultant before noon, review period commences that day. When RFI submittal is received by Consultant after noon, review period begins on the next Working Day.

.4 If, at any time, the Contractor submits a large enough number of RFIs or the Consultant considers the RFI to be of such complexity that the Consultant cannot process these RFIs within 5 Working Days, the Consultant, will confer with the Contractor and the originator of the RFI within 3 Working Days of receipt of such RFIs, and the Consultant, the Contractor, and the originator will jointly prepare an estimate of the time necessary for processing same as well as an order of priority among the RFIs submitted. The Contractor and originator shall accommodate such necessary time at no increase in the Contract Time and at no additional cost to the Owner.

END OF SECTION

RFI Number: **RFI-**

Date Prepared:

File:

Contractor: **RFI from:**

Attention:

RFI Item	Question	Spec/Detail Ref
1	List RFI items here or refer to attached RFI document from contractor.	

Note: The following response provides an answer to the request for information noted herein. Proceeding with work in accordance with this response indicates the *Contractor's* acknowledgment that there will be no change in the *Contract Price* and/or *Contract Time*. If the *Contractor* believes that this response affects the *Contract Price* or *Contract Time*, the *Contractor* shall promptly notify the *Consultant.*

RFI Item	Response

RFI Response by: **Date:**

Attachments

list attachments or state "none"

1.1 SCHEDULE OF VALUES

.1 Prior to the first application for payment, submit for Consultant's review an initial schedule of values. Modify the initial schedule of values if and as requested by Consultant. Obtain Consultant's written acceptance of the initial schedule of values prior to the first application for payment.

.2 Together with the first and all subsequent applications for payment, submit updated versions of the schedule of values to indicate the values, to the date of application for payment, of work performed and Products delivered to Place of the Work.

.3 Provide the schedule of values in an electronic spreadsheet format based on a format acceptable to all parties to the Contract, that provides for inclusion of the following information:

- .1 Identifying information including title and location of the Work, name of Contractor, number and date of application for payment, and period covered by the application for payment.
- .2 A work breakdown structure that is sufficiently detailed and comprehensive to facilitate Consultant's evaluation of applications for payment at an appropriate level of detail.
- .3 Provisions for approved Change Orders, allowances, and other relevant values, so that the breakdown amounts indicated in the schedule of values aggregate to the current total Contract Price. Also provide for indicating the estimated value of Change Directives within the schedule of values, separately from the current total Contract Price.
- .4 For each item in the work breakdown structure, provide as a minimum the following information, under headings as indicated:
  - .1 Breakdown Amount: A dollar amount, including an appropriate pro rata portion of Contractor's overhead and profit.
  - .2 Performed to Date: The value of Work performed and Products delivered to Place of the Work up to the date of the application for payment, stated as a percentage of the Contract Price and in dollars.
  - .3 Previously Performed: The value of Work performed and Products delivered to the Place of the Work for which payment has been previously certified, stated in dollars.
  - .4 Current Period: The value of Work performed and Products delivered to Place of the Work for which Contractor is currently applying for payment, stated in dollars.
  - .5 Balance to Complete: The value of Work not yet performed and Products not yet delivered to Place of the Work, stated in dollars.

.5 Schedule of Values shall include:

.1 Allocation for delivery of complete Closeout Documents required by the Contractor in the amount of 1% of the Contract Price, provided that such amount shall in no case be less than Five Thousand Dollars ($5,000) or more than Fifty Thousand Dollars ($50,000).

.2 Allocation for the preparation of the baseline schedule in the amount $15,000.

1.2 **CASH FLOW PROJECTION**

.1 Prior to the first application for payment submit, as part of start-up and mobilization, for Consultant's review, a forecast of approximate monthly progress payments for each month of the Contract Time.

.2 Submit revised cash flow forecasts on a monthly basis when required due to significant changes in rate of progress of the Work or significant changes in the Contract Price or as requested by Consultant.

1.3 **WORKERS' COMPENSATION CLEARANCE**

.1 Submit proof of workers' compensation clearance with each application for payment.

1.4 **STATUTORY DECLARATIONS**

.1 Submit a statutory declaration in the form of CCDC 9A – Statutory Declaration of Progress Payment Distribution by Contractor with each application for payment except the first.

END OF SECTION

1 GENERAL

1.1 Coordination of the Work of all Sections of the specifications as required to complete the Project is the responsibility of the Contractor.

1.2 Cooperate and coordinate with Other Contractors including Other Contractor's employed by Owner.

1.3 Ensure that Subcontractors and trades cooperate with other subcontractors and trades whose work attaches to or is affected by their own work. Ensure that minor adjustments are made to make adjustable work fit fixed work.

1.4 Allow access of Owner's Other Contractors on site and to areas of Work. Cooperate and coordinate with such Other Contractors. Schedule work to complement work of such Other Contractors.

1.5 Entry by the Owner's own forces and by Other Contractors shall not mean acceptance of the Work and shall not relieve the Contractor of their responsibility to complete the Contract.

1.6 Placing, installation, application and connection of work by the Owner’s own forces or by Other Contractors on and to the Contractor's Work shall not relieve the Contractor of his responsibility to provide and maintain the specified warranties.

1.7 Coordinate with removals/installations specified in other Divisions and Other Contracts.

1.8 Coordination of the installation of systems specified in Divisions 13, 21, 22, 23 and 26, including the interrelating operation and functioning between components of a system and between systems, is the responsibility of those performing the work of those Divisions, with final coordination the responsibility of the Contractor.

1.9 Coordinate relocation of existing mechanical and electrical items with work specified in Divisions 13, 21, 22, 23, and 26.

1.10 Existing equipment shall remain in present locations unless designated otherwise. Protect from damage. Remove, store and reinstall existing fixed equipment, fixtures and components which interfere with construction and which are scheduled for relocation.

1.11 Pay particular attention to types of ceiling construction and clearances throughout, especially where recessed fixtures are required. Coordinate work with Other Contractors and Subcontractors wherever ventilation ducts or piping installations occur to ensure that conflicts are avoided.

1.12 Install ceiling mounted components in accordance with final ceiling plans. Inform Consultant of conflicting installations.

1.13 Install and arrange ducts, piping, tubing, conduit, equipment, fixtures, materials and product to conserve headroom and space with minimum interference and in neat, orderly and tidy arrangement. Run pipes, ducts, tubing and conduit, vertical, horizontal and square with building grid unless otherwise indicated. Install piping, ducts, and conduit as close to underside of structure as possible unless shown otherwise.

1.14 Make provision, without interference or restriction by items located within the ceiling space, for unrestricted relocation of light fixtures to replace ceiling panels at grid spaces of the same size.

1.15 Where supports or openings are to be left for the installation of various parts of the Work furnish the necessary information to those concerned in ample time so that proper provision can be made for such items. Have cutting, drilling and other remedial work, and the subsequent patching or other work required for failing to comply with this requirement, performed at a later date at no additional Cost to Owner.

1.16 Properly coordinate the work of the various Sections and trades, taking into account the existing installations to assure the best arrangement of pipes, conduits, ducts and mechanical, electrical and other equipment, in the available space. Under no circumstances will any extra payment be allowed due to the failure by the Contractor to coordinate the work. If required, in critical locations, prepare interference and/or installation drawings showing the work of the various Sections as well as the existing installation, and submit these drawings to the Consultant for review before the commencement of work. Proceed with work in these areas only as, and when directed by the Consultant.

1.17 Coordinate with mechanical and electrical trades to ensure protecting supporting, disconnecting, cutting off, capping, diverting, relocating or removing of existing services in areas of Work before commencement of alteration work.

1.18 In case of damage to active services on utilities, notify Consultant and respective authorities immediately and make all required repairs under direction of Consultant and respective authorities. Carry out repairs to such damaged services and utilities continuously to completion, including working beyond regular working hours. Costs to be borne by the Contractor.

2 METRIC DIMENSIONS

2.1 Measurements in this specification 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.

2.2 All metric units specified shall be taken to be the minimum acceptable unless otherwise noted.

2.3 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. Be responsible for coordinating products supplied in metric (SI) and imperial units into the overall layout.

2.4 Where both metric and imperial sizes or dimensions are shown, the metric size or dimension shall govern.

3 BUILDING DIMENSIONS

3.1 Take necessary job dimensions for the proper execution of the work. Assume complete responsibility for the accuracy and completeness of such dimensions, and for coordination.

3.2 Verify that work, as it proceeds, is executed in accordance with dimensions and positions indicated which maintain levels and clearances to adjacent work, as set out by requirements of the Drawings, and ensure that work installed in error is rectified before construction resumes.

3.3 Check and verify dimensions referring to the work and the interfacing of services.

3.4 Do not scale directly from the Drawings. If there is ambiguity or lack of information, immediately inform the Consultant. Changes required through the disregarding of this clause shall be the responsibility of the Contractor.

3.5 All details and measurements of any work which is to fit or to conform with work installed shall be taken at the building.

3.6 Advise Consultant of discrepancies and if there are omissions on Drawings, particularly reflected ceiling plans and jointing patterns for surfaces finishes, which affect aesthetics, or which interfere with services, equipment or surfaces. Do not proceed with work affected by such items without direction from the Consultant.

3.7 Provide written requirements for site conditions and surfaces necessary for the execution of respective work, and provide setting drawings, templates and all other information necessary for the location and installation of material, holes, sleeves, inserts, anchors, accessories, fastenings, connections and access panels. Inform respective contractors whose work is affected by these requirements and preparatory work.

4 INTERFERENCE AND COORDINATION DRAWINGS

4.1 Coordinate placement of equipment to ensure that components will be properly accommodated within the spaces provided prior to commencement of work.

4.2 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the spaces provided. Provide copies of interference drawings to Consultant when requested by Consultant.

4.3 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.

4.4 Take complete responsibility for any remedial work that results from failure to coordinate any aspect of the Work prior to its fabrication/installation.

4.5 Ensure that accesses and clearance required by jurisdictional authorities and/or for easy maintenance of equipment are provided in the layout of equipment and services.

5 SLEEVING AND INSERT DRAWINGS AND TEMPLATES

5.1 Prepare sleeving drawings for work of Divisions 13, 21, 22, 23, and 26, showing size and location of all penetrations through load bearing elements. Submit sleeving drawings in the form of one transparency and 4 prints to Consultant for review not less than 15 days prior to construction of affected elements.

5.2 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.

5.3 Ensure that setting drawings, templates, and all other information necessary for the location and installation of materials, fixtures, equipment, holes, sleeves, inserts, anchors, accessories, fastenings, connections, and access panels are provided by each Section whose work requires cooperative location and installation by other Sections, and that such information is communicated to the applicable installer.

5.4 Provide cutting, fixing and making good to the work of Other Contractors, Subcontractors and trades as required for sleeving and inserts and make up time lost as a result of failure to comply with this requirement, at no additional cost to the Owner.

END OF DOCUMENT

1 CONSTRUCTION START-UP MEETING

1.1 Promptly after Contract award, Consultant will establish the time and location of a construction start-up meeting to review and discuss administrative procedures and responsibilities. Consultant will notify Contractor at least 5 Working Days before the meeting.

1.2 Senior representatives of Owner, Consultant(s), and Contractor, including Contractor's project manager and site superintendent, and major Subcontractors, shall be in attendance.

1.3 Consultant will arrange attendance of other interested parties not responsible to the Contractor.

1.4 Contractor's representative will record and distribute meeting minutes within 3 Working Days of meeting date.

2 CONSTRUCTION PROGRESS MEETINGS

2.1 Attend regularly scheduled progress meetings to be held on Site at times and dates that are mutually agreed to by the Owner, Consultant, and Contractor.

2.2 Contractor to arrange for and provide physical space for meetings

2.3 Coordinate and organize attendance of individual Subcontractors and Suppliers when requested. Relationships and discussions between Subcontractor participants are not the responsibility of the Consultant and do not form part of the meetings content.

2.4 Ensure that Contractor representatives in attendance at meetings have required authority to commit Contractor to actions agreed upon. Assign same persons to attend such meetings throughout the contract period.

2.5 Consultant will arrange attendance of other interested parties not responsible to the Contractor.

2.6 Contractor's representative will record and distribute meeting minutes within 3 Working Days of meeting date.

2.7 Contractor to provide 2-week look ahead schedule 2 working days prior to meeting.

END OF SECTION

1 GENERAL

1.1 Be responsible for planning and scheduling the Construction Progress Documentation of the Work.

1.2 Be responsible for ensuring that Subcontractors plan and schedule their respective portions of the Work. Subcontractor's schedules shall form part of the above mentioned schedules.

2 SCHEDULE MANAGEMENT

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

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

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

3 CASH FLOW CHART

3.1 As part of start-up and mobilization, submit cash flow chart as specified herein.

3.2 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.

3.3 Update cash flow chart whenever changes occur to scheduling and in manner and at times satisfactory to Consultant.

4 CONTRACT SCHEDULE

4.1 As part of start-up and mobilization, submit Contract Schedule as specified herein.

4.2 Prepare and submit, in a format acceptable to the Owner, the Contract Schedule within 10 Working Days following award of Contract. This schedule, once it is reviewed by the Consultant and Owner and if it meets the project requirements, will form part of the Contract.

4.3 Contract Schedule shall be developed using a logic network technique for planning and scheduling.

4.4 Contract Schedule shall be submitted for approval in its optimum levelled form. This presentation may be in either a time scaled network or a bar chart form. It shall be subdivided into either work areas or systems as applicable.

4.5 Contract Schedule shall include but not be limited to the following information. Information to be provided in a sufficient level of detail to effectively manage the construction process.

.1 Starting and ending dates, milestones, and key activities of each activity including the float periods.

.2 Work Packages.

.3 Manpower requirements for each activity.

.4 Order and delivery dates for long delivery Products and major or critical equipment.

.5 Interdependency with activities of other Contractors.

.6 Dates specified in the Contract Documents.

.7 Milestone dates for Ready-for-Takeover and Substantial Performance of the Work.

.8 Inspection and testing activities.

.9 Dates on which specific data will be required for submittal, i.e., Vendor data, shop drawings, samples, etc.

.10 Preparation and review of Mock-ups.

.11 Shutdown or closure activities.

.12 Demonstration and training activities.

4.6 Submit updated schedule to the Consultant and Owner monthly indicating as a minimum actual and projected start and finish dates, report date line and progress, activity relationships, float, Contract changes as well as major changes to the schedule.

5 DETAILED CONSTRUCTION SCHEDULE

5.1 Prepare and submit a detailed construction schedule within 10 Working Days of final review and acceptance of the Contract Schedule. This schedule, once reviewed and accepted by the Consultant, will be updated and submitted monthly with the Contract Schedule and weekly once the Contractor starts on Site.

5.2 This schedule shall cover the construction period. It will show, in detail, activities on a daily basis indicating durations, manpower and constraints. The activities shown on this schedule shall further clarify or detail the activities shown on the Contract Schedule.

5.3 The detailed construction schedule shall be presented in a bar chart form.

6 SUBMITTALS SCHEDULE

6.1 Format and Content:

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

.2 Prepare schedule in electronic format acceptable to Owner.

.3 Provide a separate line for each required submittal, organized by Specification section names and numbers, and further broken down by individual Products and systems as required.

.4 Allow time in schedule for review of submittals and resubmission of submittals, should resubmission be necessary.

6.2 Submission:

.1 As part of start-up and mobilization, submit initial schedule as specified herein.

.2 Submit initial schedule to Consultant within 15 Working Days after Contract award.

.3 Submit schedule in format acceptable to Owner.

.4 Consultant will review format and content of initial schedule and request necessary changes, if any, within 10 Working Days after receipt.

.5 If changes are required, resubmit finalized schedule within 5 Working Days after return of review copy.

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

7 PROGRESS RECORDS

7.1 Maintain on site, permanent written records of daily progress of the Work. Records shall be open to review by Consultant and Owner at all times and a copy shall be furnished to Consultant on a weekly basis.

7.2 Records shall show dates of commencement, progress and completion of various trades and items of work. Particulars pertaining to number of employees of various trades and type and quantity of equipment employed daily, temperature, protection methods and other such data shall be noted.

8 RECORDING ACTUAL SITE CONDITIONS ON AS-BUILT DRAWINGS

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

8.2 Electronic copies of Contract Drawings can be obtained from Consultant in AutoCAD format at a cost of $150 plus HST per sheet for Architectural Drawings. A 'Release/Terms of Use' waiver may be required to be signed at the Consultant's sole discretion.

8.3 Clearly label each drawing as "AS-BUILT DRAWING prepared by _____ _____ (name of Contractor)". Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

8.4 Authorized deviations from drawings shall be marked in red accurately on one set of drawing prints in a neat, legibly printed manner and shall be dated. Prior to final inspection, neatly transfer the recorded information to a second set of drawing prints of the most recent revision to the drawings and submit both sets to the Consultant.

8.5 Maintain as-built drawings up to date as Work progresses. Status of maintained as-built drawings may be considered as a condition for validation of applications for payment. Make as-built drawings available to the Consultant at all times.

8.6 Record actual construction including but not limited to the following:

.1 Accurate dimensioned record of deviations and changes in Work from drawings.

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

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

.4 Field changes of dimension and detail.

.5 Changes made by Change Orders and Supplemental Instructions

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

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

8.7 Accurately record locations of concealed structure, mechanical and electrical services and similar Work not clearly in view, the location of which is required for maintenance, alteration Work and future additions. Do not conceal such Work until the location has been recorded.

8.8 Accurately record locations of equipment bases, anchors, sleeves, piping, conduits, ducts, maintenance holes and valves, etc. located either below, outside or within structure.

8.9 Where piping, conduits and ducts are underground, underfloor, embedded in concrete or otherwise in inaccessible locations, accurately record with respect to structure column lines or walls and elevations with respect to finished floor levels or grades referenced to the centre line of components.

8.10 Accurately record any components which will be in inaccessible locations for Consultant's review before the component is covered, or buried, or made inaccessible.

8.11 As-built drawings shall be signed and dated by Contractor.

8.12 Submit as-built drawing to Consultant for review and make corrections as directed by Consultant.

9 PROGRESS PHOTOGRAPHS

9.1 Concurrently with monthly application for payment submit 2 CD's or DVD's of digital pictures in high definition, in format acceptable to Owner, illustrating the progress of the Work as follows:

.1 A minimum of 20 pictures that best illustrate the progress on the site.

.2 Pictures shall be in focus and properly illuminated; view shall be unobstructed.

.3 Pictures shall be taken with a minimum 10 megapixel camera or better such that quality and details can be discerned from photo.

.4 Pictures shall either have an accurate date-stamp present in the photo, or be numbered and dated in the digital filename.

.5 The CD or DVD containing the photo's shall be labeled with the following information: The project name, date taken, the period the pictures are taken in, name of photographer, description of view and date of photograph taken, and the monthly application number which the pictures are associated with.

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

10 **PROGRESS REPORTS**

10.1 Prepare a monthly progress report current to the last Friday of each month. The report shall indicate the period covered and include but not be limited to the following:

.1 Executive Summary.

.2 Areas of Concern/Action Required.

.3 Work Accomplished This Period.

.4 Work Planned Next Period.

.5 Schedule Status.

.6 Budget Status.

.7 Status of Submittals.

.8 Quality Control.

.9 Contract Changes.

.10 Outstanding Actions.

10.2 Submit the monthly progress report such that it is received by the Consultant no later than the Wednesday following the last Friday of the month, regardless of whether or not the Monday is a public holiday.

END OF SECTION

1 GENERAL

1.1 Provide labour, Products, equipment, services tools and supervision necessary for submittals work.

1.2 Submit electronic copies of submittals in a format acceptable to Owner where submittals are specified in technical Specifications.

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

1.4 Verify accuracy and completeness of submittals prior to submission.

1.5 Verify field measurements, field construction criteria, catalogue numbers and similar data.

1.6 Coordinate each submittal with requirements of the Work and the Contract Documents.

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

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

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

1.10 Supplement standard information to include details applicable to Project.

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

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

1.13 Reproduction of construction Drawings to serve as background for Shop Drawings is not permitted without written permission of Consultant.

1.14 Do not propose Substitutions or deviations from Contract Documents via Shop Drawing, Product data and sample submittals.

1.15 Notify Consultant in writing at time of submission, of any deviation in submittals from requirements of the Contract Documents.

1.16 Submit in accordance with dates established under Section 01 32 00 for shop drawings, fabrication, manufacture, erection and installation to provide adequate time for reviews, securing necessary approvals, possible revisions and resubmittals, placing orders, securing delivery and to avoid construction delays.

1.17 Accompany each submittal with a letter of transmittal in duplicate containing all pertinent information required for identification and checking of submittals including but not limited to the following:

.1 Date of initial submission and date of each subsequent submission if required.

.2 Project title and Consultant's project number.

.3 Names and address of:
.1 Contractor.
.2 Subcontractor.
.3 Supplier/manufacturer/fabricator as applicable.

.4 Identification of each submittal item and quantity.

.5 Specification section numbers to which submission is related.

.6 Countersigned stamp of Contractor certifying that they have reviewed the submission.

1.18 Allow 10 Working Days for Consultant's review of each submittal and incorporate in submittals schedule specified in Section 01 32 00. Allow additional 5 Working Days where sub-Consultant review is required.

1.19 When submittals are resubmitted, transmit under a new letter of transmission.

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

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

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

1.23 Consultant's notations on submittals are intended to ensure compliance with Contract Documents and are not intended to constitute a change in the Work requiring change to the Contract Price or Contract Time.

1.24 Resubmit corrected submittals through same procedure indicated above, within 15 working days and before any fabrication or installation of the Work proceeds. When resubmitting, notify Consultant in writing of any revisions other than those requested by Consultant.

1.25 Do not carry out Work until Consultants review of submittals has been completed.

1.26 Be responsible for payment of charges for delivery of submissions and resubmission to Consultant.

2 SHOP DRAWINGS AND PRODUCT DATA

2.1 The term "Shop Drawings" means drawings, diagrams, schematics, illustrations, schedules, performance charts, product data, brochures and other data which are required to illustrate details of the Work.

2.2 Arrange for the preparation of Shop Drawings as called for in the Contract Documents or as may be reasonably requested by the Consultant. The Contractor and each Subcontractor shall operate as experts in their respective fields and all Shop Drawings and samples shall conform to the requirements of the Contract Documents.

2.3 In addition to Shop Drawings specified in the specification sections, submit Shop Drawings required by jurisdictional authorities in accordance with their requirements.

2.4 Shop Drawings for openings, sleeving and conduit:

.1 Prior to preparation of Shop Drawings, coordinate sizes of all structural openings and sleeves with respective fabricators for mechanical ducting. Adjustments to the opening sizes indicated on the Contract Drawings shall not be made without the approval of the Consultant.

.2 Prior to detailing structural reinforcement on Shop Drawings, arrange for the Structural Engineer to review formed holes, recesses and sleeving. Completely dimension openings, recesses and sleeves and relate to appropriate grid line(s) and elevation(s).

.3 Prior to forming of the structure, arrange for the preparation of Shop Drawings for review by the Consultant showing embedded conduit to be cast within the structure. Shop Drawings shall include conduit from all sources.

2.5 Shop Drawings shall indicate the following minimum criteria and any additional criteria indicated in the individual specification sections requiring Shop Drawings:

.1 Clear and obvious notes of any proposed changes from the Contract Documents.

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

.3 Provisions for allowable construction tolerances and deflections provided for live loading.

.4 Where Products attach or connect to other Products, indicate construction arrangements and details of the parts and their connections, and interconnections with other work and that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross-references to Drawings, Specifications and other already reviewed Shop Drawings.

.5 Location and type of anchors and exposed fastenings.

.6 Materials, physical dimensions including thicknesses, and finishes.

.7 Descriptive names of equipment.

.8 Mechanical and electrical characteristics when applicable.

.9 Information to verify that superimposed loads will not affect function, appearance, and safety of the work detailed as well as of interconnection work.

.10 Assumed design loadings, and dimensions and material specifications for load-bearing members.

2.6 Include in Shop Drawing submissions detailed information, templates, and installation instructions required for incorporation and connection of the Work.

2.7 Ensure shop drawings are of one uniform size and based on field measurements.

2.8 Before submitting to the Consultant, review all Shop Drawings to verify that the Products illustrated therein conform to the Contract Documents. By this review, the Contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers and similar data and that it has checked and coordinated each Shop Drawing with the requirements of the Work and of the Contract Documents. Contractor's review of each Shop Drawing shall be indicated by stamp, date and signature of a qualified person possessing the appropriate authorization from the Contractor.

2.9 Be responsible for dimensions, confirmed at the 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.

2.10 Submit Shop Drawings for the Consultant's review with reasonable promptness and in orderly sequence so as to cause no delay in the Work nor in the work of Other Contractors. At the time of submission, notify the Consultant in writing of any deviations in the Shop Drawings from the requirements of the Contract Documents. The Contractor will be held responsible for changes made from the Contract Documents which are not indicated or otherwise communicated in writing with the submission.

2.11 Drawings submitted by the Contractor as required herein are the property of the Owner who may use and duplicate such drawings where required in association with the Work.

2.12 Submit Shop Drawings signed and sealed by a licensed Professional Engineer registered in the place of the Work where indicated in individual Sections.

2.13 Shop Drawings shall have distinct, uniform letters, numerals and line thicknesses that will ensure the production of clear legible prints at original as well as reduced size.

2.14 Shop Drawings shall include the following minimum information:

- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, date, and signature of Contractor's authorized representative responsible for Shop Drawing review, indicating that each Shop Drawing has been reviewed for compliance with Contract Documents and, where applicable, that field measurements have been verified.
- .5 Details of appropriate portions of the Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationships to other parts of the Work.
- .6 On submissions subsequent to the first, the following additional identification:
  - .1 The revised submission number.
  - .2 Identification of the item(s) revised.

2.15 Dimensions and designations of elements shall be shown in the same system of measurement used on the applicable Contract Drawings.

2.16 Consultant reserves the right to refuse acceptance of drawing submissions not meeting the above requirements.

2.17 Consultant's review will be for conformity to the design concept and for general arrangement only and such review shall not relieve the Contractor of responsibility for errors or omissions in the Shop Drawings or of responsibility for meeting all requirements of the Contract Documents unless a deviation on the Shop Drawings has been approved in writing by the Consultant. Review does not mean that Consultant approves detail inherent in Shop Drawings, responsibility which shall remain with Contractor submitting same.

2.18 Only drawings noted for revision and resubmission need be resubmitted.

2.19 File one copy of each submitted Shop Drawing at the Site.

2.20 Product Data:

.1 Before delivery of Products to the Site, submit of Product data as specified in each section or as requested by the Consultant.

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

.3 Submit manufacturer's Product data for systems, materials, and methods of installation proposed for use. Such literature shall identify systems, each component, and shall certify compliance of each component with applicable/specified standards.

3 SAMPLES

3.1 Before delivery of Products to the Site, submit duplicate samples of Products as specified or as requested by the Consultant. Label samples as to origin and intended use in the Work and in accordance with the requirements of the Specification Sections. Samples must represent physical examples to illustrate materials, equipment or work quality and to establish standards by which completed Work is judged.

3.2 Deliver samples prepaid to Consultant's business address unless another mutually agreed to location is established.

3.3 Identify samples with Project name, Contract number, date, Contractor's name, number and description.

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

3.5 Ensure samples are of sufficient size and quantity, if not already specified, to illustrate:

.1 The quality and functional characteristics of Products, including integrally related parts and attachment devices.

.2 The full range of colours available.

3.6 Notify the Consultant in writing, at time of submission, of any deviations in samples from requirements of the Contract Documents, and state the reasons for such deviations.

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

3.8 If samples are not acceptable, both samples will be returned. If samples are acceptable, one sample will be so indicated and returned. Be responsible for the cost of samples that are not accepted and for resubmission of samples.

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

3.10 Reviewed and acceptable samples will establish the standard against which installed Work will be reviewed.

3.11 Each Product incorporated in the Work shall be precisely the same in all details as the acceptable sample.

3.12 Should there be any change to the accepted sample, submit in writing for approval of the revised characteristics and resubmit samples of the Product for approval if requested.

3.13 When samples are very large, require assembly, or require evaluation at the Site, they may only be delivered to the Site with approval and as directed.

4 CERTIFICATES

4.1 Submit certificates that are required by authorities having jurisdiction or that are requested in the applicable specification sections.

4.2 Clearly show on each certification the name and location of the Work, name and address of Contractor, quantity and date of shipment and delivery and name of certifying company.

4.3 Certificates shall verify that Products and/or methods meet the specified requirements and shall include test reports of testing laboratories approved to validate certificates.

4.4 Submit certificates in duplicate and signed by an authorized representative of the certifying company.

5 CERTIFICATION OF TRADESMEN

5.1 Provide certificates, at the request of the Consultant, to establish qualifications of personnel employed on the Work where such certification is required by authorities having jurisdiction, by the Consultant or by the Contract Documents.

6 EXTENDED WARRANTIES

6.1 Submit extended warranties as requested in sections of the Specifications showing title and address of Contract, warranty commencement date and duration of warranty.

6.2 Extended warranties shall commence on termination of the standard warranty specified in the conditions of the contract and shall be an extension of these provisions. Clearly indicate what is being warranted and what remedial action is to be taken under the warranty. Ensure warranty bears the signature and seal of the Contractor.

6.3 Submit each extended warranty on a form that is acceptable to the Owner and Consultant.

7 INSPECTION AND TEST REPORTS

7.1 Submit inspection and test reports as specified in the Sections of the specifications for “Source Quality Control” and “Field Quality Control” within 5 Working days of inspection or testing. If immediate action is required by the Contractor or Consultant inform the Consultant immediately and submit inspection and testing report within one working day.

7.2 Submit 3 copies of reports submitted with certificates of compliance indicating but not limited to the following:

.1 Project name and number.

.2 Date of inspection or test and date report is issued.

.3 Name and address of inspection and testing company.

.4 Name and signature of inspector or tester.

.5 Identification of Product and Specification Section covering inspected or tested work.

.6 Specified requirements for which the inspection or testing was performed and results of inspections or tests.

.7 Location of inspection or from which tested material was derived.

.8 Overview of inspection and testing methods and procedures.

.9 Remarks and observations on compliance with Contract Documents.

7.3 Inspection and test reports shall be signed by a responsible officer of the inspection and testing company.

8 **RECORD DOCUMENTS**

8.1 Submit record documents in accordance with Section 01 78 00.

END OF SECTION

1 PROJECT RESPONSIBILITIES

1.1 The Contractor's representative shall ensure that:

1.2 All measures and procedures prescribed by the following Acts and Regulations are carried out on Site:

.1 The Occupational Health and Safety Act;

.2 The Regulations for Construction Projects;

.3 WHMIS Regulations;

.4 The Environmental Protection Act and regulations,

.5 All other legislation, regulations and standards as applicable.

1.3 Every employer and every worker performing Work on the Site must comply with the requirements referred to above.

1.4 Ensure that the health and safety of workers, employees of the Owner and the general public are protected in relation to the Work performed on the Site.

2 WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

2.1 Be familiar with and comply with WHMIS regulations.

2.2 Properly label controlled products. Provide proper warning labels and training at the Site.

2.3 Maintain on site for duration of Contract a hazardous materials log containing all required SDS. Log shall be open for inspection by Owner, Consultant and all personnel on Site.

2.4 Provide copies of safety data sheets (SDS) for any controlled products prior to delivery to the Site.

2.5 Be responsible for all applicable requirements of the regulations.

2.6 Before commencing any Work on Site, attend the pre-construction meeting and provide the Consultant with a proposal as to how hazardous materials will be stored and dispensed on Site. In addition, specifically outline the measures which will be undertaken to prevent damage or injury in the event of an accidental spill.

2.7 Provide "Handling Procedure for Hazardous Materials".

3 JOINT HEALTH AND SAFETY COMMITTEE

3.1 The Contractor shall be responsible for the establishment and operation of the Joint Health and Safety Committee as required by the Occupational Health and Safety Act.

4 DELIVERABLES

4.1 The Contractor shall deliver to the Consultant:

.1 The Contractor's Occupational Health and Safety Policy.

.2 The Contractor's safety program to implement the Occupational Health and Safety Policy for the Contract, which will effectively prevent and control accidents for the Contract.

.3 A copy of all communications with, and including all orders by, the Ministry of Labour or other occupational health and safety enforcement authority.

.4 A copy of all accident/injury investigation reports, not just the WSIB Form 7. Each report must contain a statement of actions that will be taken to prevent a recurrence.

.5 A copy of all inspection reports made by the Contractor in compliance with the employer's responsibility under the Occupational Health and Safety Act.

.6 A copy of all safety information pertaining to the Contract made and furnished by the Contractor's own "Safety Personnel" or outside consultants/advisers engaged for the purpose of inspecting the workplace for occupational health and safety.

.7 A verification that all workers in the employ of the Contractor on Site, have had a WHMIS training or refresher course within the last twelve months.

.8 A verification that all workers in the employ of the Contractor have had "Explosive Activated Tool Training" on the type of tools being used.

.9 A verification that the instruction manuals are on Site for all tools and equipment being used.

.10 A copy of the most recent workers compensation experience rating account, i.e. CAD-7, NEER, and/or an insurance carrier's experience rating account.

.11 Statistical information for the purpose of determining injury frequency and severity rates (hours worked, first-aid injuries, medical aid injuries, lost time injuries, restricted workday injuries, near-miss accident/incident and significant occurrence data), in a timely manner as required by the Consultant.

.12 The immediate reporting to the Consultant of all instances that are defined in the Occupational Health and Safety Act as "Notices of Injuries" and "Occurrences" and any occasion that a worker exercises their "Right to Refuse Unsafe Work".

4.2 The Consultant reserves the right to require additional or amended deliverables pertaining to safety during the duration of the Work at no additional cost to the Owner.

4.3 Items specified above shall be delivered to the Consultant prior to the Contractor commencing Work on the Site.

5 DUE DILIGENCE

5.1 The Contractor acknowledges that it has read and understands the measures and procedures relating to occupational health and safety as prescribed above. The Contractor acknowledges and understands its duties as therein set out and hereby expressly undertakes and agrees to comply with all such requirements and standards in their entirety and at the Contractor's expense.

5.2 The Contractor further agrees to fully cooperate with all health and safety requirements, rules, regulations, standards and criteria set out in the Contract Documents, which agreement is in furtherance of the Contractor's duties and responsibilities under occupational health and safety legislation.

5.3 The Contractor agrees that if, in the opinion of the Consultant or Owner, the health and safety of a person or persons is endangered or the effective operation of the system put in place to ensure the health and safety of workers on the Site is not being implemented, the Consultant or Owner may take such action as it deems necessary and appropriate in the circumstances, including, without limitation, the following:

.1 Require the Contractor to remedy the condition forthwith at its own expense;

.2 Require that the Site be shut down in whole or in part until such time as the condition has been remedied;

.3 Remedy the problem and the Owner shall back-charge the Contractor for the cost of such remedial work, together with an appropriate overhead factor as determined by the Owner in its sole discretion; and

.4 Terminate the Contract without further liability in the event the Contractor fails to comply with these provisions.

5.4 If a lien is registered, in respect to any monies held back, back-charged or assessed in accordance with these paragraphs, the Contractor shall consent to an order vacating such registration and shall indemnify the Owner for any and all loss, whereby direct or consequential which the Owner may sustain as a consequence of such registration.

6 SITE SAFETY PERSONNEL

6.1 In the event the Consultant deems it necessary, because of the Work, the Contractor shall assign a "Competent Safety Person" to assist the Contractor's representative in the discharging of safety responsibility, at no additional cost to the Owner.

END OF SECTION

1 GENERAL

1.1 Be responsible for inspection and testing as required by the Contract Documents, statutes, regulations, by-laws, standards or codes or any other jurisdictional authority. Give the Consultant timely notice of the readiness for inspection, date and time for such inspection for attendance by the Consultant.

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

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

1.4 Verify by certification that specified products meet the requirements of reference standards specified in the applicable specification sections.

1.5 Conduct testing, balancing and adjusting of equipment and systems specified in applicable mechanical and electrical specifications sections by independent testing company.

2 INSPECTION AND TESTING BY OWNER

2.1 The Owner may inspect and test Products during manufacture, fabrication, shop testing, installation, construction and testing phases of the Contract. The Consultant will ascertain the quantity and quality of testing to be performed. Inspection and testing may be performed at the place of manufacture/fabrication, storage, or at the Site as designated by the Consultant. Where inspection and testing is done either during manufacture, fabrication, or at Site, ensure that proper facilities and assistance are provided.

2.2 Owner retained inspection and testing:

.1 The Consultant, on behalf of the Owner may appoint an independent inspection and testing company to carry out quality control reviews of parts of the Work for conformance to the Contract Documents.

.2 Such costs for inspection and testing will be paid by the Owner. However, any additional inspection and testing due to non-conformance to the Contract Documents shall be at the Contractor's expense.

2.3 Inspection and testing under allowances:

.1 Submit a list of inspection and testing agencies for approval by the Owner and Consultant. Inspection and testing services will be tendered by the Contractor and the results submitted to the Consultant for review and approval.

.2 Such costs for inspection and testing will be paid by the Cash Allowance. However, any additional inspection and testing due to non-conformance to the Contract Documents shall be at the Contractor's expense. Cash allowance excludes any inspection and testing that is for Contractor's own quality control or is required by regulatory requirements.

2.4 Inspections and testing by the independent inspection an testing company will be promptly made. Uncover for examination any Work covered up prior to inspection or without approval of the Consultant. Make good such Work at no cost to the Owner.

3 INSPECTION AND TESTING BY CONTRACTOR

3.1 Retain and pay for inspection and testing required for Contractor's own quality control, by regulatory requirements, to ensure performance of the work or where identified in the Contract Documents.

3.2 Source and Field Quality Control specified in Other Sections:

.1 This Section includes requirements for performance of inspection and testing specified under Source Quality Control and Field Quality Control in other Sections of the specifications.

.2 Contractor’s own inspection and testing quality control shall not include responsibilities and procedures that relate solely to an inspection and testing company's functions that are retained directly by the Owner or paid for under a cash allowance. Such information is included in this Section for Contractor's information only.

3.3 Do not limit responsibility for ensuring that products and execution of the work meet Contract requirements, and inspection and testing required to this end, to specified inspection and testing.

4 QUALIFICATIONS OF INSPECTION AND TESTING COMPANIES

4.1 Inspection and testing companies to be certified by the Standards Council of Canada (SCC) or Canadian Council of Independent Laboratories (CCIL).

4.2 Companies engaged for inspection and testing shall provide equipment, methods of recoding and evaluation, and knowledgeable personnel to conduct tests precisely as specified in reference standards.

4.3 If requested, submit affidavits and copies of certificates of calibration made by an accredited calibrator to verify that testing equipment was calibrated and its accuracy ensured within the previous twelve months.

5 RESPONSIBILITIES OF INSPECTION AND TESTING COMPANIES

5.1 Determine from specifications and Drawings the extent of inspection and testing required for Work of the Contract. Subcontractors shall notify Consultant of any omissions or discrepancies in the work inspected and/or tested.

5.2 Perform applicable inspection and testing described in the Specifications and as may be additionally directed.

5.3 Provide competent inspection and testing personnel when notified by the Contractor that applicable work is proceeding. Inspection personnel shall cooperate with the Consultant and Contractor to expedite the Work.

5.4 Subcontractors shall notify the Consultant and Contractor of deficiencies and irregularities in the Work immediately when they are observed in the course of inspection and testing.

5.5 Inspection and testing companies shall not perform or supervise any of the Contractor's work, and shall not authorize:

.1 Performance of work that is not in strict accordance with the Contract Documents.

.2 Approval or acceptance of any part of the Work.

6 INSPECTION AND TESTING PROCEDURES

6.1 Perform specified inspection and testing only in accordance with specified Reference standards, or as otherwise approved.

6.2 Observe and report on compliance of the Work to requirements of Contract Documents.

6.3 Ensure that inspectors are on site or at fabricator's operations for full duration of critical operations, and as otherwise required to determine that the Work is being performed in accordance with the contract Documents.

6.4 Submit test samples required for testing in accordance with submittals schedule specified in Section 01 32 00.

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

6.6 Identify samples and sources of materials.

6.7 Review and report on progress of the work. Report on count of units fabricated and inspected at fabricator's operations.

6.8 Observe and report on conditions of significance to work in progress at time of inspection or at fabricator's operations. Include where applicable and if critical to the work in progress:

.1 Time and date of inspection.

.2 Temperature of air, materials, and adjacent surfaces.

.3 Humidity of air, and moisture content of materials and adjacent materials.

.4 Presence of sunlight, wind, rain, snow and other weather conditions.

6.9 Ensure that only materials from the work and intended for use therein are tested.

6.10 Determine locations for work to be tested.

7 INSPECTION AND TESTING REPORTS

7.1 For inspection and testing required by Contract Documents or by regulatory requirements, and performed by Contractor retained inspection and testing agencies, submit to Consultant and Owner copies of reports. Submit within 5 Working days after completion of inspection and testing.

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

7.3 Include in reports all information critical to inspection and testing.

8 TOLERANCES FOR INSTALLATION OF WORK

8.1 Unless specifically indicated otherwise, work shall be installed plumb, level, square and straight.

8.2 Unless acceptable tolerances are otherwise specified in specification sections or are otherwise required for proper functioning of equipment, site services, and mechanical and electrical systems:

.1 "Plumb and level" shall mean plumb or level within 1 mm in 1 m.

.2 "Square" shall mean not in excess of 10 seconds lesser or greater than 90 degrees.

.3 "Straight" shall mean within 1 mm under a 1 m long straightedge.

.4 "Flush" shall mean within:
.1 6 mm for exterior concrete, masonry, and paving materials.
.2 1 mm for interior concrete, masonry, tile and similar surfaces.
.3 0.5 mm for other interior surfaces.

8.3 Allowable tolerances shall not be cumulative.

9 REFERENCE STANDARDS

9.1 Perform inspection and testing in accordance with Standards quoted and as required by procedures described in specified reference standards that are applicable to the work being inspected and tested.

10 DEFECTS AND REMEDIAL WORK

10.1 Defective products, materials and workmanship found at any time prior to Ready-for-Takeover will be rejected regardless of previous inspections, testing, and reviews of the Work. Inspections, testing, and reviews shall not relieve the Contractor from their responsibility, but are a precaution against oversight or error. Remove and replace defective and rejected products, materials, systems, and workmanship. Be responsible for delays and expenses caused by rejection.

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

11 MOCK UPS

11.1 Prepare mock-ups of Work as specified in the technical Specifications. If a mock-up location is not indicated in the Drawings or Specifications, locate where directed by Consultant. Construct mock-ups of Work as required by Contract Documents on site unless otherwise indicated herein or directed by Consultant.

11.2 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-ups.

11.3 Construct mock-ups to include all related specified materials and workmanship. Make revisions as directed by Consultant, in accordance with the intent of the Contract Documents, until mock-ups are acceptable.

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

11.5 Mock-ups, reviewed and accepted by Consultant, shall become the standard of quality against which installed work will be measured.

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

11.7 Mock-ups, by prior arrangement, may be incorporated into finished work if approved by Consultant only.

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

END OF SECTION

1 GENERAL

1.1 Provide Labour, Products, equipment, services, tools and Supervision to ensure that Work complies with minimum acceptable standards of materials and performance of Work in accordance with codes and standards referenced in the Specification.

1.2 Consider contract forms, codes, Specifications, standards, manuals, and installation and application instructions referred to in these specifications to be the latest published editions at the date of submission of the bid unless otherwise stated in the Specifications or otherwise required by the authorities having jurisdiction.

2 BY-LAWS, PERMITS, AND FEES

2.1 The Building Code - Ontario Regulation 332/12, including all amendments, shall govern the construction of the Work.

2.2 Comply with all By-Laws and regulations of authorities having jurisdiction. These codes and regulations constitute an integral part of the Contract Documents.

2.3 If required, pay for construction damage deposit required by authorities having jurisdiction.

2.4 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.

2.5 Arrange for inspection, testing of Work and acceptance required by the authorities having jurisdiction. Be responsible for necessary preparations, provisions and pay all associated costs.

2.6 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.

2.7 Any additional work or changes to the materials due to Work not complying with the Ontario Building Code and Regulations as indicated by the Building Inspector shall be changed. All costs involved shall be borne by Contractor.

2.8 Obtain permit required to work on Municipal rights of way. Provide damage deposits for sidewalks, roads and services work, as applicable.

2.9 Give notice of completion of project prior to occupancy, as required by applicable legislation.

3 EXISTING PUBLIC SERVICE LINES

3.1 Where existing public services are indicated to be removed and/or relocated, perform Work in compliance with authorities having jurisdiction.

3.2 Make good public roads, walkways and curbs soiled or damaged due to construction to the requirements of local authorities.

4 CODES

4.1 Reference is made to standards in the specifications to establish minimum acceptable standards of materials, products and workmanship. Ensure that materials, products and workmanship meet or exceed requirements of the Reference standards specified.

4.2 In the event of conflict between documents specified herein, execute the Work in accordance with the most stringent requirements.

5 REFERENCE STANDARDS

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

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

5.3 Where a material or product is specified in conjunction with a referenced standard, do not supply the material or product if it does not meet the requirements of the standard. Supply another specified material or product, or an acceptable material or product of other approved manufacturer which does meet the requirements of the standard, at no additional cost to the Owner.

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

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

5.6 Where no standard is referred to, provide materials, products and workmanship which meet requirements of the applicable standards of the Canadian Standards Association, Canadian General Standards Board, and the applicable building code.

5.7 If there is question as to whether a material, product or system is in conformance with applicable standards, the Consultant reserves the right to have such materials, products or systems tested to prove or disprove conformance. The cost for such testing will be paid by the Owner in the event of conformance with Contract Documents or by the Contractor in the event of non-conformance.

5.8 Where application, installation and workmanship standards are cited, it is intended that referenced standards form the basis for minimum requirements of the specified item and specifications supplement the standards unless specified otherwise.

5.9 Matters may be dealt with in part by these specifications which are also dealt with, under the same or similar headings in cited standard. It is not intended that these specifications take the place of the standards but supplement them, unless specified otherwise.

5.10 Where reference is made to manufacturer's directions, instructions or specifications they shall include full information on storing, handling, preparing, mixing, installing, erecting, applying, or other matters concerning the materials pertinent to their use and their relationship to materials with which they are incorporated.

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

.1	AA	Aluminum Association
.2	AAMA	Architectural Aluminum Manufacturers Association
.3	AASHTO	American Association of State Highway and Transportation Officials
.4	ACI	American Concrete Institute
.5	AFBMA	Anti-Friction Bearing Manufacturer's Association
.6	AIEE	American Institute of Electrical Engineers
.7	AISC	American Institute of Steel Construction
.8	AISI	American Iron and Steel Institute
.9	AMCA	Air Movement and Control Association
.10	AMEU	Association of Municipal Electric Utilities
.11	ANSI	American National Standards Institute
.12	APA	American Plywood Association
.13	ARI	Air-Conditioning and Refrigeration Institute
.14	ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
.15	ASME	American Society of Mechanical Engineers
.16	ASTM	American Society for Testing and Materials
.17	AWMAC	Architectural Woodwork Manufacturers Association of Canada
.18	AWPA	American Wire Producers Association
.19	CaGBC	Canadian Green Building Council
.20	CEMA	Canadian Electrical Manufacturer's Association
.21	CGSB	Canadian General Standards Board
.22	CISC	Canadian Institute of Steel Construction
.23	CMPA	Canadian Paint Manufacturers Association
.24	CPCI	Canadian Prestressed Concrete Institute
.25	CRCA	Canadian Roofing Contractors Association

.26	CSA	Canadian Standards Association
.27	CSSBI	Canadian Sheet Steel Building Institute
.28	CWB	Canadian Welding Bureau
.29	CWC	Canadian Wood Council
.30	EEMAC	Electrical and Electronic Manufacturers Association Canada
.31	FM	Factory Mutual
.32	ICEA	Insulated Cable Engineers Association
.33	IEEE	Institute of Electrical and Electronics Engineers
.34	IGMAC	Insulating Glass Manufacturers Association of Canada
.35	LEED	Leadership in Energy and Environmental Design
.36	MFMA	Maple Flooring Manufacturers Association
.37	MPI	Master Painters Institute
.38	MSS	Manufacturers Standardization Society of the Valve and Fittings Industry
.39	MTO	Ministry of Transportation Ontario
.40	NAAMM	National Association of Architectural Metal Manufacturers
.41	NAAWS	North American Architectural Woodwork Standards
.42	NEMA	National Electrical Manufacturers Association
.43	NFPA	National Fire Protection Association
.44	NHLA	National Hardwood Lumber Association
.45	NLGA	National Lumber Grades Authority
	NRC	National Research Council of Canada
.46	OPSS	Ontario Provincial Standard Specification
.47	SMACNA	Sheet Metal and Air Conditioning Contractors National Association
.48	SSPC	The Society for Protective Coatings
.49	TTMAC	Terrazzo, Tile and Marble Association of Canada
.50	ULC	Underwriters' Laboratories of Canada

6 FIRE RATINGS, ASSEMBLIES AND SEPARATIONS

6.1 Where a material, component, assembly, or separation is required to be fire rated, the fire rating shall be as determined or listed by one of the following testing authorities acceptable to the authorities having jurisdiction:

.1 Underwriters' Laboratories of Canada.

.2 Underwriters' Laboratories Inc.

.3 Factory Mutual Laboratories.

.4 The National Research Council of Canada.

.5 The National Board of Fire Underwriters.

.6 Intertek Testing Services.

6.2 Where reference is made to only one testing authority an equivalent fire rating as determined or listed by another of the aforementioned testing authorities is acceptable if approved by authorities having jurisdiction. Obtain and submit such approval of authorities, in writing when requesting acceptance of a proposed equivalent rating or test design.

6.3 Fire rated door assemblies shall include doors, frame, anchors, and hardware and shall bear label of fire rating authority showing opening classification and rating.

6.4 Material having a fire hazard classification shall be applied or installed in accordance with fire rating authorities printed instructions.

6.5 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.

6.6 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.

6.7 Fire separations may be pierced by openings for electrical and similar service outlets provided such boxes are non-combustible and are tightly fitted and sealed with a ULC approved sealant for the assembly being sealed.

6.8 Construction that abuts on or is supported by a non-combustible fire separation shall be constructed so that its collapse under fire conditions will not cause the collapse of the fire separation.

6.9 Do not use combustible members, fastenings, attachments and similar items to anchor electrical, mechanical or other fixtures to fire separations.

6.10 At penetration through fire rated walls, ceilings or floors, completely seal voids with ULC approved firestopping material; full thickness of the construction element. In locations that require a smoke seal, provide appropriate ULC approved system installed in accordance with the manufacturer's recommendations.

END OF SECTION

1 TEMPORARY CONTROLS AND CONSTRUCTION FACILITIES

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

1.2 Maintain temporary controls and construction facilities in good condition for the duration of the Work.

1.3 Remove controls and temporary construction facilities from Place of the Work when no longer required.

2 TEMPORARY CONTROLS

2.1 Hoarding and barriers:

.1 Erect temporary hoarding and barriers around entire perimeter of Site to height determined by applicable regulatory requirements.

.2 Before commencing operations, supply, erect and maintain hoarding as determined by applicable regulatory requirements to protect public and private property from injury or damage. Paint outside of hoarding in a colour selected by the Consultant and mark with "POST NO BILLS" signs.

.3 Provide temporary enclosures as required to protect the building in its entirety or in its parts, against the elements, to maintain environmental conditions required for work within the enclosure, and to prevent damage to materials stored within.

.4 Provide lockable gates through hoarding and barriers for access to Site by workers and vehicles.

2.2 Prevent unauthorized entry to the Site. Barricade, guard or lock access points to the satisfaction of the Consultant and post "NO TRESPASSING" signs.

2.3 Provide hoarding, barriers and covered walkways required by governing authorities for public safety, public rights-of-way and for access to buildings. Snow fencing is not allowed as protection for sidewalk.

2.4 Provide temporary exterior and/or interior barrier free ramps/guardrails/handrails as required to permit public access to existing complex functions.

2.5 Install signs for movement of people around Work Site as required and directed by the Consultant.

2.6 Provide secure, rigid guide rails and barricades around open edges of floors and roofs as required for protection of Work, workers, and the public.

2.7 Remove hoarding, barriers, building enclosures, guide rails and barricades upon completion of Contract, unless otherwise noted on the Contract Drawings or as directed by the Consultant.

3 WEATHER ENCLOSURES

3.1 Provide weather tight enclosures to door and window openings, and other openings in floors and roofs.

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

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

4 DUST TIGHT SCREENS AND PARTITIONS

4.1 Provide dust tight screens and partitions to localize interior building areas from dust and noise generating activities.

4.2 Erect, maintain, and relocate screens and partitions as required to facilitate construction operations.

5 SERVICE AND UTILITY SYSTEMS

5.1 Consult with utility companies and other authorities having jurisdiction to ascertain the locations of existing services on or adjacent to site.

5.2 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.

5.3 Give proper notices for new services as may be required. Make arrangements with authorities and utilities for service connections required.

5.4 Pay any charges levied by utilities or authorities for work carried out by them in connection with this Contract, unless specified otherwise.

5.5 Operate and maintain all utility systems affected by work of this Contract, until the building or specific portions thereof have been accepted by the Owner.

6 SCAFFOLDING, HOISTS AND CRANES

6.1 Select, operate, and maintain scaffolding, hoisting equipment and cranes as may be required.

6.2 Do not erect or operate equipment that will endanger existing structures, local municipalities hydro installations, or traffic signals.

6.3 Design and construct scaffolding in accordance with CAN/CSA S269.2-M.

7 TEMPORARY WORKS

7.1 Installation and Removal: Provide temporary utilities, facilities, controls, and as otherwise necessary to perform the Work expeditiously. Remove from Site all such Work after use.

7.2 Arrange for utility and system connections with Owner and pay all costs for installation, maintenance and removal. Operate utilities and systems in a non-wasteful and energy efficient manner. Be responsible for any system damage. Install a sub-meter to monitor utility usage and reimburse Owner for utility costs based on metered usage.

7.3 If Owner's utilities and systems are used during the Work, ensure that systems manufacturers' warranties do not commence until the date of Ready-for-Takeover or, if manufacturers' warranties do commence earlier when systems are put into use, arrange for necessary extension of manufacturers' warranties or provide equivalent coverage under Contractor's warranty.

7.4 Temporary Power and Lighting Systems:

.1 Supply, install and maintain electrical power and necessary electrical equipment including overhead and underground feeders, transformers, motors, starters, panels, protective devices and equipment. Connections will be made available to any part of the Work within distance of a 30 m extension.

.2 Provide temporary lighting inside and outside structure of adequate intensity to illuminate construction activities. Provide temporary pedestrian lighting for sidewalk areas affected by the Work.

.3 Supply and install the type and quantity of minimum lighting equipment in each location to ensure adequate, continual illumination 24 hours per day, 7 days per week for the following:

.1 Emergency evacuation, safety and security throughout the Project at intensity levels required by jurisdictional authorities.

.2 General lighting for performance of the Work throughout the Project, evenly distributed, and at intensities to ensure that proper installations and applications are achieved.

.3 Performance of finishing trades in area as required evenly distributed, and of an intensity of at least 50 Lux.

.4 In locations approved by the Consultant. install and support the electrical plant, distribution and temporary lighting systems including service equipment and local hydro authority meter energized by the local hydro circuits. Installations shall be approved by the Consultant and shall be carried out in a neat manner to avoid interference with the application of finish material and to facilitate removal when the installed permanent lighting system is in operation.

.5 Make all necessary arrangements for a temporary electrical service of sufficient capacity to supply temporary lighting, operation of power tools, cranes and equipment for all construction, implementation, and inspection and testing purposes. Supply and install necessary temporary cables and other electrical equipment and make all temporary connections as required.

.6 Temporary power distribution wiring shall comply with Ontario Hydro Electrical Safety Code. Obtain inspection certificates for temporary electrical work.

.7 Maintain the lighting systems in operation during the life of the Contract. Replace burned or missing lamps immediately.

.8 Upon completion of Contract, remove electrical plant and temporary lighting from the Site.

7.5 Water Supply:

.1 Provide and pay for a continuous supply of potable water for construction use. Provide as a minimum one water connection on each floor level.

.2 Provide and maintain all temporary lines, extensions and hoses as required. Remove all temporary connections and lines on completion of the Work and make good any damage.

7.6 Temporary heating:

.1 Provide temporary heating and ventilation required during construction period, including attendance, maintenance and fuel.

.2 Construction heaters used inside buildings must be vented to the outside or be flame less type. Solid fuel salamanders are not permitted.

.3 Maintain temperatures of minimum 10^{o}C in areas where construction is in progress unless otherwise indicated in the Contract Documents. Protect exposed and adjacent services from freezing. Repair at no cost to the Owner any such services, buildings or other utilities disrupted by freezing.

.4 Ventilate heated areas and keep the Work free from fumes, vapours, exhaust and combustion gases, and other hazardous, noxious, or volatile substances in enclosed spaces, as required to maintain a safe work environment meeting applicable regulatory requirements.

.5 Ventilate temporary sanitary facilities.

.6 The permanent heating system of the building or portions thereof may be used when available only upon written permission by Consultant. If permission to use heating system is obtained:
- .1 Before using air handling systems, ensure that dust/debris is removed from the premises and install temporary filters to prevent construction dust/debris from entering via return air or intake openings. Keep unused ducts sealed to prevent entry of dust/debris. Replace filters frequently during construction.
- .2 On completion of work, remove temporary filters and install new filters in accordance with Division 23. After temporary use of air handling system is complete and before turning over system to Owner, vacuum internally to ensure all dust/debris is removed.

7.7 Elevators:

.1 Use of existing elevators:
- .1 Designated elevators may be used by construction personnel and for transporting Products. Coordinate use with building Owner.
- .2 Provide protective coverings for finish surfaces of cars and entrances. Assume responsibility for and make good any damage to existing elevators caused by construction personnel.

7.8 Sanitary Facilities:

.1 Provide sanitary facilities in accordance with occupational health and safety requirements in the place of the Work. Use of Owner's existing sanitary facilities or new sanitary facilities is not allowed.

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

8 PROTECTION

8.1 Protection of Public Area: Protect surrounding private and public property from damage during performance of the Work.

8.2 Take all necessary precautions to prevent damage to work affected by temperature, water, weather and other environmental conditions.

8.3 Protection of Building Finishes and Equipment:

.1 Provide protection for existing structure, finished and partially finished building finishes and equipment during performance of the Work.

.2 Cover Owner's equipment and plant within the Site with 6 mil PVC sheet, or equal, taped to make it dust-tight. Equipment and existing work moved or altered to facilitate construction, movement of Products or equipment shall be stored, protected with dust-tight covers and subsequently returned to its original location.

.3 Obtain approval from the Consultant prior to the installation of temporary supporting devices into existing roof, ceiling, or wall members for the erecting of equipment or machinery. Repair roof, ceiling, and wall members used for this purpose to the satisfaction of the Consultant.

.4 Provide necessary screens, covers and hoarding as required.

.5 Provide temporary weather tight, dust tight, and lockable partitions within the building where work is performed. Provide weather tight closures to unfinished door and window openings, top of shafts and other openings in floors and roofs.

.6 Any Products or equipment damaged while carrying out the Work shall be restored with new Products or equipment matching the original equipment. Damage shall include harm resulting from all construction work, such as falling objects, wheel and foot traffic, failure to remove debris, operation of machinery and equipment, and scaffolding and hoisting operations.

.7 Protect finished surfaces of new work from damage by restriction of access or by use of physical means suitable to the material and surface location. Where construction operations must be performed or traffic routed over finished floors, lay 6 mm plywood coverings tightly fitted and secured over surface in such areas.

8.4 Fire Protection:

.1 Take precautions to prevent fires. Provide and maintain temporary fire protection equipment of a type appropriate to the hazard anticipated in accordance with authorities having jurisdiction, governing codes, regulations, by-laws and to the satisfaction of the Consultant and insurance authorities.

.2 Excessive storage of flammable liquids and other hazardous materials is not allowed on Site. Flammable liquids must be handled in approved containers. Remove combustible wastes frequently.

.3 Inspect temporary wiring, drop cords, extension cables for defective insulation or connections frequently.

.4 Open burning of rubbish is not permitted on the Site.

.5 Handle, transport, store, use and dispose of gasoline, benzine or other flammable materials with good and safe practice as required by authorities having jurisdiction.

.6 Provide fire extinguishers of the non-freezing chemical type in each temporary building, enclosure and trailer. Use only fire-proofed tarpaulins.

.7 A fire watch shall be required for each of the following activities regardless of the number, duration or size of the activity in operation:
- .1 any open flame activities(e.g., soldering and welding);
- .2 shutdown of fire detection system;

.3 shutdown of sprinkler system.

8.5 Maintain adequate cover over services as required by Utility Authorities.

8.6 Report any discharge of a contaminant to the Authorities having jurisdiction.

9 **PEST CONTROL**

9.1 Pest control requirements to be in accordance with Section 01 57 16.

10 **FIRST-AID FACILITIES**

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

11 **USE OF NEW PERMANENT SERVICE & EQUIPMENT**

11.1 Do not use any new permanent service or equipment without Owner's written approval.

11.2 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.

11.3 Permanent services and equipment shall be turned over to Owner in "as new" and perfect operating condition.

11.4 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.

12 **PROJECT IDENTIFICATION**

12.1 If required, obtain approvals from jurisdictional authorities for temporary signs.

12.2 No other signs or advertisements, other than safety, warning, or directional signs, are permitted without the Consultant's and Owners written consent.

12.3 Maintain signs in good condition for the duration of Contract.

13 **SITE MAINTENANCE**

13.1 Maintain the Site and adjacent premises in a clean and orderly condition, free from debris and other objectionable matter. Immediately remove rubbish and surplus Products, equipment and structures from the Site. If the Site is not cleaned (within 48 hours after the Contractor has been instructed to do so), the Consultant may clean the Site and retain the cost from monies due, or to become due, to the Contractor.

13.2 When the Work is substantially performed, remove surplus Products, tools, construction machinery and equipment not required for the performance of the remaining Work.

14 **SITE STORAGE AND OVER LOADING**

14.1 Confine the Work and operations of employees to limits indicated by the Contract Documents. Do not unreasonably encumber the Site with Products.

14.2 Products shall be stored only in areas designated or approved by the Consultant, and shall not be left lying on streets, sidewalks, boulevards or elsewhere within public view. Products which the Consultant may permit to be stored elsewhere than in the Contractor's storage areas shall be neatly stacked or otherwise disposed and shall be so maintained.

14.3 Fabrication shops shall not be set up within the structure except as directed by or with the permission of the Consultant.

14.4 Do not load or permit to be loaded any part of the Work with a weight or force that it is not calculated to bear safely. Be solely responsible and liable for damages resulting from violation of this requirement. Provide temporary supports as strong as permanent support.

14.5 Do not cut, drill or sleeve load bearing members unless shown on drawings or otherwise approved by the Consultant in writing for each location.

14.6 Site storage and loading requirements to be in accordance with the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.

15 **PUBLIC CONVENIENCE AND SAFETY**

15.1 Maintain sidewalks at and adjacent to the Site in a safe condition throughout the Contract. Promptly remove ice and snow.

15.2 Keep haul routes free at all times from Products spilled on highway or street surfaces and clean highways and streets of deposits due to performance of the Work to the satisfaction of the Consultant and the highway and street authorities. Clean highways and streets within 24 hours of Consultant's instruction.

15.3 The Consultant may inspect haul routes, the Site and adjacent premises daily and may halt operations, withhold payment or carry out such additional operations as necessary, deducting the cost from monies due, or to become due, to the Contractor.

16 **VEHICULAR ACCESS**

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

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

16.3 Where construction requirements demand, construct access roads capable of withstanding construction equipment and haul traffic. Maintain access roads in good condition at all times. Remove access roads prior to completion of the Work unless otherwise noted and restore area as shown on the Contract Drawings.

17 **CONSTRUCTION PARKING**

17.1 Free parking will not be permitted on Site.

18 **PUBLIC TRAFFIC FLOW**

18.1 Provide and maintain flag persons, Police Officers, traffic signals, barricades and illumination as required by Authorities having jurisdiction and/or as necessary to perform the Work and protect the public.

19 **PUBLIC UTILITIES AND SERVICES**

19.1 Verify limitations imposed on project work by presence of utilities and services, and ensure no damage occurs to them.

19.2 Notify service authorities concerned so that they protect, remove, relocate, or discontinue them, as they may require.

19.3 Make arrangements and pay for connection charges for services required for project work.

19.4 Locate poles, pipes, conduit, wires, fill pipes, vents, regulators, meters, and sanitary services work in inconspicuous locations. If not shown on Drawings, verify location of service work with Consultant before commencing installation.

20 **ROADS, CURBS, GUTTERS, AND WALKS**

20.1 Include all curb cuts and making good of existing curbs, walks and paving on Municipal property to provide fully paved and finished approaches to requirements of authorities having jurisdiction.

21 **SITE VISITORS**

21.1 During the progress of the Work, afford access to visitors duly authorized by the Consultant and facilitate inspections or tests they may desire to make. Record site visitors in log book maintained on site.

21.2 Ensure Site visitors wear appropriate safety apparel.

22 **EROSION AND SEDIMENTATION CONTROL**

22.1 Control drainage on site to prevent flooding, erosion and run-off onto adjacent properties as a result of construction operations.

22.2 Dispose of water containing silt in suspension in accordance with requirements of jurisdictional authorities.

22.3 Conform to sedimentation and erosion control requirements of the conservation and/or municipal authority having jurisdiction. Provide and maintain until completion of work or until directed by Consultant to be removed, sediment control devices at catch basins, drainage courses and at other locations on site as directed. Comply with requirements of the local Conservation Authority.

22.4 Minimize amount of bare soil exposed at one time. Stabilize disturbed soils as quickly as practical to minimize erosion. Remove accumulated sediment resulting from construction activity from adjoining surfaces, drainage systems, and watercourses, and repair damage caused by soil erosion and sedimentation.

22.5 Do not disturb existing embankments or embankment protection.

22.6 Periodically inspect erosion and sediment control measures to detect evidence of erosion and sedimentation. Promptly take corrective measures when necessary.

22.7 If soil and debris from site accumulate in ditches or other low areas, remove accumulation and restore area to original condition.

22.8 Prevent tracking of mud and dirt from site onto paved roads. Provide stabilized vehicle access/egress points, 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 shoveling or sweeping and subsequent washing. Dispose of mud dirt in a controlled disposal area.

23 TEMPORARY DRAINAGE AND DEWATERING

23.1 Prevent surface water runoff from leaving the Site unless approved by authorities having jurisdiction.

23.2 Drainage lines, trenched, and gutters shall be kept open at all times. No flow of water shall be directed across or over pavements except through pipes or properly constructed troughs. Keep all portions of Work properly and efficiently drained during construction and until completion. Be responsible for all disturbances, dirt and damage which may be caused by or result from water backing up or flowing over, through, from or along any part of Work, or due to operations which may cause water to flow elsewhere.

23.3 Dispose of such water in a manner that will not be dangerous to public health, private property or to any portion of Work completed or under construction, nor which causes an impediment to the use of streets by the public.

23.4 When drainage is directed to existing catch basins, regularly inspect and clean such catch basins of debris and sediment.

23.5 Control surface drainage from cuts and fills, from borrow and waste disposal areas, from stockpiles, staging areas, and other work areas as required to prevent erosion and sedimentation.

23.6 Provide temporary drainage and pumping as necessary to dewater parts of the Work. Maintain such areas free of water arising from groundwater or surface run-off, as required to keep them stable, dry, and protected from damage due to flooding.

23.7 Maintain standby equipment necessary to ensure continuous operation of dewatering system.

23.8 Do not pump water containing suspended materials or other harmful substances into waterways, sewers or surface drainage systems. Treat or dispose of such water in accordance with applicable regulatory requirements

24 SNOW REMOVAL

24.1 Allow no accumulation of ice and snow on Site, and on roof deck when roofing operations are scheduled to take place.

24.2 Remove snow from access road, Site circulation paths and elsewhere as required to permit access to Work, parking and uninterrupted construction progress.

25 **POLLUTION (DUST, DEBRIS, AND NOISE) CONTROL**

25.1 Implement and maintain pollution control measures in accordance with applicable regulatory requirements.

25.2 Take measures to prevent contamination of soil, water, and atmosphere through uncontrolled discharge of noxious or toxic substances and other pollutants, potentially causing environmental damage.

25.3 Execute Work by methods that minimize dust from construction operations and spreading of dust on site or to adjacent properties.

25.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

25.5 Keep premises free of waste material.

25.6 Arrange and pay for removal of all waste generated by the work in manner acceptable to authorities having jurisdiction.

25.7 Limit noise levels in accordance with requirements of authorities having jurisdiction.

25.8 Maintain temporary erosion and pollution control features installed under this contract.

25.9 Control emissions from equipment and plant to local authorities emission requirements.

25.10 Prevent abrasive-blasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.

25.11 Use appropriate covers on trucks hauling fine, dusty, or loose materials.

25.12 Take immediate action to contain and mitigate harmful effects of the spill or release.

26 **TREE AND PLANT PROTECTION**

26.1 Within Contractor's assigned work and storage areas, where indicated on drawings, and adjacent to designated access routes, protect existing trees and plants scheduled to remain. Provide minimum 1.8 m high chain link fencing or other barriers outside of dripline of trees or groups of trees and other plants in accordance with authorities having jurisdiction.

26.2 Leave fenced areas undisturbed; do not use areas for storage, stockpiling or any other purpose. Do not dump or flush any contaminants in areas of tree feeder roots.

26.3 Do not attach rigging cables to trees.

26.4 Where limbs or portions of plants are required to be removed to accommodate new work, they shall be removed in accordance with accepted arboricultural practice.

26.5 For trees designated to remain, protect roots inside dripline from disturbance or damage during excavation and grading. Avoid traffic, dumping and storage of materials over root zones.

26.6 Where root systems of protected trees adjacent to construction are exposed or damaged, they shall be neatly trimmed and the area backfilled with suitable material to prevent desiccation.

26.7 Where necessary give trees an overall pruning to restore the balance between roots and top growth and/or to restore appearance.

26.8 Except at locations where specific procedures are included in Contract Documents do not alter grades around existing trees/plants without first obtaining Consultant's consent and directions.

26.9 Minimize stripping of topsoil and vegetation.

END OF SECTION

1 General

1.1 **PEST CONTROL**

.1 Be responsible to provide control measures, restraining procedures, and treatments to prevent infestation and spread of insects, rodents and other pests deemed to be present at Site and/or noticed during course of the Work. Carry out fumigation, pest control procedure, and posting of warning signs, notices including contents of such notices in accordance with requirements of Pesticides Act and any other authorities having jurisdictions. Pesticides used shall be in accordance with Canada Pest Control Products Act, and provincial and municipal regulations.

1.2 **SUBMITTALS**

.1 Prior to start of work on site submit written proposal outlining materials to be used and sequences of application to be followed.

.2 Submit proposed post construction inspection and maintenance procedures for inclusion into maintenance and operations manual.

2 Products

2.1 **MATERIAL**

.1 Pesticide: Boric acid dust or fossil flower cockroach and silverfish killer (diatomaceous earth), Class 4 pesticide.

.2 Sealants: as specified in Section 07 92 00.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **APPLICATION**

.1 Provide pesticide at bottom of all concealed and inaccessible spaces, including but not limited to bottom plate/runner of metal and wood framed partitions and walls, duct and pipe shafts, below base cabinets, but not including bottom of cavity of exterior cavity walls.

.2 Coordinate with all Sections whose work creates concealed and inaccessible spaces to ensure timely application of pesticide.

.3 Provide either a heavy sprinkling of diatomaceous earth or a light dusting of boric acid dust.

.4 Stud walls: Apply pesticide in bottom runner, between studs at all exterior wall steel stud framing and all interior steel stud partitions. Apply pesticide prior to installation of insulation and gypsum board.

.5 Pipe spaces and duct shafts: Apply pesticide to floor slab at bottom of all pipe spaces, duct shafts and other concealed spaces enclosed by walls/partitions, before spaces are enclosed.

.6 Cabinets: Provide pesticide covering entire floor area, below all base cabinets, prior to setting cabinets in place.

.7 Bathtubs and shower receptors: Place pesticide covering entire floor area below tub and receptors prior to setting them in place.

.8 Where pipes, conduits, wires, ducts penetrate perimeter of concealed spaces, seal annular space between penetrating elements and enclosing elements with sealant prior to completion of enclosure.

END OF SECTION

1 SPECIFIED PRODUCTS

1.1 Work of this Contract is based on Products specified by:

.1 Manufacturer's catalogued trade names and/or;

.2 References to standards (i.e. CAN, CGSB, CSA, ASTM) or;

.3 Prescriptive Specifications or;

.4 Performance Specifications.

1.2 When one Product or manufacturer is specified by a single proprietary name, Provide the named Product only. Products by other manufacturers are subject to the Consultant's acceptance as an equivalent substitution in accordance with Section 01 25 00.

1.3 When more than one Product or manufacturer is specified along with a referenced standard, any one of the specified Products or manufacturer’s will be acceptable on condition the Product complies with the referenced standard.

1.4 Whenever a Product is specified by reference to a standard only, Provide any Product that meets or exceeds the specified standard for the intended purpose. The onus shall be on the Contractor to establish that such Products meet the reference standard requirements. Products exceeding minimum requirements established by reference standards will be accepted for the Work if such Products are compatible with the Work with which they are incorporated. If requested by Consultant, submit information verifying that the proposed Product meets or exceeds the specified standard.

1.5 Whenever a Product is specified by prescriptive or performance requirements only, Provide any Product that meets or exceeds the specified requirements. If requested by Consultant, submit information verifying that the proposed Product meets or exceeds the specified standard.

1.6 When a Product is specified by reference to a standard or by prescriptive or performance requirements only, upon request of the Consultant, obtain from the manufacturer, an independent testing laboratory report showing that the Product meets or exceeds the specified requirements.

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

1.8 Unless otherwise indicated in the Specifications, maintain uniformity of manufacture for any particular or like item throughout the Work.

2 COLOUR AND FINISH SELECTION

2.1 Where colours are not specified or yet selected, the Consultant shall be able to select from the full range of available colours and finishes options at no additional cost.

3 APPROVAL OF PRODUCTS AND INSTALLATION METHODS

3.1 Wherever in the Specifications it is specified that Products and installation methods shall meet approval of Authorities having Jurisdiction, underwriters, the Consultant, or others, such approval shall be in writing.

4 PRODUCT DELIVERY CONTROL

4.1 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.

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

4.3 Contact the Consultant immediately upon receipt of information indicating that the specified Product is no longer available or if any material or item, will not be available on time, in accordance with the original schedule.

4.4 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.

4.5 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.

4.6 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.

4.7 In the event of failure to notify the Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Consultant reserves the right to direct the Contractor to take the following measures at no increase in Contract Price:

.1 Substitute more readily available Products of similar or better quality and character, or

.2 Temporarily install another Product until such time as the specified Product becomes available, at which time the temporarily installed product shall be removed and the specified Product installed.

or

.3 Request Contractor to propose actions to maintain the construction progress schedule for Consultant's review and acceptance.

5 TRADEMARKS AND LABELS

5.1 Permanent labels, trademarks and nameplates on Products are not acceptable in the finished Work, except where required by authorities having jurisdiction, for operating instructions, or when located in service rooms.

5.2 Remove trademarks and labels by grinding, if necessary, painting out where the particular surface is being painted, or if on plated parts, replace with new plain plated or non-ferrous metal parts.

6 DELIVERY, STORAGE, HANDLING AND PROTECTION

6.1 Be responsible for handling and delivery of Products. Protect Products from damage during handling, storage and installation. Deliver store and handle items in accordance with manufacturer’s instructions and as specified. Be responsible for all costs of delivery, loading and off-loading, and for transportation back to its origin for correction, if required, due to damage or defect. Reject materials and Products delivered to the Site which are damaged.

6.2 Manufacture, pack, ship, deliver, and handle Products so that no damage occurs to structural qualities and finish appearance, nor in any other way which is detrimental to their function and appearance.

6.3 Ensure that Products, while transported, are not exposed to an environment which would increase their moisture content beyond the maximum specified.

6.4 Organize delivery of materials, Products and equipment to, and removal of debris and equipment from, the site and surrounding property.

6.5 Schedule early delivery of Products to enable Work to be executed without delay. Before delivery, arrange for receiving at the Place of the Work.

6.6 Coordinate mechanical and electrical equipment and apparatus deliveries with the manufacturer’s and suppliers such that equipment and apparatus is delivered to the site when it is required, or so that it can be stored within the building and protected from the elements.

6.7 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.

6.8 Deliver packaged Products, in original unopened wrapping or containers, with manufacturer's seals and labels intact.

6.9 Label packaged products to describe contents, quantity, and other information as specified.

6.10 Labels attesting that materials conform to specified reference standards will be acceptable as verification that contents meet specified requirements. In the absence of labels, submit affidavits to validate conformance of Product to reference standards, as requested by the Consultant.

6.11 Label fire-rated Products to indicate Underwriters' Laboratories approval.

6.12 Handle and store materials and products in such a manner that no damage is caused to the materials and products, the Work, the site and surrounding property.

6.13 Do not obstruct or disrupt local traffic flow during construction period.

6.14 Allocate an area within the limits of the Work acceptable to the Owner for storage of Products brought to the site by all trades. Keep storage area tidy at all times and do not use other parts of he property for storage. Arrange and pay for off-site storage when required.

6.15 Locate products on site in a manner to cause minimal interference with the Work.

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

6.17 Store Products off the ground, in a manner to prevent damage, adulteration, deterioration and soiling to the Products, other building components, assemblies, other products, the structure, the site and surrounding property, and in accordance with manufacturer's instructions when applicable.

6.18 Store packaged or bundled Products in original and undamaged condition complete with written application instructions. Keep manufacturer's seals and labels intact. Do not remove from packaging or bundling until required in the Work.

6.19 Do not place or store materials and Products in corridors, public areas, streets, lanes, passageways or similar locations.

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

6.21 Store Products subject to damage from weather in weatherproof enclosures.

6.22 Store cementitious Products clear of earth or concrete floors, and away from walls.

6.23 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

6.24 Store sheet materials and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

6.25 Store and handle flammable liquids and other hazardous materials in approved safety containers and as otherwise prescribed by safety authorities. Store no flammable liquids or other hazardous material in bulk within the Work.

6.26 Store and mix paints in a heated and ventilated room or area assigned for this purpose. Keep this room or area locked when unattended. Remove oily rags and other combustible debris from the Place of the Work daily. Take every precaution necessary to prevent spontaneous combustion.

6.27 Protect prefinished metal surfaces by protective coatings or wrappings until time of final cleanup specified in Section 01 74 00. Protection shall be easily removable under work of Section 01 74 00 without damage to finishes. Do not permit strippable tape or coatings to become baked on surfaces which they protect.

6.28 Touch-up damaged factory finished surfaces to Consultant's satisfaction. Use primer and paint to match original.

6.29 Protect glass and other finishes against heat, slag and weld splatter by provision of adequate shielding. Do not apply Visible markings to surfaces exposed to view in finished state or that receive transparent finishes.

6.30 Protect surfaces of completed work exposed to view from staining, disfigurement and all other damage by restriction of access or by use of physical means suitable of the material and surface location.

6.31 Adequately protect trowelled concrete floors from damage. Take special measure when moving heavy loads or equipment on them.

6.32 Keep finished concrete floors free from oils, grease or other material likely to damage or discolour them or affect bond of applied finishes.

6.33 Protect finished flooring from pedestrian traffic with reinforced kraft paper as a minimum, secured in place and with joints sealed by reinforced pressure sensitive tape. Maintain protection in place until contract completion.

6.34 Protect finished flooring from continuing construction work and delivery of products with plywood panels of minimum 6 mm thickness with joints between panels sealed with reinforced pressure sensitive tape. Maintain protection in place until work and deliveries are complete.

6.35 Promptly remove, replace, clean, repair, or make good as directed by Consultant, work damaged as a result of inadequate protection.

7 HAZARDOUS MATERIALS INFORMATION

7.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of safety data sheets (SDS) in accordance with jurisdictional authorities.

7.2 Deliver copies of Safety Data Sheets (SDS) to the Consultant on all Products intended for use in the Work and designated as a "controlled product."

8 MANUFACTURER'S INSTRUCTIONS

8.1 Unless otherwise indicated in the Specifications, fabricate, apply, connect, install, erect, use, clean, and condition Products in accordance with manufacturer's instructions except where more stringent requirements are specified. Do not rely on labels or enclosures provided with Products. Obtain written instructions directly from manufacturers.

8.2 Notify the Consultant in writing, of conflicts between the Specifications and manufacturer's instructions, so that the Consultant may establish the course of action. If requested, make a copy of those instructions available at the Site.

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

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

8.5 In cases of improper installation or erection of Products, due to failure in complying with these requirements, the Consultant may direct removal and re-installation at no increase in Contract Price.

9 WORKMANSHIP

9.1 Workmanship shall be the best quality, executed by workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Consultant if required Work is such as to make it impractical to produce required results.

9.2 Do not employ any unfit person or anyone unskilled in their required duties. The Consultant reserves the right to require the dismissal from the Place of the Work, workers deemed incompetent, careless, insubordinate or otherwise objectionable.

9.3 Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with the Consultant, whose decision is final.

9.4 Give particular attention to finished dimensions and elevations of the Work. Make finished Work fit indicated spaces accurately. Make finished Work flush, plumb, true to lines and levels and accurate in all respects.

9.5 Ensure that service poles, fill-pipes, vents, regulators, meters and similar service installations are located in inconspicuous locations. If not indicated on drawings, verify location of service installations with Consultant prior to commencing installation.

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

9.7 Finish access panels and doors to match adjacent wall and/or ceiling finish unless otherwise specified or indicated.

9.8 Keep surfaces, on which finished materials will be applied, free from grease, oil, and other contamination which would be detrimental in any way to the application of finish materials.

9.9 Enforce fire prevention methods at site. Do not permit fires, open flame heating devices or accumulation or debris. Use flammable materials only if all safety precautions are taken. Provide and maintain in working order ULC labelled fire extinguishers of types suitable for fire hazard in each case, and locate them in prominent location and to approval of jurisdictional authorities.

9.10 Where flammable materials are being applied, ensure that adequate ventilation is provided, spark-proof equipment is used, and smoking and open flames are prohibited.

10 **DIMENSIONS**

10.1 Check all dimensions at the site before fabrication and installation commences and report discrepancies to the Consultant.

10.2 Where dimensions are not available before fabrication commences, ensure that dimensions required are agreed upon between the parties concerned.

10.3 Prior to commencing work, ensure that clearances required by jurisdictional authorities can be maintained

10.4 Wall thicknesses and openings shown on the drawings may be nominal only; ascertain actual sizes at the site.

10.5 Verify dimensions of shop fabricated portions of the Work at the site before shop drawings and fabrications are commenced. The Owner will not accept claims for extra expense by reason of non-compliance with this requirement.

10.6 Fabricate and erect manufactured items, shop fabricated items, and items fabricated on or off site, to suit site dimensions and site conditions.

10.7 In areas where equipment is to be installed, check dimensional data on equipment to ensure that area and equipment dimensions are compatible with necessary access and clearance provided. Ensure that equipment supplied is dimensionally suitable for space provided.

10.8 Leave areas clear where space is indicated to be reserved for future equipment, including access to such future equipment.

10.9 Whether shown on the Drawings or not, leave adequate space and provision for servicing of equipment and removal and reinstallation of replaceable items such as motors, coils and tubes.

11 CONCEALMENT

11.1 In finished areas, conceal pipes, ducts, conduit and wiring in floors, walls, ceilings, chases, or behind furring except where indicated otherwise:

.1 After review by Consultant and authority having jurisdiction.

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

11.2 Provide incidental furring or other enclosures as required.

11.3 Notify Consultant in writing of interferences before installation.

12 RELOCATION OF MECHANICAL AND ELECTRICAL ITEMS

12.1 The mechanical and electrical drawings are intended to show approximate locations of mechanical apparatus, fixtures, equipment, piping and duct runs, electrical apparatus, fixtures, outlets, equipment, units, and conduit in diagrammatic form and wherein the mechanical and electrical items are not dimensioned, consider their locations to be approximate. Check the drawings and confer with the Consultant to determine the actual locations of these items as may be required to suit aesthetic and site conditions. Such relocation shall be done without change to the Contract Price.

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

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

12.4 The Owner and the Consultant reserve the right to relocate outlets at a later date, but prior to installation, without additional cost to Owner, assuming that the relocation per outlet does not exceed 3000 mm from the original location. No credits will be anticipated where relocation per outlet of up to and including 3000 mm reduces materials, products and labour.

12.5 Should relocations per outlet exceed 3000 mm from the original location the Contract Price will be adjusted in accordance with the provisions for changes in the Contract Documents.

12.6 Alter the location of pipes and other equipment, without additional cost to the Owner, if approved, provided the change is made before installation.

12.7 Make necessary changes, due to lack of coordination, as required and when approved, at no additional cost, to accommodate structural and building conditions.

13 **EXPANSION, CONTRACTION, AND DEFLECTION**

13.1 Conform to manufacturer's recommended installation temperatures. If items, components, assemblies, systems, and finishes are installed at temperatures different from operation or service temperatures, make provisions for expansion and contraction in service as acceptable to manufacturer and consultant. Repair all resulting damage should expansion and contraction provisions provide inadequate.

13.2 Make provisions for expansion and contraction due to temperature changes within components, Products and assemblies, and between adjacent components, Products and assemblies, and due to building movements including but not limited to creep, column shortening, deflection, sway and twist. Ensure provisions for expansion, contraction and building movements prevent damages from occurring to and within components, Products and assemblies.

13.3 Make adequate allowance at wall and partition heads for deflection of the structure above. Determine requirements from Consultant where additional information is required. Where partitions butt to underside of floor assembly, or structural framing, the clearance shall be based on the span of the members supporting the floor or structural framing. In making such allowance use methods which maintain the integrity of the wall or partition as a sound, and/or fire barrier.

13.4 Make provisions in pipes, plenums, ducts and vessels containing air and fluids as is necessary to prevent damage due to fluid and air induced pressure, surges and vibrations, to pipes, plenums, ducts and vessels and to adjacent components, assemblies and construction to which pipes, ducts, plenums and vessels are attached or pass through.

14 DIELECTRIC SEPARATION

14.1 Ensure that a dielectric separator is provided in a permanent manner over entire contact surfaces to prevent electrolytic action (galvanic corrosion) between dissimilar materials. Similarly, prevent corrosion to aluminum in contact with alkaline materials such as contained in cementitious materials.

15 PRODUCTS AT SOUND ATTENUATING PARTITIONS

15.1 Avoid sound transfer at sound attenuating partitions by careful location and treatment of mechanical and electrical equipment, ducts, grilles, diffusers, electrical outlets and boxes, and similar items. Where electrical boxes are back to back, serving each side, locate them at least 250 mm apart laterally and, if interconnected, use flexible connections.

16 FASTENINGS

16.1 Include in the work of each section necessary fastenings, anchors, inserts, attachment accessories, and adhesives. Where installation of devices is in work or other sections, deliver and locate devices in ample time for installation.

16.2 Do not install fibre, plastic or wood plugs or blocking for fastenings in masonry, concrete, or metal construction, unless specified or indicated on drawings.

16.3 Install work with fastenings or adhesives in sufficient quantity to ensure permanent secure anchorage of materials, construction, components and equipment under static conditions, and to resist building thermal movement, creep and vibration.

16.4 Provide metal fastenings and accessories in same material, texture, colour, sheen and finish as metal on which they occur, unless indicated otherwise.

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

16.6 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior Work, high humidity spaces, and where attached to, or contained within, exterior walls and slabs, unless stainless steel or other material is specified. Leave steel anchors bare where cast in concrete.

16.7 Space anchors within their load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

16.8 Conceal fasteners where indicated. Keep exposed fastenings to a minimum, space evenly and in an organized symmetrical pattern.

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

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

16.11 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

16.12 Powder Actuated Fastenings:

.1 Do not use powder actuated fasteners for the support of ceilings.

.2 Do not use powder actuated fastenings on any portion of the Work, unless written consent for a specific use is obtained from the Consultant.

.3 Only low velocity tools will be permitted under any condition. Operators to be qualified and to be in possession of a valid operator's certificate.

17 **ADJUSTING**

17.1 Ensure that all components of assemblies fit snugly, accurately and in true planes, and that moving parts operate positively and freely, without binding and scraping.

17.2 Verify that work functions properly and adjust it accordingly to ensure satisfactory operation. Lubricate Products as recommended by manufacturer.

END OF SECTION

1 LAYOUT AND SURVEY

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

1.2 Existing grades, lines, and site conditions shown on drawings were taken from survey information established by persons engaged directly by the Owner. The accuracy of survey information is not the Consultant's responsibility. The Contractor will establish location of property lines.

1.3 Be responsible for setting out the Work. Prior to setting out the Work, verify dimensions and elevations shown on the Contract Documents and report to the Consultant any unsatisfactory conditions that may adversely affect the proper completion of the Work.

1.4 Prior to starting work at Site, set up and maintain permanent reference points and be responsible for the accuracy of such reference points. Preserve and protect permanent reference points on site during construction. Establish lines and levels required for the performance of the Work.

1.5 Report to Consultant when a reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations. Require registered land surveyor to replace reference points in accordance with original survey. Do not change or relocate reference points without prior written notice to Consultant.

1.6 Accurately set out the Work from levels and lines. Where Work of this Contract is dependent upon grades and elevations of existing structures or facilities, such grades or elevations shall take precedence over those determined by reference to established elevations. Advise the Consultant of any discrepancies.

1.7 During any activity of the Work, layout and check all features, including but not limited to the following:

.1 Establish a permanent bench mark, or markers as widely separated as possible.

.2 Establish and maintain temporary bench marks set in suitable locations.

.3 Provide general dimensions, lines and elevations required by Subcontractors.

.4 Verify elevations of floor and roof levels as construction proceeds and relate to bench mark datum.

.5 Verify that present or known future restrictions are not violated by construction on the site or lines of traverse to all public utilities.

.6 Correlate geodetic elevation of bench mark datum with elevations in use by public utilities adjacent to Project.

.7 Verify accuracy of site dimensions shown on Drawings.

.8 Provide a survey prior to placement of asphalt and concrete paving to confirm that grades conform to grades indicated on drawings.

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

1.9 Examine, preserve and protect established bench marks. Re-establish a lost or displaced bench mark by a Land Surveyor licensed to practice in the place of Work at no cost to the Owner. Accept responsibility for setting out the Work.

1.10 In the event of a discrepancy between the Owner and the Contractor regarding horizontal and/or vertical alignment conditions, that are beyond allowable specified tolerance, the Owner may engage the services of an independent Land Surveyor. The surveyor shall investigate the disputed condition and the results of the independent investigation shall determine the bearer of costs for this service, being either the Owner or the Contractor.

1.11 If the Contractor is found to be in error, all costs incurred to correct the condition shall be assumed by the Contractor.

2 EXISTING UTILITIES AND STRUCTURES

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

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

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

3 VERIFICATION OF EXISTING CONDITIONS

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

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

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

3.4 Notify Consultant in writing of unacceptable conditions.

END OF SECTION

1 GENERAL

1.1 Provide labour, Products, equipment, services, tools, and supervision necessary for cutting and patching work in accordance with the Contract Documents.

1.2 Obtain Consultant's approval prior to cutting, boring or sleeving load-bearing members.

2 DEFINITION(S)

2.1 The terms “make good”, “making good”, “made good”, “restore to existing”, “patch”, “repair”, or similar words or phases are used in standards and these Contract Documents to mean the following, unless context provides otherwise:

.1 Make good materials and finishes which are damaged or disturbed during the process of additions and reconstruction under the Contract.

.2 Where existing work is to be made good, match new work exactly with the existing work in material, form, construction and finish unless otherwise noted or specified.

.3 Where existing work is to be made good, there shall be no visible difference in appearance, or aesthetics between the existing work and the new work by the naked eye at a distance of 3 metres from the surface being made good. There shall be no difference in performance between existing materials and new materials.

3 SUBMITTALS

3.1 Submit written request in advance of cutting or alteration which affects:

.1 Structural integrity of any element of the Structure or Contract.

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

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

.4 Visual qualities of sight-exposed elements.

.5 Work of Owner’s or Other Contractors.

.6 Warranty of Products affected.

3.2 Include in request:

.1 Identification of Project.

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

.3 Statement of necessity for cutting or alteration.

.4 Description of proposed Work and Products to be used.

.5 Alternatives to cutting and patching.

.6 Effect on work of Owner's or Other Contractors.

.7 Written permission of affected Other Contractors.

.8 Date and time Work will be executed.

3.3 Obtain Consultant's approval of proposed method of cutting prior to proceeding with the Work.

4 PRODUCTS

4.1 Same quality or better than Products incorporated in original installation.

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

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

5 PREPARATION

5.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

5.2 After uncovering, inspect conditions affecting performance of the Work.

5.3 Beginning of cutting or patching means acceptance of existing conditions.

5.4 Provide supports to assure structural integrity of surroundings; Provide devices and methods to protect other portions of the Work from damage.

5.5 Provide protection from elements for areas which may be exposed by uncovering Work.

6 EXECUTION

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

6.2 Execute Work to avoid damage to other Work.

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

6.4 Perform cutting, fitting, patching, and remedial work to make the affected parts of the Work come together properly and complete the Work.

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

6.6 Fit Work segments together, to integrate with penetrations through surfaces and with other Work.

6.7 Remove and replace defective and non-conforming Work.

6.8 Do any drilling, cutting, fitting, patching and finishing that may be required to make the various classes and kinds of other Work fit together in a professional and finished manner. Make watertight connections with adjoining structures.

6.9 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

6.10 Execute Work by methods to avoid damage to other Work and which will provide proper surfaces to receive patching and finishing.

6.11 Cut Products using proper equipment and methods. On rigid materials, use a masonry saw or core drill. Do not use pneumatic or impact tools without Consultant's prior approval.

6.12 Where new Work connects with existing structures, cut, patch and make good existing work to match original condition.

6.13 Be responsible for correct formation and bridging of openings in masonry and structural walls as required.

6.14 Ensure compatibility between installed Products and security of installation.

6.15 Restore Work with new Products in accordance with requirements of the Contract Documents.

6.16 Fit Work airtight to pipes, sleeves, ducts, conduits and other penetrations through surfaces.

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

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

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

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

6.21 Existing utilities:

.1 When breaking into or connecting to existing services' utilities, execute the Work at times directed by local governing authorities, with a minimum of disturbance to the Work, pedestrian and vehicular traffic, and ongoing Owner operations. Inform Owner and Consultant a minimum of 72 hours prior to breaking into or connecting to existing services’ and utilities.

.2 Keep duration of interruptions to a minimum.

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

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

.5 Construct or erect barriers in accordance local governing authorities as required to protect pedestrian and vehicular traffic.

END OF SECTION

1 REGULATORY REQUIREMENTS

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

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

2 GENERAL CLEANING REQUIREMENTS

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

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

2.3 Prevent cross-contamination during the cleaning process.

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

3 PROGRESS CLEANING AND WASTE MANAGEMENT

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

3.2 Ensure that only cleaning materials are used which are recommended for the purpose by both the manufacturer of the surface to be cleaned and of the cleaning material.

3.3 Provide appropriate, clearly marked, containers for collection of waste materials and recyclables.

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

3.5 Maintain building work areas "broom clean" at least on a daily basis, but shall also be done immediately before finishing work.

3.6 Remove from finish work, spatters, droppings, soil, labels, and debris, before they set up.

3.7 No waste material may be burned or buried at site. Remove as often as required to avoid accumulation, no less than, at the end of each working day.

3.8 Remove packaging materials and debris from the site immediately after product and equipment is unwrapped or uncrated.

3.9 Ensure that volatile fluid wastes are not disposed of in storm or sanitary sewers, in open drain courses, or anywhere on site.

3.10 Do not allow waste material and debris to accumulate in an unsightly or hazardous manner. Sprinkle dusty accumulations with water. Provide containers in which to collect waste material and debris. Dispose of hazardous products in accordance with requirements of jurisdictional authorities.

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

3.12 Ensure that cleaning operations are scheduled to avoid deposits, of dust or other foreign matter on surfaces during finishing work and until wet or tacky surfaces are cured.

3.13 Provide instructions for final cleaning of finishing work, and for inclusion in Maintenance and Operating Manuals.

4 FINAL CLEANING

4.1 In addition to requirements for progress cleaning, Work shall include final cleaning by professional cleaning specialists on completion of construction.

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

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

4.4 Before final inspection, replace glass and mirrors broken, damaged, and etched during construction, or which are otherwise defective.

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

4.6 Remove temporary protections and make good defects before commencement of final cleaning.

4.7 Final cleaning shall remove dust, stains, paint spots, soil, grease, fingerprints, and accumulations of construction materials, interior and exterior to the building for all new work throughout new and existing Building. Work shall be done in accordance with manufacturer's instructions for each material. This work shall include:

.1 Washing of exterior paved surfaces, and of interior concrete floors.

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

.3 Clean exterior and interior window glass and frames.

.4 Cleaning and polishing of glass, mirrors, porcelain, enamel and finish metals.

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

.6 Vacuum cleaning of ceilings, walls and floors, and behind grilles, louvres and screens.

.7 Cleaning and polishing of tile floors.

.8 Cleaning of resilient flooring.

.9 Buffing of resilient flooring followed by two light coats of wax, each buffed.

.10 Washing clean of glazed wall surfaces.

.11 Cleaning of hardware, mechanical fixtures, plumbing fixtures, lighting fixtures, cover plates, and equipment, including polishing of their finish metal, porcelain, vitreous, and glass components. Replace filters for mechanical equipment if equipment is used during construction.

.12 Cleaning of windows and entrances, both interior and exterior surfaces.

4.8 Lock or otherwise restrict access to each room or area after completing final cleaning in that area.

4.9 Re-clean as necessary areas that have been accessed by Contractor's workers prior to Owner occupancy.

5 WASTE AUDIT, MANAGEMENT AND DISPOSAL

5.1 Prepare and submit waste audit and waste reduction plan in accordance with Ontario Regulation 102/94 Waste Audits and Waste Reduction Workplans.

5.2 Prepare and submit source separation plan in accordance with Ontario Regulation 103/94 Industrial, Commercial and Institutional Source Separation Programs.

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

5.4 Deliver to nearest appropriate depot all materials accepted for recycling by the region or municipality having jurisdiction over the Place of Work, including but not limited to cardboard, paper, plastic, aluminum, steel, and glass. Deliver to nearest appropriate depot all scrap and excess gypsum wallboard for recycling of this material. Pay all costs for this work.

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

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

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

END OF SECTION

1 DEMONSTRATION AND INSPECTION OF PRODUCTS AND SYSTEMS

1.1 Arrange for a demonstration of equipment, systems and operating Products upon the 100% completion of their installation, testing, adjusting and balancing has been performed, equipment and systems are fully operational, completed operation and maintenance manual is available, and prior to application for Ready-for-Takeover.

1.2 Include in the arrangements for the attendance of the Consultant, Owner, jurisdictional authorities, and personnel assigned by the Owner for the operation of the systems and/or Products.

1.3 Demonstrations shall be conducted by the Subcontractor responsible for the installation of the systems and/or Product, assisted by representatives of the manufacturer or supplier. All personnel conducting the demonstration shall be completely knowledgeable of all conditions of the operating, functioning and maintenance of the systems and/or Products.

1.4 Subcontractor to demonstrate start up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment and system.

1.5 Owner's representative will acknowledge the successful completion of each demonstration on a form provided by the Contractor. The form shall be agreed to by the Owner, Consultant and Contractor prior to demonstration and testing.

1.6 Submit report(s) within 5 Working Days after completion of demonstration and inspection:

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

.2 Summarizing the demonstration and training performed, and

.3 Including a list of attendees.

1.7 Submit copies of letters from manufacturers of Systems and/or Products before making application for Ready-for-Takeover to verify that the Products have been installed and connected correctly, and that they are operating in a satisfactory manner. The certification shall be based upon inspection and testing of the Products by competent technical personnel. Include in letter of certification the names of personnel conducting the testing and inspection, the methods of inspection utilized, and the location in the building of the Products certified.

1.8 Following submission of letters of certification and their acceptance by the Owner, the Owner shall have the right to use the Products on a trial basis and for instructing their personnel in its use.

2 FINAL INSPECTIONS AND CLOSE OUT

2.1 Submit proposed closeout procedures and schedule of inspection to Consultant for approval before final demonstrations and inspections commence.

2.2 Submit layout and survey requirements required by Owner and Authorities having jurisdiction.

2.3 Arrange for, conduct and document final demonstrations, inspections, close-out and take-over at completion of the Work in accordance with procedures described in OAA/OGCA TAKE-OVER PROCEDURES, OAA/OGCA Document No. 100. Where "Architect" is referred to in Document No. 100 it shall mean Consultant.

3 CERTIFICATE OF COMPLIANCE

3.1 Submit Certificates of Compliance, prior to the application for Ready-for-Takeover 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 Safety Data Sheets have been submitted and accepted.

.3 Other Work/Products identified in the Contract Documents as requiring a Certificate of Compliance.

3.2 Each Certificate of Compliance shall indicated names and addresses of the project, the Owner, 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 Safety Data Sheets.

3.3 Each Certificate of compliance shall be issued on the subcontractor's letterhead, properly executed, under whose work the prospective Work/Product has been provided.

3.4 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.

4 READY-FOR-TAKEOVER

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

5 INSPECTION AND REVIEW BEFORE READY-FOR-TAKEOVER

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

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

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

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

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

5.2 Consultant's Review: Upon receipt of the Contractor's application for review, together with the Contractor's list of items to be completed or corrected, the Consultant and the Contractor shall arrange a mutually satisfactory agreed date and time to jointly review the Work. The Consultant will advise the Contractor whether or not the Work is Ready-for-Takeover and will add additional items, if any, to the Contractor's list of items to be completed or corrected. Provide the Consultant with a copy of the revised list.

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

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

6 PREREQUISITES TO FINAL PAYMENT

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

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

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

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

7 SUBSTANTIAL PERFORMANCE OF THE WORK

7.1 The prerequisites to, and the procedures for, attaining Substantial Performance of the Work, or similar such milestone as provided for in the lien legislation applicable to the Place of the Work, shall be:

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

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

END OF SECTION

1 GENERAL

1.1 Prepare closeout submittals and comprehensive operation and maintenance manual, using personnel qualified and experienced for this task.

1.2 Submit comprehensive operations and maintenance manual and material suitable for the Owner's maintenance employees electronically in format acceptable to the Owner.

1.3 Hand over to the Consultant one (1) copy of closeout submittals and comprehensive operations and maintenance manual and material suitable for the Owner's maintenance employees. Manuals shall cover all Products supplied and installed under the Contract.

1.4 Submit draft of closeout submittals including operation and maintenance manuals for the Consultant's review at least 15 days before testing systems and equipment. Incorporate alterations and additions, as found to be necessary during testing, and prepare the final version of the manual from the corrected draft.

1.5 Submit final version of closeout submittals including operation and maintenance manuals prior to Ready-for-Takeover.

1.6 Testing of systems and equipment will not be deemed to be complete until the requisite number of copies of the final version of the manuals has been handed over to Consultant.

1.7 If standard literature is incorporated into the operations and maintenance manual, any irrelevant information shall be deleted, or suitably noted.

1.8 The manuals shall have sufficient detail in order that the Owner can totally maintain the equipment without outside help.

1.9 Submit all material in English.

2 FORMAT

2.1 Organize data in the form of an instructional manual.

2.2 Arrange content by systems or process flow, under Section numbers and sequence of Table of Contents.

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

2.4 Provide tabbed fly leaf for Products and systems which are supplied by the Owner but installed as part of the Work of this Contract.

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

2.6 Provide electronic copy of manual in PDF format.

2.7 Provide electronic copy of Shop Drawings in manual as 1:1 scaled CAD files in .dwg format on electronic media acceptable to Owner.

3 **OPERATION AND MAINTENANCE MANUAL CONTENT**

3.1 Operation and maintenance manuals shall contain the following minimum information and data:

.1 Table of contents.

.2 Introductory information:
- .1 Provide date of manual submission.
- .2 Title of Contract, complete contact information for Consultants, subconsultants, Contractor, and subcontractors with name of responsible parties.
- .3 Schedule of Products and systems, indexed to content of the volume.

.3 For each Product or system: Include complete contact information for Subcontractors, suppliers, manufacturer's, and service representatives, including local source of replacement supplies and parts.

.4 Product Data:
- .1 Mark each sheet to clearly identify specific products, options, and component parts, and data applicable to installation. Delete or strike out inapplicable information. Supplement with additional information as required.
- .2 Drawings: Supplement Product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams and as required in the Specifications.
- .3 Typed text: As required to supplement Product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions and as required in the Specification.

.5 Complete set of reviewed Shop Drawings.

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

.7 Warranties: Warranties are between the Contractor and Owner. Warranties shall include, as a minimum:
- .1 Separate each warranty with index tab sheets keyed to Table of Contents listing.
- .2 List each warrantor with complete contact information.
- .3 Verify that documents are in proper form and contain full information. Ensure that warranties are for the correct duration and are in Owner's name.
- .4 Description of warranty coverage.
- .5 Date warranty starts (being date of Ready-for-Takeover).
- .6 Date warranty expires.

.7 Contact name, address and phone number (the Contractor shall also be responsible for advising the Owner of changes in contact information during the warranty period).
.8 Equipment and components performance curves.
.9 Hydro certificates.

.8 Reports: For each Product or system provide the following:
.1 Manufacturer's certified reports.
.2 Factory test reports.
.3 Field testing reports.

.9 Details of design, construction and/or fabrication features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of the installation.

.10 Technical data, Product data, supplemented by bulletins, component illustrations, detailed views, technical descriptions of items and parts lists.

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

.12 Equipment and systems content:
.1 Each item of equipment and each system: Include description of unit or system and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
.2 Schematic and wiring diagrams, wiring interconnection lists and diagrams fully cross referenced and coordinated, printed circuit board layouts including the component identification, component parts list with electronic substitution equivalent. Provide cross referenced components lists and sequence of operations.
.3 Panel board circuit directories: Provide electrical service characteristics, controls, and communications.
.4 Include installed colour coded wiring diagrams.
.5 Operating procedures: Include start up, break in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut down, and emergency instructions. Include summer, winter, and any special operating instructions.
.6 Maintenance requirements: Include routine procedures and guide for trouble shooting and fault location; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
.7 Provide servicing, preventative maintenance, and lubrication schedule, and list of lubricants required.
.8 Include manufacturer's printed operation and maintenance instructions.
.9 Include sequence of operation by controls manufacturer.
.10 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.11 Provide installed control diagrams by controls manufacturer.
.12 Provide Contractor's coordination drawings, with installed colour coded piping diagrams.
.13 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
.14 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
.15 Include testing and balancing reports.
.16 Include additional content as specified in technical Specifications sections.

.13 Product and finishes:
.1 Include Product data, with specific Product, component parts, and catalogue number, options selected, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured Products. Delete inapplicable information.
.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
.3 Include an outline of requirements for routine and special inspections and for regular maintenance to ensure that on-going performance of the building envelope will meet the initial building envelope criteria.
.4 Include additional content as specified in technical Specifications sections.

.14 As-built drawings: Submit final as-built drawings in the form specified in Section 01 32 00.

.15 Training materials.

4 DRAWINGS

4.1 Prepare all required drawings in an electronic format acceptable to Owner.

4.2 Supply and hand over to the Consultant electronic files for each final drawing prepared under this Contract, including but not limited to circuit drawings, equipment layout drawings, and shop drawings.

4.3 The final size of drawings shall be 560 mm x 860 mm. Half size reproductions (280 mm x 430 mm) shall also be provided.

4.4 Prior to Ready-for-Takeover, supply and hand over to the Consultant, one complete set of electronic drawing files on storage media acceptable to Consultant for each final drawing prepared under this Contract, including but not limited to circuit drawings, equipment layout drawings, and shop drawings.

4.5 Text files shall be written in word processing program acceptable to Owner.

5 TRANSMITTAL

5.1 Forward storage media to the Owner through the Consultant with a transmittal form. Transmittal shall contain the list of file names contained on the storage media.

5.2 Data forwarded to the Owner shall contain the following files in addition to the design information:

.1 Library parts used in the design files.

.2 Level convention used for each design file.

.3 Plotting instructions used to prepare hard copies including colour tables, pen tables and plot scale.

.4 Working units of the design files.

.5 Font library, if the standard is not used.

6 PROJECT RECORD DRAWINGS

6.1 Transfer all information marked up on the as-built drawings during the progress of the Work to a master set of record drawing files provided by Consultant, in electronic format agreed to with Owner.

6.2 Mark revised drawings as "RECORD DRAWINGS".

6.3 Submit completed record drawings in electronic form to Owner.

7 SPARE PARTS, MAINTENANCE MATERIALS AND SPECIAL TOOLS

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

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

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

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

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

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for demolition and removal work in accordance with the Contract Documents.

.2 Work included: Requirements for demolishing, salvaging and removing wholly or in part the various items designated on the drawings or required to be removed or partially removed for the receipt of the Work of this Contract, including not necessarily limited to:

.1 Alteration and renovations to existing building.
.2 Cutting and removing of walls, floors, ceilings, doors and frames, in the existing buildings as indicated on Drawings.
.3 Patching, making good openings and chases in walls, floors, ceilings, including the supply and installation of lintels, channels and finishes.
.4 Removal of rubbish, debris, demolished fixtures, fitments and items not scheduled to remain the Owner's property, resulting from the demolition and preparatory work.
.5 Remove abandoned services such as conduits, pipes, wiring, ducts, fixtures, equipment, etc. where required for the work or indicated on the drawings.
.6 Removal of all mechanical items including plumbing fixtures, services etc. where required for the work or indicated on drawings and or where not required to be relocated.
.7 Removal of existing electrical items including fixtures, etc. where required for the work or indicated on the drawings and not required to be relocated.
.8 Dust control during the operations of the work of this Section.
.9 Removal shall mean removal from site and safe disposal in a legal manner.

.3 Refer to Section 02 41 13 for structural removal work and Section 03 01 32 for percussive concrete removal work.

1.2 **REFERENCES**

.1 CSA S350-M, Code of Practice for Safety in Demolition of Structures.

1.3 **SUBMITTALS**

.1 Where required by authorities having jurisdiction, submit a Fire Plan to local fire department for review and approval.

.2 Submit shop drawings, diagrams and details in accordance with Section 01 33 00.

.3 30 calendar days prior to start of demolition and removals work, submit for review, drawings, diagrams or details showing sequence of disassembly work and shoring of supporting structures in accordance with authorities having jurisdiction.

.4 Submit Dust Control Plan conforming to requirements of the City of Toronto’s Public Health Services.

.5 Have submissions signed and sealed by Professional Engineer licensed in Province of Ontario.

.6 Submit to Consultant, details of where rubble, debris and other materials are to be disposed or reused. Include each disposal/reuse site location, operator's name and business address, type of license under which site operates, and criteria used by site to assess suitability of rubble, debris and other materials for disposal.

.7 Give notice to Utility Authorities controlling services and appurtenances which will be affected by demolition work.

1.4 **QUALITY ASSURANCE**

.1 Prepare waste audits, waste reduction workplans, source separation programs and recycling programs as required by jurisdictional authorities and update programs and implement such programs as required.

.2 Perform the work of this section in accordance with the ‘Environmental Protection Act’ including Ontario Regulation 102 and the ‘Environmental Assessment Act’ including Ontario Regulation 103.

.3 Conform to Fire Code, Regulation under the Fire Marshals Act.

.4 The demolition contractor must engage a registered professional engineer who holds a certificate of authorization and an appropriate level of liability insurance to prepare demolition procedures.

.5 As part of the contract requirements, the engineer for the demolition contractor should be required to sign the general review commitment required by city building departments.

1.5 **SITE CONDITIONS**

.1 Perform operations, machine and equipment movements, deliveries and removals at time or times that will permit uninterrupted operations in and around structures, including parking, deliveries, and Site access and egress.

2 Products

2.1 **MATERIALS**

.1 All materials requiring removal shall become the Contractor's property and shall be removed and disposed of from the site, as the work progresses, unless indicated otherwise.

.2 Salvaged material:
- .1 All salvaged and removed items are to be confirmed with Owner in walk through prior to start of demolition.
- .2 Salvage and stockpile Products, materials, and equipment as specified herein, indicated on Site or indicated on drawings.
- .3 Coordinate items to be salvaged with Consultant.
- .4 Salvaged materials shall not be chipped, cracked, split, stained or damaged.
- .5 Store items off of moist surfaces.

3 Execution

3.1 **GENERAL**

.1 Clean up rubble and debris, resulting from work promptly and dispose at end of day or place in waste disposal bins. Empty bins on regular basis.

.2 Stockpiling of rubble, debris, and surplus Products on Site will not be permitted.

.3 Remove, handle and transport Products indicated to be salvaged and stored for future use. Transport Products to storage area(s) designated by Consultant. Perform work to prevent any damage to Products during removal and in storage. Products damaged during removal, will be inspected by Consultant. Consultant will determine extent of damage and accept or refuse Products.

.4 List and description of items to be removed and stored or reused:
- .1 Paper towel dispenser.
- .2 Commercial kitchen appliances/equipment, washers and dryers.
- .3 Electrical panel.
- .4 Plaques.
- .5 Tile for small tile patching.
- .6 Fire extinguisher cabinet.
- .7 Fire safety plan box.
- .8 Additional items as indicated on the drawings or by the Consultant.

.5 Tag and log all items to be salvaged to the satisfaction of the Consultant. Ensure identification tags do not damage items to be salvaged and are non-permanent, removable and durable.

.6 Communicate Dust Control Plan procedures to all appropriate personnel on site and their head offices and due diligence measures to be maintained to control all fugitive emissions.

.7 Take precautions to guard against movement, settlement or collapse of adjacent services, sidewalks, driveways, or trees. Be liable for such movement, settlement or collapse caused by failure to take necessary precautions. Repair promptly such damage when ordered.

.8 Any items salvaged and not ultimately reused are to be reviewed with the Consultant, and removed and disposed of if required.

3.2 **EXAMINATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

.2 Examine adjacent structures and other installations prior to commencement of demolition and removal work.

3.3 **PRESERVATION OF REFERENCES**

.1 Record location and designation of survey markers and monuments located within demolition area, prior to removal. Store and restore markers and monuments upon completion of Work or relocate as directed by Consultant.

3.4 **PROTECTION**

.1 Prevent movement or damage of adjacent structures, services, walks, paving, trees, landscaping, adjacent grades, and parts of existing structure to remain. Supply and install bracing, and shoring as required. Make good damage caused by demolition to acceptance of Consultant.

.2 Protect adjacent structures and property against damage which might occur from falling debris or other causes. Repair or replace damage caused from work of this Section to acceptance of Consultant.

.3 Do not interfere with use of adjacent structures and Work areas. Maintain free, safe passage to and from adjacent structures and Work areas.

.4 Take precautions to support affected structures. If safety of structure being demolished, adjacent structures or services are endangered, cease demolition operations and take necessary action to support endangered item. Immediately inform Consultant. Do not resume demolition until reasons for endangering have been determined and corrected and action taken to prevent further endangering.

.5 If movement or settlement occurs, install additional bracing and shoring as necessary and make good damage to acceptance of Consultant.

.6 Hang tarpaulins where debris and other materials are lowered. Build in around openings with wood and plywood at locations used for removal of debris and materials.

.7 Prevent debris from blocking surface drainage system, elevators, mechanical, and electrical systems which are required to remain in operation.

.8 Pay particular attention to prevention of fire and elimination of fire hazards which would endanger Work or adjacent structures and premises.

.9 Supply and install adequate protection for materials to be re-used, set on ground and prevent moisture pick-up. Cover stockpiles of materials with tarpaulins.

.10 Close off access to areas where demolition is proceeding by barricades and post warning signs.

.11 Supply, install and maintain legal and necessary barricades, guards, railings, lights, warning signs, security personnel and other safety measures, and fully protect persons and property.

.12 Dust/weather partitions:
- .1 Prior to demolition work proceeding in existing structures, temporarily enclose Work areas, access and supply and install dustproof and weatherproof partitions. Design partitions to prevent dust and dirt infiltration into adjoining areas, prevent ingress of water, and to resist loads due to wind.
- .2 Prevent dust, dirt and water from demolition operations entering operational areas.
- .3 Adjust and relocate partitions as required for various operations of work.
- .4 Upon completion of work, remove and dispose of partitions from Site.

.13 Dust protection:
- .1 Perform dust control procedures in accordance with approved Dust Control Plan and work of this Section.
- .2 Clean water to be applied to hard and soft surfaces on Site daily to eliminate dust.
- .3 Roadways and sidewalks to be cleaned daily or as required.
- .4 A designated truck loading area on granular material or existing asphalt to be used to mitigate tracking of demolition debris off Site.
- .5 Loaded vehicles leaving Site to be cleaned of debris with power washing or alternative method.
- .6 Trucks loaded with demolition debris to be covered by tarps or attached screens.

.14 Blasting is not permitted.

3.5 PREPARATION

.1 Disconnect and/or re-route electrical data, communication and telephone service lines entering structures to be demolished. Remove abandoned lines as required for remedial work. Post warning signs on electrical lines and equipment which is required to remain energized.

.2 Disconnect and cap designated mechanical services:
- .1 Natural gas supply lines: As required for remedial work, to be removed by qualified workers in accordance with gas company instructions.

.2 Sewer and water lines: Remove and dispose of as required for remedial work.

.3 Disassemble and remove mechanical equipment, ductwork and piping complete with supports and associated components.

.4 Do not disrupt active or energized utilities designated to remain undisturbed.

.5 Perform rodent and vermin control to comply with health regulations.

3.6 **CONCRETE CUTTING AND CORING**

.1 Refer to Section 03 01 32 for requirements regarding percussive concrete removal work.

.2 Prior to cutting or coring any concrete slab, suspended or on grade, or any concrete beam, investigate by telemetrically scanning the element for presence of embedded services (piping, cabling, conduit, etc.), and for locations of reinforcing steel in suspended concrete slabs and beams.

.3 Acceptable telemetric scanning systems include:
.1 X-Ray scanning of suspended slabs and for concrete beams.
.2 (Ground-penetrating) radar for slab on grade, for suspended slabs and for concrete beams.

.4 Magnetic radio scanners not acceptable for telemetric scanning.

.5 The term x-rays include gamma ray methods, and procedures that use electrically generated x-rays.

.6 Where x-rays employed:
.1 Provide Owner minimum 5 working days advance notice of scanning time in order to provide sufficient advance notice to personal that may be affected by the x-ray work.
.2 Conform to Owner’s radiation protection requirements prior to start of any x-ray work.

.7 Provide Owner and Consultant with inspection agency's written report, summarizing investigations and conclusions.

.8 Obtain Consultant's direction where investigations reveal that cutting or coring required in Contract would cut or damage embedded services, or cut or damage reinforcing steel in suspended concrete slabs or beams.

.9 Execute cutting and coring to prevent damage to all embedded services. Make good all damage arising from cutting embedded services.

.10 Execute cutting and coring to prevent damage (cutting in whole or in part) reinforcing steel in suspended concrete slabs with Consultant's prior authorization.

.11 Make good all damage arising from cutting reinforcing steel in suspended concrete slabs and beams.

3.7 **DEMOLITION**

.1 Perform demolition with extreme care. Confine effects of demolition to those parts which are to be demolished.

.2 Perform work and prevent inconvenience to persons outside those parts which are to be demolished.

.3 Carry out demolition in accordance with the requirements of CSA S350-M.

.4 Demolish parts of structure to permit remedial work as indicated.

.5 Demolition shall proceed safely in systematic manner from roof to grade and as necessary to accommodate remedial work indicated.

.6 Do not overload floor or wall with accumulations of material or debris or by other loads.

.7 Perform work to minimize dusting. Keep work area wetted down with fog sprays to prevent dust and dirt rising. Supply and install temporary water lines and connections that may be required. Upon completion, remove installed temporary water lines. Use covered chutes, water down.

.8 Do not sell or burn materials on Site.

.9 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as Work progresses.

.10 At end of day's work, leave Work in safe condition with no part in danger of toppling or falling. Protect interiors of parts not to be demolished from exterior elements.

.11 Drainage and sewer system protection:
- .1 Ensure that no dust, debris or slurry enters drainage and sewer system on Site.
- .2 Remove and dispose of debris and slurry promptly from Site.
- .3 Comply with City of Toronto Sewer Use By-Law.

.12 Roof removal work: Roof removal work to be in accordance with Section 07 52 16.

.13 Concrete: Refer to Sections 02 41 13 and 03 01 32 for requirements regarding concrete removal work.

.14 Masonry:

.1 Demolish block walls in small sections of not more than 2 m^2. Do not permit masonry to fall in mass from one level to another.

.2 Where only part(s) of a wall is to be demolished, install adequate support for adjacent part(s).

.3 After removal of masonry walls, grind smooth floors ready for new floor finish.

.15 Steel: Where only part or parts of structure is to be demolished, dismantle and maintain structure stable. Do not place excessive loads on components. Install adequate temporary guys and supports to ensure stability and to prevent excessive loading. Support each component being disconnected from structure, and lower, do not drop, component after it is disconnected.

.16 Cut openings through existing walls, partitions and floors. Establish exact location of steel reinforcing in existing concrete slabs or walls before cutting. Be responsible for damage to existing steel reinforcing and be liable for structural failure. Make good surfaces disturbed with materials to match existing.

17. Where doors are scheduled to be removed, include removal of door frames and door hardware.

18. Remove interior partitions, fittings, fixtures and accessories as indicated on drawings. Partitions and walls shall be removed full height to structure above.

19. Remove interior finishes, such as ceiling and floor finishes, where new finishes are indicated on Contract Drawings.

1. Removal of existing ceilings shall include complete removal including bulkheads and suspension system.
2. Removal of adhesive applied finishes shall include complete removal to substrate including adhesive. Take adequate care to prevent damage to substrate.
3. Remove existing floor finishes, include mortar bed, underlayment or other cleavage membranes, underpad, base, floor moulding and transition strips.

20. Demolish all other items indicated or required.

3.8 RECYCLING

.1 Whenever possible, all materials shall be recycled. Pay all costs for this work.

.2 Deliver to nearest appropriate recycling depot all materials accepted for recycling by Authorities having jurisdiction over the Place of Work, including but not limited to cardboard, paper, plastic, aluminum, steel, and glass.

.3 Deliver to nearest appropriate depot all scrap and excess gypsum wallboard for recycling of this material.

.4 Ceiling tiles to be stacked on skids and wrapped for recycling and delivered to nearest appropriate recycling depot.

.5 Base building light fixture lamps to be placed on skids and wrapped for recycling and delivered to nearest appropriate recycling depot.

3.9 **DISPOSAL OF MATERIALS**

.1 Remove from Site, rubble, debris, and other materials that can not be recycled resulting from demolition and removals work in accordance with Authorities having Jurisdiction, except where specified or indicated on Contract Drawings to be reused.

.2 Conform to requirements of municipality's Works Department regarding disposal of waste materials.

.3 Materials prohibited from municipality waste management facilities shall be removed from Site and dispose of at recycling companies specializing in recyclable materials.

3.10 **RESTORATION**

.1 Where demolition removed a structure or installation, restore area in accordance with authorities having jurisdiction.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Installation of hoarding/dust protection and shoring around the Work as indicated on phasing drawings in accordance with Section 01 56 00.

.2 Provide all labour, material, equipment, and supervision required to remove and dispose of all material and debris resulting from removal of deteriorated floor sheathing, where directed by the Consultant.

.3 Provide all labour, material, equipment, and supervision required to remove and dispose of all material and debris resulting from removal of existing floor joists to be replaced as described in the Drawings.

.4 Cutting and remedial work required to make the affected parts of the Work come together properly.

2.0 PRODUCTS

Not applicable.

3.0 EXECUTION

3.1 Inspection

.1 Visit and examine the site and note all characteristics and features affecting the Work of this Section.

.2 Properly identify all services, whether buried, built-in, or exposed, as to position, type of service, size, and direction of flow.

.3 Inspect materials, equipment, and components to be re-used or turned over to the Owner. Note their condition and advise the Consultant in writing of any defects or conditions that would affect their removal and re-use.

3.2 Preparation

.1 Prevent movement, settlement, or damage of elements of existing building that are to remain. Provide bracing, shoring, and supports as required. Protect existing surfaces not to be restored from damage during removal procedures.

.2 Cut and/or cap existing services within the work area, if any, prior to start of Work as required, but do not affect services of areas not under construction or essential to on-going operation of the building.

.3 In all cases, exercise reasonable care during removal operations to avoid damaging items to be salvaged, re-used, or items that are not part of the Work.

.4 Seal off work areas to prevent dust and debris from affecting other areas outside of work area. Prevent public access to areas being repaired.

.5 Tape and/or seal and provide protection to all mechanical and electrical services and all fire alarm and security devices still functioning adjacent to work areas to prevent damage resulting from dust, water, or impact.

.6 Cover drains as required to prevent any construction-related materials and debris from entering the drains. Ensure that all drains continue to operate as required during construction.

.7 Remove or protect in place all surface-mounted or permanent fixtures not to be demolished from damage during demolition procedure.

.8 Apply filter cloth to all exhaust and ventilation vents within work area to prevent dust generated by construction activity from escaping.

.1 Clean or replace filter cloth if filter cloth becomes unsuitably dirty as determined by Consultant.

.9 Provide proposed demolition sequence for Consultant review prior to commencing work.

.10 Provide temporary lighting and ventilation as required to work areas. Owner to provide 110 volt, 220 amp service to work area for Contractor’s use.

.11 Provide temporary lateral bracing for walls, foundation walls, and columns as indicated on drawings prior to slab demolition.

.1 This bracing is to be left in place until completion of each phase of slab replacement.

.12 Submit details of proposed bracing for Consultant review prior to commencing work.

.1 Details to be designed and stamped by Registered Professional Engineer in Province of Ontario.

3.3 Demolition

.1 Remove and dispose of material and debris resulting from removal of deteriorated floor sheathing, where directed by the Consultant.

.2 Remove and dispose of material and debris resulting from removal of existing floor joists to be replaced, as described in the Drawings.

.3 Remove existing mechanical and electrical services associated with slab areas to be demolished. Removal of these services is to be accomplished prior to commencing demolition work outlined in Contract Documents.

.4 Remove concrete slabs to be demolished using sawcutting techniques.

.5 Jackhammer demolition of concrete shall be restricted to those areas where existing slab reinforcement is to be preserved intact and at locations adjacent to vertical surfaces where sawcut cannot reach, or where undercutting is required.

.1 Jackhammer size is specified in Section 03 01 32.

.6 Demolition procedures and equipment shall meet all applicable noise control by-laws and regulations at the Place of the Work.

.7 Provide shoring to support slab when removals reduce its load-carrying capacity, as directed by Consultant. No payment will be made for such shoring, as it is to be included in costs of repair as outlined in these documents.

.8 Take care not to damage the surface of sound material that is to remain through removal operation. Where any such damage is done, it is to be repaired by Contractor at their own expense to Consultant’s approval.

.9 Where new concrete is to be applied to existing concrete, leave surface clean and sound.

.10 All required re-painting due to damage overspray, etc. is Contractor’s responsibility.

.11 At end of each day’s work, leave work in safe condition so that no part is in danger of causing injury or damage.

3.4 Cutting and Remedial Work

.1 Perform cutting and remedial work required to make affected parts of the Work come together properly and complete the Work.

.2 Coordinate and perform the Work so that cutting and remedial work is kept to a minimum.

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

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

.5 Cutting and remedial work shall be performed by competent and qualified specialists familiar with the Products affected and in a manner that neither damages nor endangers the Work.

.6 Ensure that cutting and remedial work does not jeopardize manufacturers' warranties.

3.5 Waste Disposal

.1 Dispose of waste products and material in strict accordance with product manufacturer's material safety data sheets and governing waste control regulations.

.2 Existing drainage system is not to be used to dispose of project wastes and/or materials.

.3 Store volatile wastes or material in covered metal containers. Remove wastes that create hazardous conditions from premises daily.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, material, equipment, and supervision necessary to prepare slab surface, slab soffit, column, wall, and beam repair areas and place new concrete repair material.

.2 Use of pre-packaged materials is to be in targeted repair locations as directed by the Consultant. These locations may include drive aisles requiring fast turnaround, locations requiring expedited application of traffic deck coating following concrete repairs, or smaller localized concrete repair areas.

1.2 Repair Quantity Determination

.1 Length and width shall be measured to the nearest 25 mm (1”). Depth, if applicable, shall be measured to the nearest 13 mm (1/2 inch).

1.3 References

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CSA A23.1/CSA A23.2	Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
.4	CSA A3000	Cementitious Materials Compendium
.5	CSA S413	Parking Structures
.6	ASTM C260/C260M	Standard Specification for Air-Entraining Admixtures for Concrete
.7	ICRI 310.2R	Selecting and Specifying Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair

1.4 Performance Requirements

.1 Repaired concrete surfaces shall not scale or crack excessively.

.2 Concrete repair materials shall not spall or debond from existing concrete.

.3 Concrete repair materials shall achieve a minimum compressive strength of 20 MPa within 24 hours.

1.5 Submittals

.1 Submit manufacturer's product specifications and data sheets for the following products:

.1 Cement slurry bonding agent

.2 Rapid cure delamination repair concrete material

.3 Top surface patch material

.2 Submittals to be provided for review by the Consultant a minimum of two weeks prior to placement or use of products.

.3 Do not commence placement of repair products until review is complete and proposed products and procedures are accepted by Consultant.

.4 If requested by Consultant, provide a certificate signed by the Contractor and pre-packaged material manufacturer certifying the following:

.1 Surfaces to receive pre-packaged material were acceptable and satisfactory to receive the materials per the manufacturer’s requirements and these Specifications. Application of pre-packaged materials shall imply acceptance of surfaces.

.2 Pre-packaged materials were installed in accordance with manufacturer’s written instructions and these Specifications.

1.6 Qualifications

.1 Use only qualified concrete placers and finishers, with a minimum of two years’ experience in similar work.

2.0 PRODUCTS

2.1 Materials

.1 Portland Cement: Type GU to CSA A3000.

.2 Aggregate: Natural stone to CSA A23.1.

.3 Water: Potable and to CSA A23.1.

.4 Air Entraining Agents: To ASTM C260/C260M.

.5 Chemicals Admixtures: To CSA A3000. Calcium chloride is not permitted.

.6 Pozzolanic Mineral Admixtures: To CSA A3000.

.7 Curing Materials: To CSA A23.1.

.8 Blended Hydraulic Cementing Material: Type 10SF to CSA A3000.

.9 Supplementary Cementing Material: To CSA A3000.

.10 Superplasticizing Admixture: To CSA A3000.

2.2 Cement Slurry Bonding Agent

.1 Cement slurry grout consisting of a mixture of one part cement to one part fine aggregate and enough water to make a heavy cream consistency. Aggregate to conform to CSA A23.1 Clause 4.2.3.

.2 Contractor to provide written confirmation of manufacturer's recommended slurry bonding agent prior to placement of repair material.

2.3 Surface Delamination Repair Materials

.1 Proportion patch materials with specially graded aggregate to give the following properties in accordance with CSA A23.2:

	Description	Requirements
.1	Compressive Strength (24 hours)	20 MPa minimum
.2	Compressive Strength (7 days)	30 MPa minimum
.3	Flexural Strength (7 days)	5 MPa minimum
.4	Slant/Shear Bond Strength (7 days)	5 MPa minimum
.5	Linear Shrinkage	0.08% maximum
.6	Rapid Chloride Permeability	less than 1,000 coulombs

.7 Thermally compatible with concrete substrate under all applicable service conditions.

.2 The patch materials listed below may conform to the specified properties and linear shrinkage requirements. Manufacturer's latest product data sheets for proposed patch materials shall demonstrate that the patch material conforms to the specified requirements. Where product data is incomplete, manufacturer is to provide supplementary independent test data that demonstrates conformance.

.3 Patch Materials:

	Product Name	Manufacturer
.1	MasterEmaco T1060	Master Builders Solutions
.2	MasterEmaco T1061	Master Builders Solutions
.3	MasterEmaco S 466CI	Master Builders Solutions
.4	MasterEmaco S 440MC	Master Builders Solutions
.5	Blue-Line Rapid Repair Grout	Con-Spec
.6	CPD Rapidcrete	CPD
.7	Eurocrete	Euclid Chemical
.8	Versaspeed	Euclid Chemical
.9	HP-S6	King
.10	HP-S10	King
.11	MS-S6	King
.12	MS-S10	King
.13	RS-S10	King
.14	Planitop 18	Mapei
.15	SikaTop 111 Plus w/Sikacem Accelerator	Sika
.16	SikaQuick 1000	Sika
.17	Structuroc H	Solhydroc
.18	Traffic Patch Coarse	Target
.19	Traffic Patch Fine	Target

2.4 Concrete Resurfacing Materials

.1 Proportion patch materials with specially graded aggregate to give the following properties.

	Description	Requirements
.1	Compressive Strength (24 hours)	20 MPa minimum
.2	Compressive Strength (7 days)	30 MPa minimum
.3	Flexural Strength (7 days)	5 MPa minimum
.4	Slant/Shear Bond Strength (7 days)	5 MPa minimum
.5	Linear Shrinkage	0.08% maximum
.6	Thermally compatible with concrete substrate under all applicable service conditions.	

.2 The patch materials listed below may conform to the specified properties and linear shrinkage requirements. Manufacturer's latest product data sheets for proposed patch materials shall demonstrate that the patch material conforms to the specified requirements. Where product data is incomplete, manufacturer is to provide supplementary independent test data that demonstrates conformance.

.3 Patch Materials (6 to 13 mm thickness):

	Product Name	Manufacturer
.1	SikaTop 122 Plus	Sika
.2	Quikcrete Bonded Topping Mix	Target
.3	MasterEmaco T 1060	Master Builders Solutions
.4	Mapecem 202	Mapei
.5	Planitop 12 SR	Mapei

.4 Patch Materials (greater than 13 mm thickness):

	Product Name	Manufacturer
.1	Quikcrete Bonded Topping Mix	Target
.2	MasterEmaco T 1060/1061	Master Builders Solutions
.3	Blue-Line Rapid Repair Grout	Con-Spec
.4	Planitop 12 SR	Mapei

.5 Expansion Joint Nosing Repair Materials:

	Product Name	Manufacturer
.1	MasterEmaco S 6000	Master Builders Solutions
.2	MasterEmaco S 77CI	Master Builders Solutions
.3	MasterEmaco T 1060/1061	Master Builders Solutions

2.5 Repair Materials for Reduced Curing Period

.1 Approved product for surface delamination repairs requiring extra-fast curing period:

	Product Name	Manufacturer
.1	VersaSpeed	Euclid Chemicals
.2	MasterEmaco T 415	Master Builders Solutions
.3	MasterEmaco T 430	Master Builders Solutions

2.6 Admixtures

.1 Use only compatible admixtures and add to mix in strict accordance with manufacturer's written instructions.

.2 Use of calcium chloride not permitted.

3.0 EXECUTION

3.1 Concrete Surface Preparation

.1 All concrete surfaces to receive new concrete repair material shall have a minimum No. 6 CSP per ICRI 310.2R and be thoroughly abrasive-blast prior to concrete placement to remove laitance, debris, and loose aggregate.

.2 Clean all existing concrete surfaces to receive new concrete of foreign material, dust, debris, grease, and oil as directed by Consultant. Emulsifiers shall be required for surfaces containing grease or oil.

.3 Contractor to notify Consultant to review surfaces prior to concrete placement.

3.2 Concrete Placement – Surface Repairs

.1 Prepare patch surface, mix patch material, and apply, finish, and cure in strict accordance with the more stringent requirements of the Contract Specifications and manufacturer's written instructions.

.2 The patch area shall be thoroughly wetted as required to achieve a saturated surface dry (SSD) state prior to placing concrete repair material.

.3 Puddles of free water shall be blown from the patch area and the surface is to be permitted to dry to a saturated surface dry (SSD) state prior to application of cement slurry.

.4 Apply a cement slurry bonding agent to the surface of the concrete just prior to placing new concrete.

.5 The cement slurry bonding agent shall be broomed or scrubbed into the deck to fully saturate the surface but not allowed to puddle.

.6 Pre-wet filter fabric, burlap, or cotton mats shall be available on site prior to placement of concrete to allow for immediate placement overtop of new concrete patches after their initial set.

.7 Prepare pre-packaged concrete mix per manufacturer's specifications.

.8 Contractor to confirm the minimum and maximum application lift thickness prior to placement of concrete. If required and permitted by the manufacturer, the concrete repair material can be extended with aggregate.

.9 Contractor to submit proposed aggregate extension mix design to the Consultant prior to proceeding with Work.

.10 On slab top surfaces, place new dense concrete thoroughly compacted and vibrated into place to ensure good bond.

.1 Ensure reinforcing steel is secured in place and is not disturbed during placement.

.2 Vibrators are to be used for consolidation purposes only and are not to be used to an extent that causes segregation of the concrete.

.3 Internal vibrators shall conform to CSA A23.1 Clause 7.2.5.2 and Table 19: Internal Vibrators for Various Applications.

.4 Vibrators shall be inserted into concrete perpendicular to concrete surface.

.5 Vibrators shall be inserted such that zones of consolidation always overlap.

.11 Concrete surfaces to be flush with existing surfaces, free of voids and cracks, and have a uniform surface and transition to the existing surface.

.12 Finish concrete in accordance with CSA A23.1/A23.2. Initial finish shall be completed before any bleeding or free water is present on the surface of the concrete. Final finishing shall commence after the bleed water has disappeared and when the concrete has stiffened sufficiently to prevent the working of excess mortar to the surface. Do not add water to finish.

.13 Do not overwork concrete surface. Wood float finish is acceptable.

.14 Do not use steel trowels with air-entrained concrete. For air-entrained concrete, the surface can be further levelled and consolidated with a magnesium bull float for larger repairs or a magnesium trowel for smaller repairs. One or more passes shall be made at suitable time intervals to obtain a level finish free of float marks. Do not work bleed water on the concrete surface into the concrete during finishing.

.15 Tool crack control joints where indicated on Drawings or, if not shown on Drawings, per existing layout.

.16 Cure in accordance with the more rigorous requirements of this Section and manufacturer’s written instructions.

.17 Areas of concrete repair completely through the thickness of the slab shall be patched with concrete, well consolidated, and vibrated into place on to smooth plywood forms with suitable release agents adequately shored from the slab below, to the approval of the Consultant. Once forms have been removed, edges of through slab repair are to be ground, hand patched, etc. as required to produce smooth (form like) transition from new patch material to the existing slab.

.18 Do not allow traffic on newly placed repair patches until 75% of the specified 28-day strength has been reached.

3.3 Slab Surface - Repair of Surface Scaling

.1 The entire slab surface shall be lightly jackhammered or scarified to a minimum No. 6 CSP per ICRI 310.2R and be thoroughly abrasive-blast, sandblast, or shot blast prior to concrete placement to remove laitance, debris, and loose aggregate.

.2 Slab surfaces shall be cleaned of all grease and oil.

.3 Areas where the slab surface has deteriorated greater than 25 mm in total depth, or where reinforcing is exposed, are to be repaired as a concrete surface repair.

.4 Thoroughly clean patch of dust and debris.

.5 Prepare surfaces and place concrete mixture in strict accordance with CSA A23.1 and manufacturer requirements.

.6 Surfaces to be trowelled smooth, flush with existing surfaces, and with no voids at patch edges.

.7 Cure in accordance with the more rigorous requirements of this section and manufacturer written instructions.

.8 Do not permit traffic on repairs for a minimum of 24 hours after finishing.

3.4 Concrete Mixing and Placing

.1 Concrete shall be machine mixed unless otherwise stipulated by the manufacturer. Mixing and placing shall be in accordance with CSA A23.1.

.2 Concrete shall be conveyed from the mixer to the place of deposit by methods that will ensure the required quality of concrete. Equipment for conveying the concrete shall be of such size and design as shall ensure a practically continuous flow of concrete at the delivery end without separation of materials.

.3 Concrete shall be deposited in the forms as near as practicable to its final position to avoid re-handling.

.4 Depositing shall be continuous throughout each division and the concrete shall be placed and worked so that a uniform texture will be produced.

.5 No concrete shall be placed later than one half hour after leaving the mixer. No re-tempered concrete shall be allowed.

.6 Mix concrete in accordance with the manufacturer's written instructions.

3.5 Compaction and Vibration

.1 Concrete shall be consolidated by means of sufficient vibrators of adequate size operated by competent workers.

.2 The use of vibrators to transport concrete shall not be allowed.

.3 Concrete shall be thoroughly worked around reinforcement, around embedded items, and into corners.

.4 Compaction and vibration is to eliminate all air and stone pockets that may cause honeycombing, pitting, or planes of weakness.

3.6 Concrete Curing

.1 Ensure manufacturer's recommended curing conditions are maintained over the patch area. The more stringent curing conditions between the manufacturer's written instructions and those outlined in this section will govern unless otherwise agreed upon by the Consultant in writing.

.2 Initiate surface concrete repair wet curing as soon as possible after the concrete has sufficiently set, and no later than 30 minutes after finishing.

.1 Minimum acceptable wet curing method on slab surfaces is installation of pre-saturated filter fabric, burlap, or cotton mats that are covered with soaker hoses and plastic sheeting. Overlap wet-curing mats 150 mm and ballast in place without marring the concrete surface.

.2 Wet curing procedures to be in accordance with manufacturer's written requirements, but shall be no less than a one-day period at a minimum temperature of 10°C. Water shall not be permitted to evaporate from the concrete surfaces at any time within the wet cure period.

.3 Prevent airflow in the space between the wet-curing mats and the plastic sheeting. Protect wet-curing assembly from freezing during cold weather.

3.7 Inspection and Testing

.1 Testing is to conform to CSA A23.2.

.2 Inspection and testing to be conducted by a testing agency designated by the Owner. The Owner will pay costs of inspection and testing described in this section.

.3 Contractor to inform testing agency 24 hours in advance of concrete placement.

.4 Testing shall include:

.1 Preparation and testing of concrete grout cubes or cylinders for compressive strength.

.2 Review manufacturer product data sheets submitted by the Contractor.

.3 Bond testing of concrete repair patches to existing concrete where designated by the Consultant.

.4 Submission of test results to the Owner, the Consultant, and the Contractor.

.5 A minimum of one set of concrete grout cubes (9 cubes) or cylinders (4 cylinders) shall be taken for compressive strength testing for of concrete patch material used each day unless otherwise directed by Consultant. Concrete test samples are to be placed in an area with similar curing conditions to that of the cast concrete.

.5 Testing procedures for concrete shall conform to the following requirements:

.1 Compression tests on concrete shall be carried out in accordance with CSA A23.1 and A23.2. Strength test on approved grout shall consist of nine grout cubes with three cubes tested at seven days and the remainder tested at 28 days. For cylinders, strength tests shall be undertaken on one cylinder each at 3 and 7 days with the remaining two tested at 28 days.

.6 The Contractor shall provide at no additional costs to the Owner:

.1 Samples of all material required for testing.

.2 Cooperation with the execution of concrete testing. which shall include protection against injury or loss of grout cubes or cylinders.

.3 Access for the testing agency to test and/ or inspect materials.

.4 Site storage facilities meeting requirements of CSA A23.2 for concrete test specimens prior to removal to laboratory.

.7 Bond Strength:

.1 After the concrete or grout has cured, the testing agency may perform bond strength tests if requested by Consultant.

.2 These cores are to be used for the evaluation of the bond strength of the new concrete to the existing by direct tensile force. The testing agency will drill through patches selected by Consultant.

.3 Failure to achieve a minimum tensile bond strength of 0.9 MPa shall constitute failure of patches.

.4 Contractor to fill all core holes with non-shrink cementitious grout upon completion of the tests.

.8 Contractor shall pay for costs of additional testing as follows:

.1 If Contractor fails to notify testing agency in event of pour cancellation.

3.8 Field Quality Control

.1 The Consultant shall evaluate bonding of fresh patch material to existing concrete after the fresh patch material has cured sufficiently.

.2 The evaluation shall be performed by sounding, using a "chain-drag" or other techniques.

.3 Hollow sounds detected in repair area provide reason to suspect inadequate bonding. Contractor to core these areas to determine bonding adequacy where requested by the Consultant.

.4 Coring shall be through the new concrete and into the existing concrete. Core diameter shall be 75 mm, or as required by the Consultant. Length of cores shall be twice the core diameter or twice the thickness of new concrete, unless otherwise requested by the Consultant.

.5 Scanning is to be completed prior to coring to avoid coring through embedded reinforcing, conduit, or other embedded items.

.6 Cores will be visually inspected after removal and any further testing that is required will be determined by the Consultant.

.7 Contractor to patch core holes.

3.9 Rejection of Defective Work

.1 The Consultant shall have the right to order additional concrete testing of any portion of repairs in accordance with CSA A23.1 if previous testing demonstrates non-conformance with specified requirements. The testing agency shall be selected by the Consultant and shall deal directly with the Consultant. Payment for costs associated with the additional concrete testing will be at the Contractor's expense.

.2 Where it is the Consultant's opinion that material or workmanship fails to meet the specified requirements, the work shall be replaced or repaired to the approval of the Consultant at no additional cost to the Owner.

.3 Bond failure between repair material and the existing concrete, or failure to meet compressive strength requirements based on compression testing of concrete cylinders, will result in drilling of additional core samples at the Contractor's expense. Failure of these additional samples will require the work to be replaced or repaired to the approval of the Consultant at no additional cost to the Owner.

3.10 Record Drawings

.1 Maintain accurate records of the location, size, and concrete placement date for each repair area.

.2 Records to be kept up-to-date and made available to Consultant throughout the duration of the Work.

.3 Prior to Substantial Performance of the Work, provide a plan showing location, size, and date of concrete repairs.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Supply, install, and remove shores and scaffolding as required to support the structure during wood framing removals and repairs.

.2 Structural shoring must be provided as indicated in shoring shop drawings prepared by a specialty Professional Engineer.

.3 Structural shoring costs are included in Lump Sum Prices.

1.2 Submittals

.1 If shoring not indicated on the Drawings, provide shoring shop drawings that include a shoring design and layout designed by a specialty Professional Engineer licensed to practice in Ontario a minimum of two weeks prior to starting demolition Work. Specialty Professional Engineer is to be retained by the Contractor at no additional cost to the Owner.

.1 Shoring shop drawings are to include shoring layouts for randomly located surface, soffit, through-slab, vertical concrete delamination repairs, and lateral wall bracing if required.

.2 Shoring layout and shop drawings shall depict arrangement of equipment for shoring, showing installation details, timber cribbing, member types, and spacing of connections.

.3 Shoring layout and shop drawings shall be designed, sealed, and signed by specialty Professional Engineer.

.2 Shoring shop drawings are to be reviewed by the Consultant for the effect on the base structure and accepted prior to installation of shoring.

.3 Shoring shop drawing submission excludes any shoring specifically detailed on the Drawings.

.4 Submit documentation of field inspections and certifications required from specialty Professional Engineer, as specified by this Section, and Contract Documents.

1.3 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3 CSA S269.1 Falsework and Formwork

.4 CSA S269.2 Access Scaffolding for Construction Purposes

.5 CSA S350 Code of Practice for Safety in Demolition of Structures

2.0 PRODUCTS

2.1 Equipment and Materials

.1 Unless otherwise specified by Contract Documents, use only commercially manufactured shoring and bracing systems.

.2 Minimum capacity of commercially manufactured equipment as follows:

.1 Post shores with a minimum capacity of 24 kN at 2.5 m height

.2 Standard scaffold frames with a minimum capacity of 22 kN per leg.

.3 Heavy-duty scaffold frames with a minimum capacity of 44 kN per leg.

.3 Manufactured shoring systems shall consist of pre-engineered steel or aluminium components, designed and produced specifically for structural shoring, and installed in accordance with manufacturer's recommendations.

.4 Shoring members need not be new materials. Previously used materials are acceptable, provided that they are in good repair, unbent, and undamaged.

.5 Use of "scaffolding" equipment (i.e. where not specifically intended for use as structural shoring of heavy loadings), wood shoring or bracing members, or tube-and-coupler assemblies require preapproval by the Consultant or Specialty Professional Engineer

.1 Use of wood materials shall be limited to wedges and shims, where not supporting vertical loading and where not subject to shrinkage or potential deterioration in wet conditions or long-term application.

.6 Design of shoring members or structural steel members and components that are not of a pre-manufactured system shall be in accordance with provisions of governing Building Code and Standards for specific material of member.

.7 Slabs are to be shored for a minimum of two levels or to the slab-on-grade level unless otherwise indicated on the approved shoring shop drawings or the Drawings.

3.0 EXECUTION

3.1 Structural Slab Shoring

.1 Support the structure during the Work. Supply and install all shoring and bracing in accordance with approved shop drawings and necessary to prevent movement, settlement, or damage to the structure, services, and property.

.2 Specialty Professional Engineer who designed shoring systems shall inspect installation and provide written certification that shoring and bracing systems and components, as installed, meets intent of their design and compliance with project criteria.

.3 Provide additional shoring prior to wood joist removals where the Consultant or specialty Professional Engineer deems it necessary to prevent movement, settlement, or damage to the structure, services, and property based on identified concrete delamination repair locations.

.4 Provide additional shoring to support suspended sprinkler, piping and mechanical systems during the Work.

.5 Provide additional shores at the Contractor’s expense where it is necessary to support stockpiled rubble and equipment.

.6 Formwork shoring requirements are in addition to structural shoring requirements.

.7 Install and arrange slab shoring in a manner that prevents sharp projections that may cause personnel injury.

.8 Modify the position of shores if requested by the Consultant or specialty Professional Engineer at no additional cost to Owner.

.9 Manage and maintain shoring by regularly inspecting and checking installed shoring and bracing components to ensure that supports, fastenings, wedges, ties, and parts are secure.

.10 Tighten all shores below the level being repaired prior to installation of new wood framing elements.

.11 Do not strip shores until new wood framing is completely installed and reviewed.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Remove sound and unsound concrete from slab surfaces where directed by Consultant and as described herein.

2.0 PRODUCTS

2.1 Equipment

.1 Provide hand-held jackhammers for concrete removal that are capable of efficiently removing sound and unsound concrete without causing excessive or unwanted removal.

.2 Maximum jackhammer size is 15 kg. Light chipping hammers are to be used where the Consultant deems it necessary to reduce the amount of concrete breakage. Maximum light chipping hammer size is 7 kg. The use of light chipping hammers is at no additional cost to the Owner.

.3 Equipment located outside shall be mufflered or placed within an acoustic enclosure to produce maximum operating noise levels of 70 dBa at 3.0 m. Noise levels are also to be in accordance with all local and municipal by-laws and regulations.

.4 Use "silenced" compressors.

.5 Compressors and all diesel-powered equipment are to be fitted with a diesel exhaust scrubber.

2.2 P-T Sheathing Repair Coatings

.1 Approved products:

.1 C.I.M. 1000 by C.I.M. Industries Inc.

.2 MasterSeal HLM 5000 by BASF

.3 Black Jack All-Weather Roof Cement by Gardner Gibson

3.0 EXECUTION

3.1 Surface Concrete Removal

.1 Remove concrete in areas that are already spalled or that produce a hollow sound under a hammer test, which indicates the presence of concrete delaminations. The areas shall be initially located by the Contractor and marked on the concrete surface with a durable red-coloured paint. The Consultant will then review the markings and mark out the actual area of concrete to be removed.

.2 Take precautions to avoid punching through the slab.

.3 Remove concrete within designated areas to obtain a minimum of 25mm clearance around all exposed reinforcement within delamination repair. Minimum removal depth shall be 50 mm, which may include sound concrete.

.4 Upon exposure of visibly corroded or debonded reinforcement, additional concrete removal shall be performed until bars appear to be rust-free and well bonded for a distance of 75mm and perimeter of designated area is sound, or until otherwise directed by the Consultant.

.1 This concrete removal shall not proceed until authorized by Consultant.

.2 Contractor shall not receive payment for concrete removals not authorized by nor considered necessary to Consultant.

.5 Excess or unnecessary concrete removal to be at no extra cost to the Contract.

.6 Outline patch area with a 13-mm deep vertical sawcut as close as possible to limits of concrete already removed. Reduce sawcut depth if necessary to avoid cutting reinforcement. Remove concrete to sawcut taking precautions to avoid damaging sawcut edge. Edges with spalls or chips will be rejected and shall be re-sawcut at Contractor's expense.

.7 Call for review by Consultant to confirm acceptability of patch preparation prior to cleaning of reinforcement. After concrete removal has been complete, a final check adjacent to the areas shall be made by the Contractor to determine any additional spalling or delamination which may have occurred. Contractor shall mark out these areas and notify Consultant to make a review.

.8 Remove additional concrete required to provide adequate development and/or lap for new reinforcing steel required as directed by the Consultant.

.9 Where the Consultant deems that required concrete removal is excessive adjacent to vertical surfaces, a key is to be chipped into existing columns and walls prior to concrete placement. The key is to have a minimum depth of 40 mm into the vertical element. Install shoring and bracing as required.

3.2 Concrete Removal for Surface Scaling Repairs

.1 The Consultant will locate and define the extent of repair on site. Approximate areas have been indicated on Drawings.

.2 Contractor will outline the area with a 13 mm deep vertical sawcut. All patches will be rectangular and perpendicular to grid lines unless directed otherwise by Consultant.

.3 Remove concrete to sawcut taking precautions to avoid damaging sawcut edge. Edges with spalls or chips will be rejected and shall be re-sawcut at Contractor's expense. Minimum depth of removal is to be 13 mm.

.4 Call for review by Consultant to confirm acceptability of concrete removal prior to patching.

3.3 Existing Exposed Electrical Services

.1 The Contractor shall perform temporary removal, replacement, or relocation of existing electrical wiring, conduit, equipment, fixtures, or hardware in designated concrete delamination repair areas as required for completion of the Work.

.2 All exposed conduit, fixtures, attached devices, wet-sprinkler fire system piping, heads and pull stations, fire extinguishers, mechanical system components, louvers and ducts are to be protected or Contractor to correct damages at their own expense. The Contractor shall promptly report any damage to the Owner and the Consultant.

.3 Prior to commencing the Work, the Contractor shall contact the Owner to locate all protective or alarm systems and sensors. All services shall be protected against damage or interruption. The Contractor shall provide the Owner with minimum 48 hours advance notice of any necessary interruption. All claims resulting from damage shall be the responsibility of the Contractor.

3.4 Existing Embedded Electrical Services

.1 It is the Contractor's responsibility to ensure that all potential areas of buried conduit be identified and that all high voltage systems located in the area of work are switched off to prevent possible injury. Coordinate requirements with Owner.

.2 The Contractor shall take the utmost caution during concrete removal operations in order to prevent damage to embedded conduits. Any damage caused to such conduits will be immediately reported to the Owner and Consultant. In no instance will damaged or deteriorated conduits be covered up by the Contractor without specific approval from the Owner.

.3 Contractor to repair or abandon damaged conduit within the slab at the discretion of the Consultant. Owner to pay for repairs provided that damage did not result from Contractor's negligence.

.4 Contractor to coordinate required repairs with designated Electrical Sub-Contractor. Contractor shall designate Electrical Sub-Contractor for the Work.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Clean and prepare existing reinforcement exposed within concrete repairs and where otherwise designated by the Consultant.

.2 Supplement corroded or damaged reinforcement with new reinforcing steel and accessories, including supply, fabrication, handling, and placing.

1.2 Reference Standards

.1 All Reference Standards are latest editions referenced by the building code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CSA A23.1/CSA A23.2	Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
.4	CSA G30.18	Carbon Steel Bars for Concrete Reinforcement

.5 ACI Manual of Standard Practice for Detailing – 28th Edition

.6	CSA W186	Welding of Reinforcing Bars in Reinforced Concrete Construction

.7 Reinforcing Steel Institute of Canada (RSIC) Manual of Standard Practice

.8	SP-71 (08)	ASTM Standards in 318-08
.9	ASTM A775/A775M	Standard Specification for Epoxy-Coated Reinforcing Steel Bars

1.3 Product Handling

.1 Protect reinforcement in a manner that prevents excessive rusting and fouling with dirt, grease, form oil, and other bond-breaking coatings.

.2 Reinforcement shall be free from excessive corrosion, mud, oil or other coatings that adversely affect its bonding capacity at the time concrete is placed.

.3 Take special care to prevent damage to epoxy-coated reinforcement.

.4 Contractor shall repair damage to epoxy coatings using a manufacturer-approved epoxy patching material. Completely remove any corrosion that forms prior to repairing damaged epoxy coating.

.5 Coat cut ends of epoxy coated reinforcing with approved epoxy patching material.

2.0 PRODUCTS

2.1 New Concrete Reinforcement and Accessories

.1 Reinforcing steel bars shall conform to CSA G30.18, 400 MPa grade unless otherwise specified herein or on the drawings. Epoxy coated finish.

.2 Reinforcing bars to be welded shall conform to CSA G30.18.

.3 Bar supports shall conform to SP-71: ASTM Standards in 318 unless otherwise approved by the Consultant.

.4 Chairs, bolsters, bar supports, and spacers shall be epoxy coated or plastic. The use of pebbles, pieces of broken stone or brick, pipe, or wooden blocks will not be permitted.

.5 Tie wire for coated or galvanized reinforcing shall be plastic-coated.

2.2 Factory Applied Epoxy Coating

.1 New epoxy coated reinforcing steel shall conform to CSA G30.18 and ASTM A775/A775M. Approved factory applied epoxy coating to be Scotchkote 413.

3.0 EXECUTION

3.1 Preparation - Reinforcement in Place

.1 Exposed reinforcement and steel shall be completely cleaned of cement paste, corrosion, oil, and contaminants. Dry abrasive-blast clean to near-white blast, completely cleaned of all grease, oil, dirt, mill scale, cement paste, debonded epoxy, etc. Additional cleaning shall be performed if subsequent corrosion occurs after initial cleaning.

.2 Wire brush, grinding, and similar hand-cleaning methods shall not be permitted in lieu of abrasive-blast cleaning of reinforcement, unless approved by the Consultant.

.3 The Contractor may elect to cut, remove, and replace damaged or corroded reinforcement with new reinforcement in lieu of cleaning existing exposed reinforcement, subject to approval of the Consultant. Provide required tension lap splices with existing cleaned reinforcement at no additional cost to the Owner and Consultant's approval.

.4 Epoxy coat exposed reinforcing steel only where repairs do not utilize silica fume modified concrete mixes as follows:

.1 After the Consultant has reviewed the degree of cleaning, epoxy shall be provided on designated steel and reinforcement bars.

.2 In no case shall application of the coating be delayed more than 8 hours after cleaning.

.3 Apply 100% coverage of epoxy coating to reinforcement and steel in the patch areas in accordance with manufacturer's recommendations as soon as possible after cleaning and before oxidation that is discernible to the unaided eye occurs.

.4 Epoxy coating dry film thickness to be 7 to 12 mils. Do not apply epoxy thicker than 12 mils.

.5 Apply additional coats where required to achieve minimum thickness after the first coat is completely cured and dry (tack-free), in accordance with manufacturer's recommendations.

.6 Do not proceed with concrete placement until high solids epoxy coatings are dry or 100% solids epoxy coatings are tack free.

.7 Repair visible holes, voids, and cracks that appear after coating.

.8 Coverage shall be uniform and free from running. Epoxy coating will be rejected if uniform coverage is not provided.

3.2 Installation

.1 Replace or supplement damaged or severely corroded reinforcement exposed in concrete delamination repair patches with new epoxy coated reinforcement where existing reinforcing steel has a section loss of 20% or greater.

.2 Replace or supplement damaged or severely corroded reinforcement where otherwise directed by the Consultant.

.3 Replacement or supplemental reinforcing bars shall be the same bar size or greater than the original bar.

.4 Additional concrete removal may be required to allow for placement of supplemental reinforcing bars. The length of the supplemental bars shall be equal to the length of the deteriorated segment of the existing bars, plus the required lap splices at each end. Splicing requirements shall be in accordance with indicated Reference Standards. Supplemental bars shall be placed parallel to, and approximately 20 mm from, the existing bars.

.5 Additional concrete removal required for supplemental reinforcement placement will be paid by Owner except where Contractor elects to replace bars in lieu of abrasive-blast cleaning.

.6 Reinforcement that is fully exposed in repair areas for the entire bar length shall be removed and replaced with new reinforcement of the same bar size or greater at no additional cost to the Owner.

.7 Accurately place supplemental reinforcement and secure existing reinforcement exposed in the delamination repair patches to maintain original design layout.

.8 Reinforcement shall be firmly tied and supported by bar supports and side form spacers to ensure proper concrete cover and spacing within allowable tolerances before and during concrete placement.

.9 Bar supports shall be sufficient in number and strength to carry the reinforcement they support and prevent displacement by workers or equipment before and during concrete placement.

.10 Bars shall be tied at all intersections where spacing is greater than 250 mm in each direction and at alternate intersections where spacing is less than 250 mm in each direction.

.11 Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, and embedded items. If bars are moved more than one bar diameter, or enough to exceed specified tolerances, the resulting arrangement of bars shall be subject to Consultant’s approval.

3.3 Welding

.1 Any welding of reinforcing steel shall be in accordance with CSA W186.

.2 Copies of the Canadian Welding Bureau approved welding procedure and certificate of current operator qualification shall be submitted to the Consultant prior to commencement of welding.

3.4 Inspection and Testing

.1 No concrete shall be placed until Consultant has reviewed reinforcing in-place. Provide minimum 24 hours of notice of time when reinforcement will be substantially in place and ready for Consultant's review.

.2 Inspection of reinforcement coated in place shall include visual inspection with flashlight and mirror. This inspection shall be first made by the Contractor. When the Contractor is satisfied epoxy coating is in conformance with the Specifications, notify Consultant to review the work.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for topping work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM C109M, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).

.2 ASTM C1708/1708M, Standard Test Method for Self-leveling Mortars Containing Hydraulic Cements.

.3 ASTM C348, Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, and limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Certificates: Submit certification from manufacturer, stating that materials proposed for use are compatible with specified floor finishes.

1.4 **QUALITY ASSURANCE**

.1 Installers qualifications: Perform work of this Section by a company that has a minimum of five years proven experience in installations of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator’s current certificate of approval by the material manufacturer as proof of compliance.

.2 Mock-up:
- .1 Construct one room mock-up of topping in location acceptable to Consultant.
- .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with work.
- .3 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
- .4 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

1.5 **SITE CONDITIONS**

.1 Do not install work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
- .1 Concrete temperature: 10°C minimum.
- .2 Ambient air temperature: 16^0C to 30^0C
- .3 Precipitation: None.

.2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 48 hours before, during, and 48 hours after installation.

2 Products

2.1 **MATERIALS**

.1 Primer: Type as recommended by topping manufacturer to suit site conditions and intended end use.

.2 Concrete based levelling compound (with floor finish):
- .1 Compressive strength to ASTM C1708/1708M, 28 day, 4300 psi.
- .2 Flexural strength to ASTM C348: 28 day, min. 850 psi.
- .3 Acceptable material: ‘TechLevel 150' by CustomTech or approved equal by Ardex Engineered Cements.

.3 Concrete based levelling compound (wear surface):
- .1 Compressive strength to ASTM C109, 28 day, 6100 psi.
- .2 Flexural strength to ASTM C348: 28 day, min. 1200 psi.
- .3 Acceptable material: ‘Ardex SD-T Self-Drying, Self-Levelling Concrete Topping' by Ardex Engineered Cements or approved equal.

.4 Metal mesh: 3.4 lb galvanized, expanded, diamond metal lath mesh.

.5 Water: potable.

2.2 **MIXES**

.1 Mix toppings in accordance with manufacturer's written instructions.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **PREPARATION**

.1 Remove loose, spalled, cracked, eroded and disintegrated concrete to solid surface.

.2 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, projections and any other foreign matter detrimental to performance. Obtain manufacturer's approval of substrate in writing, submit copy to Consultant.

.3 Prohibit traffic on prepared areas until work of this Section is completed.

.4 Supply and install temporary protection to adjacent surfaces, floor drains, and steel angles to prevent damage resulting from work of this Section.

.5 Prior to application of topping, remove all debris by vacuuming.

3.3 **WOOD SUBFLOOR PREPARATION**

.1 Examine wood subfloors and ensure they confirm to the topping manufacturers requirements.

.2 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, projections and any other foreign matter detrimental to performance. Obtain manufacturer's approval of substrate in writing, submit copy to Consultant.

.3 Prohibit traffic on prepared areas until work of this Section is completed.

.4 Supply and install temporary protection to adjacent surfaces, floor drains, and steel angles to prevent damage resulting from work of this Section.

.5 Prior to application of topping, remove all debris by vacuuming.

.6 Fill any open joints with product as approved by topping manufacturer.

.7 Apply primer to subfloors and allow to dry.

.8 Install metal mesh, stapling every 150 mm and overlapping adjacent sheets by minimum 25 mm.

3.4 **INSTALLATION**

.1 Install topping in accordance with manufacturer's written instructions.

.2 Levelling topping:
- .1 Install levelling material in accordance with manufacturer's instructions.
- .2 Let cure in accordance with manufacturer's recommendations.

3.5 **PROTECTION**

.1 Provide temporary protection for surfaces subjected to concentrated loads before they have cured sufficiently to carry them without damage.

.2 Prevent traffic over completed areas, and protect work of this Section from precipitation, freezing, and debris after final installation.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for masonry work in accordance with the Contract Documents.

.2 Work of this Section to include and not be limited to:
- .1 Visually inspect for obvious signs of deteriorated masonry and testing/verification of masonry joints.
- .2 Repair and/or replacement of damaged and/or deteriorated brick.
- .3 Localized re-pointing of the mortar joints.
- .4 Concrete masonry partitions.
- .5 Precast concrete sills.
- .6 Grinding of existing precast copings and reinstallation.
- .7 Mortar and grout materials.
- .8 Accessories and reinforcement.

1.2 **REFERENCES**

.1 ASTM A1064/A1064-M, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

.2 ASTM C207, Specification for Hydrated Lime for Masonry Purposes.

.3 CAN/CSA A82, Fired Masonry Brick Made From Clay or Shale.

.4 CSA A165 Series, CSA Standards on Concrete Masonry Units.

.5 CSA A179, Mortar and Grout for Unit Masonry.

.6 CSA A370, Connectors for Masonry.

.7 CSA A371, Masonry Construction for Buildings.

.8 CAN/CSA A3001, Cementitious Materials for Use in Concrete.

.9 CSA G30.18, Carbon Steel Bars for Concrete Reinforcement.

.10 CSA S304, Design of Masonry Structures.

1.3 SUBMITTALS

.1 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 33 00 indicating.
- .2 Submit completed shop drawings for brick unit masonry prior to installation.
- .3 Indicate sizes and sections of brick, layout, arrangements of joints and bonding, anchoring, dowelling, and cramping.
- .4 Wall sections and details, reinforcing and anchors, special detailing, patterning and locations of control joints.

.2 Samples:
- .1 Submit samples in accordance with Section 01 33 00:
- .2 Submit samples of each type and colour of masonry unit used prior to placing order.
- .3 Submit samples of coloured mortar to match masonry samples.
- .4 Submit samples of masonry anchors, and ties.
- .5 Submit 250 x 200 mm samples of membrane/thru-wall flashing.

.3 Quality control submittals: Submit manufacturer's certificates stating that materials supplied are in accordance with this Specification.

.4 Closeout submittals: Submit maintenance data covering the care, cleaning and maintenance of finishes for incorporation into maintenance manual in accordance with Section 01 78 00.

1.4 QUALITY ASSURANCE

.1 Provide plain and reinforced masonry in accordance with CSA A370, CSA A371, and CSA S304.

.2 Cold Weather Protection:
- .1 To CAN/CSA-A371 and as follows:
  - .1 Maintain temperature of mortar between 5°C and 50°C until batch is used or becomes stable.
  - .2 Maintain ambient temperature of masonry work and it's constituent materials between 5°C and 50°C and protect site from windchill.
  - .3 Maintain temperature of masonry above 0°C for minimum of 3 days, after mortar is installed.
  - .4 Preheat unheated wall sections in enclosure for minimum 72 hours above 10°C, before applying mortar.
  - .5 Do not use scorched aggregate. Do not use salts or anti-freezes. Only use approved smokeless heaters.

.3 Hot Weather Requirements:
.1 To CAN/CSA-A371 and as follows:
.1 Plan in advance for hot weather construction. Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.
.2 Avoid using dry masonry in hot weather conditions. Use predampened masonry unit nominally saturated, but surface dry at time of laying. Do not dip masonry unit in bucket of water.
.3 Spread only enough mortar to permit soft setting of masonry units; do not over mix mortar materials; do not retemper mortar after 2 hours of use; do not retemper pigment coloured mortar; do not spread more than 900 mm (3') of mortar for placement of masonry unit.

.4 Mock-up:
.1 Construct one 1 m^2 mock-up to demonstrate repair procedure demonstrating replaced deteriorated masonry and repointing work and style, in location acceptable to Consultant.
.2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with work.
.3 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
.4 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle Products in accordance with the Conditions of the Contract and as specified herein.

.2 Remove unacceptable materials from Site and replace to acceptance of Consultant. Store materials off ground protected from wetting by rain, snow or ground water, or inter-mixture with earth or other materials. Store metal ties and reinforcement to prevent corrosion.

.3 Do not concentrate storage of materials on any part of structure beyond design load, take particular care not to overload unsupported portions of structure which may have not attained their full design strength.

.4 Comply with CSA A371. Do not use salt or calcium-chloride to remove ice from masonry surfaces.

.5 Deliver mortar materials in original unbroken and undamaged packages with the maker's name and brand distinctly marked thereon. Prevent damage to units.

.6 Keep masonry materials free from ice and frost. Keep units protected from concrete, mortar and other materials which could cause staining.

1.6 **EXISTING CONDITIONS**

.1 Before commencing masonry work, verify the site conditions will allow construction of masonry within required limitations for wall heights, wall thicknesses, openings, bond, anchorage, lateral support, and compressive strengths of masonry units and mortars.

.2 The Contractor shall make allowances in their bid for the removal and replacement of extra bricks around bricks to be replaced to facilitate installation. No extras shall be entertained after tender for the removal and reinstallation or any preparation work required to accommodate the replacement of damaged and/or deteriorated brick.

.3 Before commencing masonry work, investigate for evidence of previous repairs, cracks, moisture, and dampness beyond the area designated for replacement reporting any findings to the Consultant.

.4 The Contractor shall provide all required support to safely support all the loads.

.5 The decision to locally replace and repoint the existing masonry is based on cracked and deteriorated mortar joints, and loose and spalled brick. Immediately inform the Consultant should any other masonry deterioration be detected during the execution of the Work that is unrelated to these defects.

.6 Study mortar pointing styles and develop a method for reproducing them, submit sample for review by the Consultant before starting work.

2 Products

2.1 **MASONRY UNITS**

.1 Burned clay brick (BMV-1): CAN/CSA A82, to match existing brick where new brick is required for brick replacement.

.2 Concrete block units: Normalweight units, CSA A165 Series, sizes as indicated on Contract Drawing, classifications as follows:
- .1 H/15/A/M.
- .2 SS/15/A/M.
- .3 SF/15/A/M.

.3 Precast concrete sills:
- .1 Reinforced and constructed of 27.5 MPa concrete with slopes in direction indicated. Provide drips. Dowel and hook anchors to be stainless steel. Finish: Smooth unless otherwise indicated.
- .2 Apply water repellent sealer in accordance with Section 07 19 00 to precast concrete sill or provide sill with integral water repellent.

.4 Special shapes: Unless indicated otherwise, supply and install corner returns, bull-nosed or double bull-nosed units for exposed and external corners, bond beams, sash blocks for control joints, solid block where noted, concrete block lintels over openings in concrete block walls and any additional special shapes as indicated.

.5 Obtain each masonry unit type from same manufacturer. Supply and install units of uniform texture and colour for each kind required.

.6 Supply masonry units with exposed surfaces free of cracks, chips, blemishes, and broken corners.

2.2 **ACCESSORIES**

.1 Reinforcement: CSA A370, CSA A371, and ASTM A1064/A1064-M, all components to be hot dip galvanized, unless otherwise specified:
- .1 This specification is based on products manufactured by Blok-Lok Limited. Products by Hohmann & Barnard Inc. and Fero Corporation are approved equal.
- .2 Type 1 (single wythe): Truss type; ‘Blok-Trus BL30'.
- .3 Type 2 (existing walls): Anchors fabricated from 1.5 mm plate x 50 mm wide with 25 mm bend with 4.76 mm wire, complete with screws; ‘BL-5407' with ‘Flex-O-Lok tie’.
- .4 Connectors: CSA A370 and CSA S304.
- .5 Reinforcing steel: CSA G30.18, Grade 400, refer to Contract Drawings for number, size, and location.

.2 Loose steel lintels and lateral support angles: Supplied as part of work of Section 05 50 00.

.3 Membrane/thru-wall flashing (TWF-1): Asphalt-free, self-adhering, composite flashing consisting of polyethylene film laminated to both sides of copper sheet; ‘SA Self-Adhering Copper Fabric Flashing' by Hohmann & Barnard, Inc. (Blok-Lok Limited) or approved equal, complete with primer and adhesive recommended by flashing manufacturer.

.4 Compressible filler: 75 x 6 mm thick preformed, polyurethane foam; 25V by Emseal Joint Systems Ltd.

.5 Control joint filler: Prefabricated extruded rubber joint to suit wall thickness; RS Series Rubber Control Joint by Blok-Lok or approved equal.

2.3 **MORTAR MATERIALS**

.1 Loadbearing masonry: CSA A179, Type S, proportion method.

.2 Interior non-loadbearing masonry: CSA A179, Type N, proportion method.

.3 Exterior non-loadbearing masonry: CSA A179, Premixed 1-1-6 Type N, portland cement/lime, proportion method.

.4 Cement: CAN/CSA A3001, normal Portland, Type GU. Provide white cement where required for white or light coloured mortars.

.5 Masonry aggregate: CSA A179. Provide white aggregate where required for white or light coloured mortars.

.6 Hydrated lime: ASTM C207, Type S.

.7 Water: Clean potable, free from deleterious elements and free from salts that can cause efflorescence.

.8 Mortar pigment: 'Bay Ferrox' by Bayer Inc. or approved equal by Huntsman Pigments and Additives and Solomon Colors, Inc. Colour to later selection by Consultant.

.9 Concrete fill and grout: Minimum 12.5 Mpa concrete in accordance with CSA A179.

3 Execution

3.1 **EXAMINATION AND PREPARATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

.2 Visually review and sound all surfaces of the exterior wall zones identified in the Contract Documents to locate targeted repair areas and localized deteriorated brick masonry and masonry mortar joints.

.3 The Contractor shall sound, identify, and mark all masonry wall areas covered in the Contract that are deteriorated. The Contractor shall commence with repairs upon receipt of approval by the Consultant in writing.

.4 Establish all lines, levels, coursing, and ensure coordination with other trades as required.

.5 Provide waterproof protection over construction surfaces at mixing areas to prevent deposit of mortar and mortar materials on them.

.6 Ensure surfaces to receive new mortar are cleaned of all laitance, grease, oil, and previous mortar where required.

.7 No new mortar is to be applied until the surface preparation has been inspected and accepted by the Consultant.

.8 Ensure all damaged and/or deteriorated brick and mortar have been removed, including all dust and fragments.

.9 Remove any additional brick in good condition, as required to accommodate the installation of the new bricks. Bricks in good condition that are damaged during removal are to be replaced at no cost.

.10 The Contractor shall be responsible to replace all fixtures to original location and condition if removed to facilitate the required brick wall repairs.

.11 Protect adjacent finished materials from damage due to masonry work.

.12 Seal and protect all openings, doors, windows, and adjacent areas to minimize the potential for damage and the spread of dust, water, or other materials into the building or adjacent sidewalks and properties.

.13 Brace all openings to remain plumb.

.14 Construct cavity walls using techniques that will minimize mortar dropping in cavity space. This may require the use of batten boards to catch mortar droppings. No mortar shall bridge cavity space or plug cavity vents at bottom of cavity.

.15 Examine Contract Documents and coordinate installation of masonry with related sections so that this work can be performed with a minimum of cutting and patching.

3.2 **PROTECTION**

.1 Brace brick walls as necessary to resist wind pressure and other lateral forces during construction.

.2 The Contractor shall maintain the stability and water tightness of the structure at all times.

.3 Supply and install temporary waterproof, non-staining coverings, secured against displacement, to extend over walls and down sides to protect masonry Work from snow and wind driven rain, and from drying too quickly, until masonry work is completed and protected by flashings or other permanent construction.

.4 Supply and install non-staining, protective coverings on horizontal and vertical surfaces to protect work of this Section from damage, staining, marking, and mortar droppings.

3.3 **WORKMANSHIP**

.1 Perform masonry work in accordance with CSA A371 and as indicated .

.2 Supply and install masonry work plumb, level and true to line, with vertical joints in alignment and horizontal courses level, uniform, and straight.

3.4 **MASONRY - GENERAL INSTALLATION**

.1 Construct masonry work as required by jurisdictional authorities.

.2 Before commencing masonry work, verify required limitations for wall heights, wall thicknesses, openings, bond, anchorage, lateral support, and compressive strengths of masonry units and mortars.

.3 Construct masonry fire protection and fire separations of the thickness indicated on Drawings for the fire resistant ratings as noted on Drawings, and conforming to the Fire-Performance Ratings, Appendix 'D' to the National Building Code of Canada.

.4 Fire Separations and Fire Separations with Fire Resistance Ratings: Construct walls tightly to construction above and at perimeter, and without openings or voids. Do not reduce the thickness of walls to less than the thickness indicated on the Drawings or for the required fire resistance rating where required.

.5 Do not butter corner units, throw mortar droppings into joints, or excessively furrow bed joints. Do not shift or tap units after mortar has taken initial set. If adjustment is necessary after mortar has started to set, remove and replace with fresh mortar.

.6 Do not use admixtures without Consultant's written acceptance.

.7 Tool mortar joints slightly concave with non-staining tools unless indicated otherwise. Strike joints flush in non exposed areas or where shown on Contract Drawings. Use sufficient force to press mortar tight against masonry units on both sides of joints. Remove excess, remaining mortar material and burrs.

.8 Install masonry walls 25 mm clear of underside of steel building frames, roof or floor deck. Install masonry with a 19 mm space beneath shelf angles and install compressible filler.

.9 Cut masonry units with a wet saw to obtain straight, clean, even, unchipped edges. Cut units as required to fit adjoining work neatly or for flush mounted electrical outlets, grilles, pipes, conduit, leaving 3 mm maximum clearance. Use full-size units without cutting wherever possible.

.10 Reinforce veneer walls with adjustable wall reinforcing at maximum 400 mm o.c. vertically and 600 mm o.c. horizontally. Install reinforcing in accordance with manufacturer's instructions. In veneer walls extend reinforcement from support wall, spanning cavity into exterior wythe. Place at maximum 75 mm o.c. each way around perimeter of openings, within 300 mm of openings.

.11 Reinforce block walls with continuous wire reinforcement in every second block course. Supply and install prefabricated L and T sections. Cut, bend and lap reinforcing units as per manufacturer's printed directions for continuity at returns, offsets, pipe enclosures, and other special conditions. Bending of masonry reinforcement is not permitted.

.12 Reinforce masonry walls with reinforcing steel as indicated on Drawings. Vertical reinforcing shall be fully grouted in masonry cores with grout.

.13 At openings in block walls install extra reinforcement, so that first and second courses above and below openings are reinforced. Extend extra reinforcement 600 mm beyond opening in each direction.

.14 Reinforce joint corners and intersections with strap anchors 400 mm o.c.

.15 Do not place reinforcement across masonry wythes at control joints.

.16 Install masonry with 10 mm thick joints unless indicated otherwise. Make vertical and horizontal joints equal and of uniform thickness.

.17 Build control joints in masonry walls at intervals and in locations shown. Form joints for block walls using sash block units in accordance with details shown. Form joints for veneer walls by leaving head joints between stacked units void of mortar. Fill chase and joint with joint filler full height of control joints. Leave a depth of 13 mm for sealing unless otherwise shown.

.18 Install control joints in masonry walls where indicated on drawings and at projections and changes in direction. Where control joints have not been indicated provide joints at 6100 mm o.c. for exterior walls and 9150 mm o.c. for interior walls.

.19 If required, provide movement joints, similar to building control joints, installed between areas with different support conditions.

.20 Supply and install solid block or metal lath under block, and fill block cells solid for lintel bearing and as required to secure built-in anchor bolts and/or anchors shown.

.21 Do not tooth intersections of walls except as otherwise indicated.

3.5 **MORTAR MIXING**

.1 Thoroughly mix mortar ingredients in proper quantities needed for immediate use to requirements of CSA A179.

.2 Measure and batch mortar materials either by volume or weight, to accurately control and maintain proportions. Do not measure materials by shovel.

.3 Mix mortar with maximum amount of water consistent with workability for maximum tensile bond strength within capacity of mortar.

.4 Do not use mortar which has begun to set. Use mortar within 2 hours after initial mixing. Re-temper mortar during 2 hour period only as required to restore workability.

.5 Add mortar colour and admixtures to requirements of manufacturer's instructions.

.6 Provide uniformity of mix and colouration.

3.6 **BLOCK**

.1 Lay blocks in running bond except as indicated otherwise. Align block webs vertically and install thicker ends of face shells up.

.2 Install a full bed of mortar for first courses of masonry, for masonry units 100 mm thick and less, and between solid units. For remaining courses bed face shells, including vertical end joints, fully in mortar.

.3 Install special shaped and sized concrete block units as indicated and as required for a complete and coordinated assembly and to minimize cut units.

.4 Supply and install two courses of solid block beneath lintel bearing.

.5 Stagger end joints in every course. Align joints plumb over each other in every other course.

.6 Bond intersecting block walls in alternate courses. Where block work abuts concrete, anchor each block course to concrete.

3.7 **REPLACEMENT OF DETERIORATED MORTAR**

.1 Remove unsound or defective mortar patches in the Contract area as directed by the Consultant.

.2 Mortar is defective when it is cracked, spalled, chalked, or otherwise crumbling.

.3 The Contractor shall notify the Consultant in writing of any other mortar joint deterioration identified prior to commencing with any repair work. The Consultant shall provide written instructions to complete any repair work.

.4 The Consultant shall review the locations of deteriorated mortar with the Contractor prior to commencing with repairs.

.5 Tools used for cutting out of the mortar joints shall be narrower than the joint.

.6 Cutting out of the joint shall be performed using: Handheld rotary saws or a grinder or wheel with a vacuum bag.

.7 The joints shall be cleaned back for the full specified depth. All mortar shall be removed on the masonry surfaces to a square surface of existing mortar at the back of the joint.

.8 All loose particles in the mortar joints shall be removed with compressed air and left open for review by the Consultant.

.9 The depth of the raking shall be carried out to at least twice the width of the joint to a minimum depth of 25 mm measured from the face of the masonry unit and beyond the existing depth of repointing.

.10 Consultant Review: The Contractor shall provide access, permit inspection, correct any defects, and obtain written comment of all raked joints prior to commencing with the pointing.

.11 Where mortar is found to be defective beyond the specified raking depth, the Contractor shall continue raking until solid mortar is encountered. Remove all loose mortar, dirt, and other undesirable material.

.12 Be aware that additional raking beyond specified depths will be necessary and that voiding can be expected. Back pointing will be required at these locations prior to re-pointing.

.13 If masonry unseats or the bond is broken, remove the unit and reset in accordance with the work outlined in this Section.

.14 The Contractor shall take all reasonable precautions in order to prevent damage to the masonry units resulting from the removal process.

.15 Such damage to the masonry includes, but is not limited to, the widening of the joints, nicks, gouges, and chipped or scratched surfaces from the cutting out tools due to improper workmanship.

.16 The Contractor shall replace or repair all damaged units to the satisfaction of the Consultant with no change in the Contract Price or schedule.

.17 Obtain the Consultant's written acceptance of raked out and back pointed work prior to commencing with the pointing operation.

.18 Immediately prior to pointing, thoroughly wet the joints in order to control absorption. Verify with environmental requirements. Prior to pointing, the joints should be wet, water shall be soaked into the masonry and mortar, but with no standing water.

.19 Fill all bed and head joints with pointing mortar; compact joints firmly to ensure positive adhesion to all inner surfaces.

.20 At initial set, finish neatly the joints to match the existing pointing style.

.21 Keep the work area clean; remove all droppings as the work proceeds, and again at the end of each day.

.22 Prevent the mortar from being placed or smeared onto the front face of the stone or masonry to minimize the potential for staining on the faces during the pointing.

.23 Cut out and replace all mortar joints that dry prematurely and are lighter than the surrounding joints and/or have shrinkage cracks.

3.8 REPLACEMENT OF DETERIORATED BRICK MASONRY UNITS

.1 The Contractor shall mark the location of masonry to be removed for verification by the Consultant prior to commencing with the removal process.

.2 The brick is damaged or deteriorated when it is cracked, chipped, spalled, or the outer face is hollow.

.3 Should the amount of deteriorated brick rise above 5% of the Contract quantity, the Contractor must stop all work and notify the Consultant immediately. The Contractor must obtain written review from the Consultant prior to replacing amounts of brick totalling above 5% of the Contract quantity.

.4 The Contractor shall maintain the stability and water tightness of the structure at all times.

.5 Localized brick replacement (areas with less than four bricks to be replaced):
- .1 Bond, coursing, and jointing to match the existing.
- .2 Immediately prior to placing the masonry, thoroughly wet the adjacent substrates in order to control absorption. Verify with environmental requirements.
- .3 Allow water to soak into the masonry, leaving no standing water but remaining wet. Should the surfaces dry prior to pointing, the substrates should be wet.
- .4 Set the brick in a full bed of mortar, true to line, and level with the adjacent units.
- .5 All wedges must be pre-soaked prior to placing masonry units. All wedges should be removed when the mortar has dried prior to pointing.
- .6 Avoid bridging of airspace between veneer and back-up wall by beveling back edge of bed joint.
- .7 Tool the mortar joints flush to match the existing.

.6 Rebuilding areas of brickwork:
- .1 Meet or exceed requirements of CSA A371.
- .2 Build masonry plumb, level, and true to line, with vertical joints in proper alignment.
- .3 Lay masonry in running bond to meet specified requirements of CSA A371, unless otherwise specified.
- .4 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings with minimum of cutting.
- .5 Remove laitance, loose rust, scale, and other foreign materials from supporting bed surfaces to ensure bonding.
- .6 Use only dry and unfrozen materials.
- .7 Where mortar has started to harden at units requiring repositioning, remove and replace with fresh mortar.

.8 Joints:
- .1 Make joints of uniform thickness with vertical joints plumb over each other.
- .2 Form tooled concave joints wherever exposed to view, whether behind cabinets, fitments, and wall accessories.
- .3 Ensure that no mortar protrudes from joints on wall surfaces to which insulation will be applied.

.9 Stop off horizontal runs of walls by racking back a half unit in each horizontal course. Do not tooth.

.10 Install special units as may be required to form corners, returns, offsets, reveals, and indents without cut ends being exposed and without losing bond pattern or module.

.11 Fit masonry closely against electrical and plumbing outlets so that collars, plates, and covers will overlap and conceal all cuts.

.12 Use chipped and blemished units only where concealed. Do not use defective or broken units.

.13 Distribute masonry units of varying textures to avoid spotty appearance over wall surfaces exposed to view. Do not use units that contrast too greatly with overall range. Remove masonry units of non-matching colour variation. Replace with conforming units at no additional cost to the Owner.

.14 Where replacing in excess of four bricks in one area, install masonry ties to bond facing with back-up wythes of masonry.

.15 The ties should be randomly installed in rebuilt areas except where areas are sufficiently large for the ties to be set every 600 mm horizontally and vertically with staggered centres.

.16 Drill entry hole into the block backup and drive the tie into position in accordance with the manufacturer's recommended embedment length and hole diameter.

.17 Ensure that the ties are solidly set in the back-up wythe.

3.9 PRECAST SHAPES

.1 Install flashings continuous under full length of precast shapes.

.2 Grind existing precast concrete coping drip edge to 10 x 10 mm using a small angle grinder or similar method. Grinding work to meet the satisfaction of the Consultant. Reinstall coping so drip edge is minimum 50 mm proud from the face of the masonry wall below and with correct drainage. Ensure coping slopes with minimum slope as indicated, away from landing.

.3 Install precast shapes in full mortar bed and secure units to each other with stainless steel dowels and to masonry units with stainless steel hook anchors, fully grouted.

.4 Provide new backer rod and sealant around perimeter of sills to provide watertight installation. Sealing work in accordance with Section 07 92 00.

3.10 **LINTELS**

.1 Install concrete block lintels over openings in masonry except where steel lintels are indicated.

.2 Set lintels with minimum of 200 mm uniformly distributed bearing at each end. Provide bond breaker under bearing ends.

.3 Install reinforcing steel and concrete fill in block lintels.

.4 Install loose steel lintels, as indicated in Contract Drawings. Centre over opening width.

.5 Where non load bearing unit masonry partitions meet structural elements at top of partitions, install lateral supports as required by the Ontario Building Code and in accordance with Structural details. In areas where ceilings are scheduled, use 150 mm lengths of steel angle located each side of partition at 1200 mm and staggered.

3.11 **BUILT-IN ITEMS**

.1 Coordinate and locate build-in items required to be built into masonry or supplied under work of other Sections including hollow metal doors, windows, lintels, sleeves, inserts, etc. Build-in items to present a neat, rigid, true and plumb installation.

.2 Build wall openings, slots, and recesses required for ducts, grilles, pipes and other items.

.3 Coordinate installation of conduit, outlet boxes and other mechanical and electrical built-ins with work of Divisions 21, 22, 23 and 26.

.4 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as Work progresses.

.5 Brace door jambs to maintain plumbness. Set anchors between metal frames and masonry and fill voids between hollow metal frames and masonry walls with mortar.

3.12 **INSTALLATION TOLERANCES**

.1 Install masonry work to a plane flatness and exposed end tolerance of 3 mm in 3000 mm.

.2 Variation in Alignment from Unit to Adjacent Unit: 1.5 mm maximum.

.3 Plumb within 6 mm in 3 m, or in 6 mm in 6 m at external corners, expansion joints, or other conspicuous lines.

.4 Level within 6 mm in any bay or 6 m maximum distance, and 12 mm in 12 m or more.

.5 Located from position shown, and from related position of columns, walls, and partitions within 12 mm in any bay or 6 m maximum distance, and 19 mm in 12 m or more.

.6 Opening sizes within 6 mm of designated dimension.

.7 Column and wall cross-section dimensions within minus 6 mm and plus 12 mm.

.8 Joint widths to dimensions indicated or specified herein, but in no case greater than 12 mm. Variation of Mortar Joint Thickness: 1 mm every metre.

3.13 **REPAIR AND POINTING**

.1 Remove and replace masonry units which are loose, chipped, broken, cracked, marked, stained, discoloured, or otherwise damaged. Supply and install new units to match adjoining units and install in fresh mortar, and point to eliminate evidence of replacement.

.2 During tooling of joints, enlarge any cracks, holes, or other defects, point and completely fill with mortar.

.3 Point-up joints including corners, openings and adjacent Work for a neat, uniform appearance, properly prepared for application of sealant compounds.

3.14 **CLEANING**

.1 Obtain and follow unit masonry manufacturer's written instructions for cleaning of masonry.

.2 Clean exposed, masonry surfaces, removing excess mortar as work progresses. Allow mortar droppings to partially dry then dry brush with a stiff fibre brush.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, and services to supply and erect structural steel required and/or indicated on the drawings or specified herein:

.1 Install new lintel above new window opening as detailed on the Drawings.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CSA S16	Design of Steel Structures
.4	CSA S136	North American Specification for the Design of Cold-Formed Steel Structural Members
.5	CSA W47.1	Certification of Companies for Fusion Welding of Steel Structures
.6	CSA W59	Welded Steel Construction (Metal-Arc Welding)
.7	CSA G40.20/G40.21	General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel

1.3 Qualifications

.1 Structural steel fabricator shall have not less than five years experience in the fabrication of structural steel.

.2 Erector shall have not less than five years experience in erection of structural steel.

.3 Steel fabricators and erectors must be certified under the requirements of CSA W47.1 as required by CSA S16.

.4 Welding procedures, welders, and welding operations shall be qualified in accordance with the Canadian Welding Bureau Standards.

.5 All connections shall be designed by a CISC-approved Fabricator unless otherwise noted.

1.4 Examination

.1 All dimensions taken from the Drawings are to be confirmed on site prior to fabrication. Contractor is to be responsible for the correctness of such measurements and report to the Consultant in writing all discrepancies between measurements at building and those shown on drawings prior to commencing work. Verify location of anchor bolts and embedded steel and ensure that work prepared by other trades is at a proper elevation, on-line, level, and true.

.2 Contractor to locate all mechanical/electrical openings required in structural members for existing systems prior to fabrication.

.3 Contractor responsible for all costs associated with site location of existing strands and embedded conduits.

1.5 Shop Drawings

.1 Drawings, which accompany these specifications, are to be used for estimating purposes only, and show in general the type of construction that shall be followed, but must not be considered as fabrication drawings.

.2 Submit detailed erection and shop drawings prepared under the supervision of a Registered Professional Engineer in accordance with the General Requirements. Where pre-engineered or fabricator designed elements are part of the shop drawings, the shop drawings shall be stamped by a Professional Engineer licensed in Ontario.

.3 The shop drawings shall clearly show all shop and erection details, including cuts, copes, connections, holes, threaded fasteners, splices, and welds. All welds, both shop and field, shall be indicated by AWS welding Symbols as specified in CSA W59 Appendix D and E.

.4 Shop drawings shall be submitted in an orderly sequence and sufficiently in advance of the work proceeding so as to not affect the schedule of the Work. The Contractor and the Consultant shall jointly determine the schedule for which the shop drawing submissions shall occur.

.5 The Consultant’s review of the shop drawings is for general conformance only and does not relieve the Contractor of the responsibility for errors or omissions that may be present in the shop drawings.

.6 Upon request by the Consultant, the Contractor shall revise and resubmit the shop drawings.

.7 Provide setting drawings, templates and directions for the installation of anchor bolts, plates and other devices.

.8 Structural drawings are not prepared to be used in sepia form as erection drawings.

.9 Shop drawings shall show complete details necessary for fabrication and erection of the component parts of the structure, including location, type, size and extent of all welds, as well as all mechanical/electrical openings required. Splices not shown on the shop drawings will not be accepted.

.10 Prior to starting erection work, submit a description of the methods, sequence of erection and type of equipment proposed for use in erecting structural steel.

1.6 Inspection and Testing

.1 The Owner will engage and pay for the services of a welding Engineer and a testing agency.

.2 Allow free access to all parts of the work area for the purposes of inspection at all times.

.3 Prior to commencement of work, provide a schedule of shop fabrication.

.4 Submit certified results of testing in accordance with CSA G40.20 properly correlated to the elements being fabricated.

.5 High tensile bolts will be tested in accordance with Section 23 of CSA S16.

.6 For the purpose of bidding, assume all welds will be examined by a non-destructive testing method.

.7 Testing of all connections and splices not indicated on the design drawings shall be undertaken by the Owner’s testing agency and will be to the Contractor’s account.

.8 The Contractor shall advise the testing agency of the scheduling of all shop and field work pertaining to this Project. The Contractor shall permit the testing agency full access to the fabrication shop and the site for the purpose of carrying out their work and he shall provide assistance required to aid in the performance of the inspection and testing.

.9 If more than 5% re-inspection is required due to faulty workmanship, the Contractor will be required to pay for this re-inspection.

.10 The Engineer may reject at any time during the progress of the work a piece of material for any member found defective or not in accordance with the detailed drawings. This material may be rejected notwithstanding any previous acceptance and components so rejected shall be replaced at no expense to the Owner. In case of dispute, the decision of the Engineer shall be final.

1.7 Storage and Handling

.1 The Contractor shall be responsible for the protection of all steel work during fabrication, shipping, storage, and construction. All small bends and damage shall be reported to the Engineer for instruction. Steel work that is bent, broken, or otherwise damaged shall be replaced by the Contractor prior to erection, to the satisfaction of the Engineer, at no cost to the Owner.

.2 The Contractor shall be responsible for proper scheduling of delivery and erection for the structural steel, all in accordance with the construction schedule.

.3 Structural steel members shall be stored at the site above ground on platforms, skids, or other devices.

.4 Steel shall be protected from corrosion.

.5 Other material shall be stored in a weather tight and dry place until ready for use in the Work.

.6 Package materials shall be stored in their original unbroken packages or container.

1.8 Supply of Alternate Products

.1 Should the rolled sections shown on the drawings not be procurable from Canadian Mills, or should substitution for those sections be desired, sections of equivalent strength may be substituted if approved by the Consultant. In each case, full particulars thereof must be submitted prior to the closing of Bid. Material substitutions after the closing of Bid, if accepted, will be at the Contractor’s cost.

1.9 Coordination with Other Trades

.1 Supply all necessary instructions and drawings to other trades for setting bearing plates, anchor bolts, and other members that are built in with the work of other trades. Supply the necessary material in accordance to the construction schedule.

2.0 PRODUCTS

2.1 Materials

.1 Rolled shapes, rolled plate, and welded wide flange sections to CSA G40.21 300W.

.2 High strength bolts shall be to ASTM F3125/F3125M.

.3 Welding material shall be in accordance with CSA W59.

.4 Anchor bolts and nuts to ASTM A307.

.5 Embedment anchors shall be Nelson headed anchors with fluxed ends or approved equal conforming to ASTM A108.

.6 Bar anchors shall be Nelson deformed bar anchors or approved equal conforming to ASTM A1064/A1064M.

.7 Structural steel (exterior exposure) not to receive shop or field paint shall be hot-dip galvanized to Z275 G90 designation.

.8 Touch-up primers for exterior exposure not to receive a shop or field paint finish shall be zinc chromate Type 1, conforming to CGSB 1-GP-40D.

.9 Primers used in a multi-coat system where a final shop or field paint finish is to be applied shall be selected and pre-approved based on surface preparation, exposure conditions, and compatibility with subsequent coatings.

2.2 Design

.1 All connections and beam web openings shall be designed by the fabricator to the reference standards unless otherwise noted.

3.0 EXECUTION

3.1 Fabrication

.1 Verify all dimensions and take necessary field measurements before fabrication.

.2 All fabrication shall be to CSA S16.

.3 All welding shall be to CSA W59.

.4 All fabricated units shall be straight and true and without sharp kinks or bends.

.5 All hollow structural sections shall be closed airtight with end plates sealed with welds.

.6 All plates and shapes shall be inspected visually for laminations. Repair plates or shapes that contain laminations in a manner approved by the Consultant.

.7 Provide punched holes for the convenience of other trades in attaching wood blocking or other materials. Coordinate with drawings of other disciplines for location and details.

.8 Obtain Consultant’s approval for holes required through structural steel that are not shown on the drawings.

3.2 Cleaning and Priming

.1 All steel shall be thoroughly cleaned of loose mill scale, loose rust, oil, or dirt.

.2 All steel shall be primed (exterior exposure) except for steel to be encased in concrete, steel to be fireproofed, steel that will receive shear studs, and faying surfaces of friction connections.

.3 Structural steel to be primed for exterior exposure or to receive a shop or field paint finish shall be cleaned in accordance with SSPC-SP6 “Commercial Blast Cleaning”.

.4 All primers shall be applied strictly in accordance with the manufacturer’s instructions. Apply one coat of primer thoroughly and evenly and work well into the joints and other open spaces.

.5 After erection and after connections are completed, provide a field touch-up coat of primer to all surfaces that had no shop coat, or have been chipped or scraped.

3.3 Shop Painting

.1 Steel shall be painted with shop primer meeting the requirements of CSA S16 unless noted otherwise.

.2 Architecturally Exposed Steel

.1 Cleaning, preparation of steel, and the paint product shall be compatible with requirements of finish painting.

.2 Use paint as prepared by manufacturer without thinning or adding admixtures. Execute painting on dry surfaces, free from rust, scale, and grease. Do not paint in temperatures lower than 8°C.

.3 Interior structural steel - steel surfaces to be encased in concrete, welded, fireproofed, zinc coated, galvanized or to receive shear connector studs or embedment anchors - shall not be painted.

.4 Clean contact surfaces by effective means before assembly but do not paint.

.5 Where shop painting is required, give two coats of paint (preferably of different colours) to parts inaccessible after final assembly.

.6 Touch-up welds, bolts, and burnt or scratched surfaces of painted steel after completion of erection.

3.4 Connections

.1 Use connections of type and detail shown on the Drawings. Modifications to the specified connection types and details will not be permitted without prior approval from the Consultant.

.2 Connections designed by the fabricator shall be in accordance with CSA S16.1 and stamped and sealed by a Professional Engineer registered in the Province of Ontario.

.3 All connections shall be designed to carry the loads specified on the Drawings. If loads are not given, the connection shall have the capacity not less than the members being connected.

.4 Structural steel members spliced for ease of fabrication or transportation shall have splices designed to develop the full strength and stiffness of the member. Splices shall be subject to non-destructive testing as directed by the Consultant. The cost for such testing shall be borne by the Contractor.

.5 Use standard connection types where possible.

.6 Provide stiffeners in beam webs at all locations of beam continuity. Unless noted otherwise web stiffeners shall be 12 mm minimum.

3.5 Separators and Miscellaneous Supports

.1 Provide plates and / or angles for support of masonry where required.

3.6 Erection

.1 Supervise the setting of bases, anchor bolts, and other steel to concrete connections. Cutting of base plates to accommodate anchor bolts shall be cause for rejection of base plates.

.2 Install all temporary bracing that is required to stabilize the work against wind, earthquake, and construction loads. Keep structure true and plumb until completion of the building.

.3 As erection progresses, the work shall be securely bolted up to take care of all dead loads, wind, and erection stresses. Any failure to make proper and adequate provisions for stresses during erection shall be solely the responsibility of the Contractor.

.4 The structural steel erector shall be responsible for the design of all hooks, erection connections, and handling gear.

.5 Whenever piles of materials, erection equipment, or other loads are carried during erection, proper provision shall be made to take care of stresses resulting from it.

.6 All structural steel shall be assembled and erected in accordance with the approved erection drawings and specified reference standards.

.7 Structural steel work shall be carefully located at the proper grade and rigidly secured in place using steel shims. All spaces under the steel shall then be filled with non-shrink pre-mix grout.

.8 Plumb, level, and align individual members of steel work as specified in CSA S16.

.9 Structural steel frames shall be accurately assembled to the lines and elevations indicated within the specified tolerances.

.10 The various members forming parts of complete frame of structure after being assembled shall be aligned and adjusted accurately before being fastened.

.11 Bearing surfaces and surfaces that will be in permanent contact shall be cleaned before the members are assembled.

.12 Temporary bolts, clips, angles, etc. used to facilitate the erection shall be removed unless noted otherwise on the drawing.

3.7 Temporary Flooring

.1 Provide all temporary flooring, planking, and scaffolding necessary in connection with erection of structural steel, or support of erection machinery in accordance with governing regulations or by-laws.

3.8 Completion

.1 The Registered Professional Engineer responsible for the shop drawings, or their representative shall visit to review in place connections and components designed by that Registered Professional Engineer as required to substantiate compliance with their sealed shop drawings. He shall then submit a letter of compliance provide a seal and signed letter to the Consultant and Engineer.

.2 On completion of the work of this section, all protection erected in conjunction with the structural steel work shall be removed, all damage to this work and adjoining work shall be made good, and all surplus materials, debris, tools, and equipment shall be removed from the site.

3.9 Welding

.1 All welding shall be done by the shielded metal-arc method in accordance with the requirements CSA W59. The welding operators shall have passed, within the preceding six months, the qualifications test as set forth in CSA W47.1.

.2 Submit welding procedures prepared and sealed by a Professional Engineer registered in Ontario and familiar with this discipline to the Consultant for their examination and comments.

.3 Surface to be welded shall be free from loose scale, rust, paint, or other foreign matter. Where weld material is deposited in two or more layers, each layer shall be cleaned before the next layer is deposited. Take care to minimize stresses due to heat expansion, contraction, and distortion by using proper sequence in welding and by approved methods.

.4 Welding consumables for all processes shall be fully approved by the Canadian Welding Bureau and certified by the manufactures as complying with the requirement of this specification. Such certificates shall be not more than two years old.

.5 Electrode strengths to be equal to E480XX (E70xx) or better.

.6 Embedment anchors, shear stubs, and deformed bar anchors shall be automatically end welded with suitable stud welding in accordance to the manufacture’s recommendations. Fillet welding of anchors will be rejected.

3.10 Field Quality Control

.1 Structural steel work (material and workmanship) shall be subject to review and tested by a testing agency retained by the Owner.

.2 Construction review by the testing agency or the Consultant does not relieve the Contractor of their responsibility to furnish materials and workmanship in accordance with the Drawings and Specifications.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for the miscellaneous and metal fabrication work in accordance with the Contract Documents.

1.2 **REFERENCES**

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

.2 ASTM A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished

.3 ASTM A123, Specification for Zinc (Hot Dip Galvanized) Coatings on Iron & Steel Products.

.4 ASTM A153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.5 ASTM A276, Specification for Stainless and Heat-Resisting Steel Bars and Shapes.

.6 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

.7 ASTM A480/A480M, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.

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

.9 CISC/CPMA 1.73a, A Quick-Drying One-Coat Paint for Use on Structural Steel.

.10 CAN/CSA-G40.20/G40.21-M, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steels.

.11 CAN/CSA S16.1-M, Limit States Design of Steel Structures.

.12 CSA S136.1-M, Commentary on CAN/CSA S136-M, Cold Formed Steel Structural Members.

.13 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.14 CSA W48, Filler Metal and Allied Materials for Metal Arc Welding.

.15 CSA W59-M, Welded Steel Construction (Metal Arc Welding).

.16 CAN/CSA W117.2-M, Safety in Welding, Cutting and Allied Processes.

.17 CGSB 85-GP-16M, Painting Galvanized Steel.

.18 NAAMM, The National Association of Architectural Metal Manufacturers.

.19 Steel Structures Painting Council (SSPC), Steel Structures Painting Manual, Vol. 2.

1.3 DESIGN REQUIREMENTS

.1 Design details and connections, where not shown on Drawings, in accordance with CAN/CSA-S16.1 and CSA S136.1.

1.4 SUBMITTALS

.1 Shop drawings:
- .1 Submit shop drawings for fabrication and erection of miscellaneous and metal items in accordance with Section 01 33 00 indicating:
  - .1 Materials, core thicknesses, class of finish (AMP 555), connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.5 QUALITY ASSURANCE

.1 Retain a Professional Engineer, licensed in the Province of Ontario, with experience in work of comparable complexity and scope, to perform the following services as part of the work of this Section:
- .1 Design metal fabrication items that are required to resist live, dead, lateral, wind, or seismic loads.
- .2 Review, stamp, date and sign shop drawings.

.2 Workmanship: Fabricate work of this Section to meet the required class of workmanship indicated below in accordance with NAAMM's AMP 555, Section 8.
- .1 Class 1: for use on direct exposed to view fabricated items:
  - .1 Exposed surfaces are finished smooth without pitts, mill marks, nicks, burrs, sharp edges, and scratches filled or ground off. Defects should not show when painted, polished, or finished.
  - .2 Welds should be concealed where possible. Exposed welds are ground to small radius with uniform sized cove unless otherwise noted.
  - .3 Distortions should not be visible to the eye.
  - .4 Exposed joints are fitted to a hairline finish.

.3 Execute welding by firms certified in accordance with CSA W47.1 Division 1 or 2.1. Ensure welding operators are licensed per CSA W47.1 for types of welding required by Work.

.4 Perform stainless steel work in accordance with NAAMM, Code of Standard Practice for the Metal Industry, Workmanship, Class 1.

2 Products

2.1 **MATERIALS**

.1 General:
- .1 All materials under work of this Section, including but not limited to, primers and paints are to have low VOC content limits.
- .2 Unless detailed or specified herein, standard products will be acceptable if construction details and installation meet intent of Drawings and Specifications.
- .3 Include all materials, products, accessories, and supplementary parts necessary to complete assembly and installation of work of this Section.
- .4 Incorporate only metals that are free from defects which impair strength or durability, or which are visible. Install only new metals of best quality, and free from rust or waves and buckles, and that are clean, straight, and with sharp defined profiles.

.2 Structural shapes, plates, and similar items: CAN/CSA-G40.20/G40.21-M, Grade 350W. Hollow structural sections: CAN/CSA-G40.20/G40.21-M, Grade 350W, Class H.

.3 Galvanized sheet steel: ASTM A653/A653M Grade A, Z275 Commercial Quality zinc coating, size and shape as shown.

.4 Stainless steel materials:
- .1 Stainless steel sheet and plate: ASTM A480/A480M, Type 316, brushed finish to AISI No. 4. Size as shown.
- .2 Stainless steel shapes: ASTM A276, Type 316, brushed finish to AISI No. 4. Sizes and shapes as shown.

.5 Bollards (protection posts): ASTM A53/A53-M, galvanized Schedule 40 standard weight steel pipe in quantity and sizes shown.

.6 Welding materials: CSA W48 and CSA W59-M.

.7 Fasteners: Conforming to ASTM A307, Grade A, in areas not exposed to view, use unfinished bolts with hexagon heads and nuts. In areas exposed to view, use bolts, nuts, washers, rivets, lock washers, anchor bolts, machine screws and machine bolts Z275 zinc coated in accordance with ASTM A653/A653M. Supply bolts of lengths required to suit thickness of material being joined, but not projecting more than 6 mm beyond nut, without the use of washers.

.8 Primer paint: CPMA 1.73a.

.9 Galvanized primer paint: Inorganic zinc rich primer. For use on galvanized fabrications where touch up is to remain unpainted in finished work; Carbozinc 11WB by Carboline Company, Catha-Coat 305 by Devoe Coatings or Zinc Clad XI by Sherwin Williams.

.10 Drilled inserts: “HSL-3" by Hilti Inc. or “Dynabolt Sleeve Anchors” by ITW Construction Products, heavy-duty anchors, sizes as shown.

.11 Adhesive anchor system: ‘HIT HY 200 Injectable Mortar with Hilti HAS Stainless Steel Anchor Rod System’ by Hilti Ltd. or approved equal by ITW Construction Products, complete with all components required for a complete installation.

2.2 **FABRICATION**

.1 Verify dimensions of existing Work before commencing fabrications and report any discrepancies to the Consultant.

.2 Fit and assemble work in shop where possible. Execute work in accordance with details and reviewed shop drawings.

.3 Use self-tapping shake-proof screws on items requiring assembly by screws or as indicated. Use screws for interior metal work. Use welded connections for exterior metal work unless otherwise found acceptable by the Consultant.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush. Seal exterior steel fabrications against corrosion in accordance with CAN/CSA S16.1-M.

.5 Execute shop welding to requirements specified.

.6 Carefully make and fit details. Take special care with exposed finished work to produce a neat and correct appearance to the Consultant's acceptance.

.7 Assemble members without twists or open joints.

.8 Correctly size holes for connecting work of other trades where such can be determined prior to fabrication. Where possible, show holes on shop drawings. Place holes not to cause appreciable reduction in strength of member.

.9 Draw mechanical joints to hairline tightness and seal countersunk screw and access holes for locking screws with metal filler where these occur on exposed surfaces.

2.3 **FABRICATED ITEMS**

.1 Refer to Drawings for details of metal fabrication work and related items not specifically listed in this Section.

.2 Where work is required to be built into work of other Sections supply such members to respective Sections.

.3 Provide miscellaneous and metal fabrications indicated on the drawings, listed below, and not indicated to be supplied under other Sections. Provide miscellaneous and metal fabrications including but not limited to the following:

.4 Lintels: Fabricated from CAN/CSA-G40.20/G40.21-M, Grade 350W, size and location as shown, width to be not less than 25 mm less than width of wall and extend 200 mm beyond opening at each end. Unless otherwise shown, fabricate lintels in block walls of steel sections.

5. Masonry lateral support angles:
   .1 Supply only, to Section 04 20 00 for installation, all horizontal lateral support anchors at top of non-load-bearing masonry walls.
   .2 Refer to Structural Drawings for size and spacing of required support anchors. Provide drilled holes as required for anchorage.
   .3 Galvanized for all exterior wall and unheated and high humidity locations.

.6 Bollards (protection posts):
   .1 Provide bollards as indicated on drawings. Posts to be 250 mm diameter with a wall thickness of 8 mm. Place posts into a 1500 mm foundation, fill with 20 Mpa concrete and round top. Project pipes 1500 mm above finished grade. Finish prime coat.
   .2 Finish: Provide paint finish in accordance with Section 09 91 00, colour to be selected by Consultant.

.7 Millwork and vanity counter supports:
   .1 Provide triangular supports for millwork and vanity counters. Construct HSS supports of 38 mm x 38 mm x 6 mm steel angles. Where indicated, conceal supports within cavity of drywall partition.
   .2 Provide all drill holes required for concealed anchorage of counters and for anchoring to building structure.
   .3 Finish (exposed locations): Prime painted finish for field painting in accordance with Section 09 91 00.

.8 Bench supports:
   .1 Supply only, for installation under work of Section 06 20 00, bench supports constructed of HSS plates. Provide supports at maximum 609 mm centres and not less than 152 mm from ends of bench run.
   .2 Provide all drill holes required for concealed anchorage of wood bench and for anchoring to building structure.
   .3 Finish (exposed locations): Prime painted finish for field painting in accordance with Section 09 91 00.

.9 Stainless steel counter cladding (ST1):
   .1 Provide stainless steel cladding material for counters where indicated.
   .2 Provide 1.9 mm (14 ga.) thick stainless steel sheet cladding materials for millwork counters as required. Coordinate with Section 06 20 00 as required for sizing, installation and cut-outs.
   .3 Ensure laminate materials are installed straight, smooth, and free of defects in appearance.

.10 Stainless steel trims:

.1 Provide stainless steel trims for bulletin boards under work of Section 10 80 00. Coordinate with noted Section as required for sizing and installation of trim work.

.2 Installed trims shall have butt joints and no exposed fasteners. Detail joints to ensure visibly straight runs of trims, free of dipping or other irregularities impairing appearance; joints shall not be noticeable in final installation. Use single piece lengths wherever possible. Where not possible, use longest lengths practical to minimize number of joints.

.11 Miscellaneous steel brackets, supports and angles:

.1 Supply and install or supply for installation by trades responsible, all loose steel brackets, supports and angles where indicated, except where such brackets, supports and angles are specified under work of other Sections. Drill for countersunk screws, expansion anchors and anchor bolts.

.2 Unless otherwise specified, prime paint for interior installation; galvanized finish for exterior and interior humid area installation.

.3 Design supports and anchorage to support assembly dead loads and live loads, and lateral loads attributable to misuse and vandalism.

.4 Miscellaneous steel brackets, supports and angles are to include but not be limited to the following:

.1 Steel L angle for stair application, prime painted with field painted finish in accordance with Section 09 91 00.

2.4 STAINLESS STEEL WORK

.1 Take all necessary precautions to safeguard against latent surface discolouration due to disturbance of the natural protective oxide coating of the material or to contamination from other sources.

.2 Workmanship shall be the best standard practice for this type of work. Execute stainless steel work in accordance with the applicable instructions set forth in Atlas Stainless Steels' "Technical Data" handbook on stainless steel.

.3 Do all stainless steel fabrication in clean shops, located away from areas where carbon steel is burnt, ground, or cut with abrasive wheels to ensure that carbon steel dust will not be embedded into the stainless steel, and as follows:

.1 In fabrication of stainless steel do not use tools and dies which have been used on carbon steels.

.2 Ensure tools and dies use for forming and cutting stainless steel are free of nicks and other damage.

.3 Do not use carbon grits and grinding wheels which will imbed foreign particles into stainless steel surfaces. Use only stainless steel wool when wool polishing is required.

.4 Stainless steel items, on which rust stains appear, shall be replaced with new fabricated material.

2.5 ANCHORS AND FASTENING

.1 Use weld studs of size not larger than 10 mm for attaching miscellaneous materials and equipment to building steel. If weight of item requires larger fasteners use clips or brackets and secure by welding or through bolting.

.2 Use self drilling expansion type concrete anchors for attaching to masonry and concrete

.3 Do not secure items to steel deck.

.4 Use steel beam clamps of two bolt design to transmit load to beam web. Do not use C and I clamps.

2.6 WELDING

.1 Perform welding by electric arc process.

.2 Execute welding to avoid damage or distortion to Work. Execute welding in accordance with following standards:

- .1 CSA W48 - for Electrodes. If rods are used, only coated rods are allowed.
- .2 CSA W59-M and CSA W59S1-M for design of connections and workmanship.
- .3 CAN/CSA W117.2-M - for safety.

.3 Thoroughly clean welded joints and expose steel for a sufficient distance to perform welding operations. Finish welds smooth. Supply continuous and ground welds which will be exposed to view and finish paint.

.4 Test welds for conformance and remove work not meeting specified standards and replace to Consultant's acceptance.

2.7 SHOP PAINTING

.1 Clean steel to SSPC SP6 and remove loose mill scale, weld flux and splatter.

.2 Shop prime steel with one coat of primer paint to dry film thickness of 0.07 mm. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 deg C. Paint items under cover and leave under cover until primer is dry. Follow paint manufacturer's recommendations regarding application methods, equipment, temperature, and humidity conditions.

.3 Shop prime galvanized steel in accordance with CGSB 85-GP-16M.

.4 Clean but do not paint surfaces being welded in field.

.5 Do not paint surfaces embedded in concrete, but clean as if they were to be primed.

.6 Do not prime steel to be fireproofed or to receive intumescent paint coating.

.7 Do not prime machine finished surfaces, but apply an effective anti-rust compound.

.8 Take precautions to avoid damage to adjacent surfaces.

2.8 **HOT DIP GALVANIZING**

.1 After fabrication, hot dip galvanize specific miscellaneous steel items as indicated. After galvanizing, plug relief vents air tight with appropriate aluminum plugs as suitable and required for intended metal fabricated item. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with zinc rich primer in accordance with manufacturer's printed directions.

.2 Hot-dip galvanize members in accordance with requirements of the following ASTM, with minimum coating weights or thicknesses as follows:

.1 Rolled, pressed and forged steel shapes, plates, bars and strips: ASTM A123; average weight of zinc coating per square/metre of actual surface, for 4.8 mm and less thickness members 600 g/m^2 for 6 mm and heavier members 640 g/m^2.

.2 Iron and steel hardware: ASTM A153; minimum weight of zinc coating, in ounces per square foot of surface, in accordance with ASTM A153,Table 1 for the various classes of materials used in the Work.

3 Execution

3.1 **EXAMINATION**

.1 Examine previously installed work, upon which this Section depends, verify dimensions and condition of existing Work, and coordinate repairs, alterations, and rectification if necessary. Commencement of work of this Section is deemed to signify acceptance of existing, prior conditions.

.2 Obtain Consultant's written approval prior to field cutting or altering of structural members.

3.2 **ERECTION**

.1 Install metal fabrications in accordance with reviewed shop drawings and manufacturer's written instructions.

.2 Fit joints and intersecting members accurately. Make work in true planes with adequate fastenings. Build and erect work plumb, true, square, straight, level and accurate to sizes detailed, free from distortion or defects detrimental to appearance or performance.

.3 Perform drilling of concrete and steel as required to fasten work of this Section.

3.3 **TOUCH UPS**

.1 Paint bolt heads, washers, nuts, field welds and previously unpainted items. Touch up shop primer damaged during transit and installation, with primer to match shop primer.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for fire-retardant wood treatment work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.

.2 CAN/CSA O80 Series M, Wood Preservation.

1.3 **SUBMITTALS**

.1 Product data:
  .1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
    .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, and limitations.
    .2 Product transportation, storage, handling and installation requirements.

1.4 **QUALITY ASSURANCE**

.1 Each piece of fire retardant treated lumber shall be shop marked with the ULC monogram respectively, in accordance with CAN/CSA O80-M.

2 Products

2.1 **FIRE RETARDANT TREATMENT**

.1 Fire retardant treatment of lumber and plywood (interior and protected locations): ‘Dricon FRT’ fire retardant treatment by Biewer Lumber or approved equal, conforming to ASTM E84, to provide a flame spread rating of 25 or less.

2.2 **APPLICATION**

.1 Apply fire retardant treatment in accordance with manufacturer’s written instructions and to meet requirements of authorities having jurisdiction.

.2 Use fire retardant lumber for blocking/framing in ceiling\spaces, partitions and bulkheads.

3 Execution

3.1 **Note Used**

END OF SECTION

1.0 GENERAL

1.1 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CSA O80 Series	Wood Preservation
.4	CSA O141	Softwood Lumber
.5	CSA O121	Douglas Fir Plywood
.6	CSA O151	Canadian Softwood Plywood
.7	CSA O153	Poplar Plywood
.8	CSA O325	Construction Sheathing
.9	CAN/CSA O437 Series	Standard on OSB and Waferboard
.10	CSA B111	Wire Nails, Spikes and Staples (Withdrawn)

.11 National Lumber Grade Authority (NLGA) Standard Grading Rules for Canadian Lumber

1.2 Submittals

.1 For products treated with preservative by vacuum-pressure impregnation, submit following information certified by authorized signing officer of treatment plant:

.1 Information listed in AWPA M2 and revisions specified in CAN/CSA 080 Series, Supplementary Requirement to AWPA M2 applicable to specified treatment.

.2 Moisture content after drying following treatment with water-borne preservative.

.2 Submit product data for double hot-dipped galvanized nails confirming compliance with ASTM A153.

1.3 Installer Qualifications

.1 Maintain a qualified crew of carpenters for the work of this Section. Only qualified journeymen shall be engaged in framing and each journeyperson shall have a Certificate of Proficiency.

1.4 Delivery, Storage, and Handling

.1 Protect materials from moisture upon delivery.

.2 Store materials on raised supports. Cover materials with waterproof covering. Provide adequate air circulation and ventilation.

.3 Do not store seasoned materials in wet or damp areas.

.4 Store all materials in a dry environment. Do not cover materials having a moisture content of over 15%.

2.0 PRODUCTS

2.1 Lumber Materials

.1 Lumber: Except as otherwise specified, lumber shall be softwood, S-P-F, S4S, kiln-dried, moisture content 15% or less, not finger jointed, and in accordance with the following standards:

.1 CSA O141.

.2 Graded and stamped in accordance with the NLGA Standard Grading Rules for Canadian Lumber and by an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Furring, Blocking, Strapping, Nailing Strips, Grounds, Rough Bucks: S-DRY, Douglas fir species.

.1 Board Sizes: “Standard” grade to NLGA, Paragraph 114c.

.2 Dimension Sizes: “Standard” grade to NLGA, Paragraph 122c.

.3 Roofing Curbs, Nailers, Blocking, Cants: As specified in 2.1.2 above.

.4 Wood Trim: Kiln-dried spruce, comb-faced fascia material.

2.2 Panel Materials

.1 Douglas Fir Plywood: To CSA O121 with applicable grade stamp.

.1 Interior Floor Sheathing: untreated Tongue & Groove, 15.8 mm (5/8”) thick. Use Select Tight Face plywood under deck membrane.

.2 Other Panel Products: Marked with a recognized, visible grade stamp.

2.3 Fasteners

.1 Roof Nailers: CSP material, “Sheathing” grade.

.2 Nail, Spikes, and Staples: To CSA B111 and as follows:

.1 Use common spiral nails and spiral spikes, except where specified otherwise, for interior work.

.2 Fasteners in Contact with Borate-Treated Lumber: Hot-dipped galvanized finished steel.

.3 Fasteners in Contact with ACQ-Treated Lumber: Stainless steel.

.3 Subfloor Fasteners:

.1 Staples: Chisel point, non-divergent, double-coated, length ensuring minimum 85% penetration into subfloor but not penetration through subfloor.

.4 Bolt, Nut, Washer, Screw and Pin Type Fasteners: Hot-dipped galvanized finished steel for all fasteners in contact with borate-treated lumber or stainless steel for all fasteners in contact with ACQ-treated lumber, unless specified otherwise.

.5 Joist Hangers: Hot-dipped galvanized finished steel for all hangers, plates, straps, etc. in contact with borate-treated lumber or stainless steel for all such connectors in contact with ACQ-treated lumber.

.6 Do not combine stainless steel fasteners with galvanized hardware or vice-versa.

2.4 Preservative Treatment

.1 Treat following items in accordance with applicable CSA O80 commodity standard using alkaline copper quaternary type C (ACQ-C) or copper azole type B (CA-B) preservative to obtain minimum net retention of 4.0 kg/cu. m of wood. Materials shall be kiln-dried after treatment.

.1 All dimension lumber and panel materials directly exposed to moisture (i.e. deck boards, trellis and similar such framing, exposed stairs).

.2 Treat following items in accordance with applicable CSA O80 commodity standard using “Advance Guard” borate-pressure treatment to obtain minimum net retention of 2.7 kg/cu. m of wood. Materials shall be kiln-dried after treatment. Lumber shall carry the Canadian Wood Preserver’s Bureau Quality Mark (“Advance Guard” quality mark).

.1 New lumber and panel materials inside, outside, and crossing wall moisture barrier.

.2 Items in contact with concrete or masonry.

.3 Inspection of products treated with preservative by vacuum-pressure impregnation will be carried out by an accredited inspection agency of the Canadian Wood Preservers Bureau (CWPB).

.4 All treated lumber and plywood shall bear an identifying stamp in accordance with the CWPB, CSA O80, or AWPA requirements.

.5 Following water-borne preservative treatment, dry material to maximum moisture content of 15%.

2.5 Accessories

.1 Subflooring Adhesive: To CAN/CGSB 71.26, cartridge loaded.

.2 Field Applied Wood Preservative:

.1 For ACQ or CA Preservative Wood: Organic solvent, copper naphthenate, prepared in accordance with CSA O80, coloured green.

.2 For Borate Preservative Wood: Water-based, borate-based, prepared in accordance with CSA O80, tint green.

.3 Polyethylene Film: To CAN/CGSB-51.34, 100 micrometres thick.

.4 Sealing Tape: Minimum 60 mm wide, polypropylene sheathing tape with acrylic adhesive, or duct tape of same width.

.5 Sill Gaskets: Closed-cell vinyl foam, with moisture-resistant properties.

3.0 EXECUTION

3.1 Field Treatment of Preservative-Treated and Existing Products

.1 Field-treat surfaces exposed by cutting, trimming, or boring of preservative-treated items with liberal application of preservative and in accordance with AWPA M4.

.2 Apply preservative in accordance with manufacturer’s instructions. Apply by dipping, brush, or spray to completely saturate and maintain wet film on surface for minimum 3-minute soak on lumber and 1-minute soak on plywood. Allow to dry 24 hours prior to covering.

3.2 Erection of Framing Members

.1 Install members true to line, levels, and elevations, and square and plumb. Space uniformly.

.2 Construct continuous members from pieces of longest practicable length.

.3 Install spanning members with "crown-edge" up.

.4 Install blocking to facilitate installation of finishing materials, fixtures, specialty items, and trim.

.5 Select exposed framing for appearance. Install lumber and panel materials so that grade-marks and other defacing marks are concealed or remove by sanding where materials are left exposed.

.6 Frame, anchor, fasten, tie, and brace members to provide necessary strength and rigidity.

.7 Countersink bolts where necessary to provide clearance for other work.

.8 Install foam sill gaskets between wood and concrete.

3.3 Nailing Strips, Grounds, and Rough Bucks

.1 Install rough bucks, nailer, and linings to rough openings as required to provide backing for frames and other work.

.2 Erect all wood framing members to be level and plumb. Construct to framing member’s full height without splices.

3.4 Panel-Type Subflooring

.1 Install subflooring with panel end-joints located on solid bearing, staggered at least 800 mm.

.2 Apply subflooring adhesive on wood framing to support panel-type subflooring. Place continuous single-bead on each framing member and double-bead on framing members supporting panel joints. Comply with adhesive manufacturer's installation instructions.

.3 Fasten subfloor panels using common-spiral or annular-grooved nails spaced 150 mm o.c. along edges and 300 mm o.c. along intermediate supports. Do not use of staples.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products equipment and services necessary for the finish carpentry work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ANSI A208.1, Particleboard.

.2 ANSI/NEMA LD 3, High-Pressure Decorative Laminates.

.3 APA - The Engineered Wood Association.

.4 ASTM F1667, Driven Fasteners: Nails, Spikes and Staples.

.5 Architectural Woodwork Manufacturers Association of Canada (AWMAC).

.6 North American Architectural Woodwork Standards (NAAWS).

.7 CAN/CSA O141, Softwood Lumber.

.8 CSA O151-M, Canadian Softwood Plywood.

.9 National Lumber Grades Authority (NLGA) Standard Grading Rules for Canadian Lumber.

1.3 **SUBMITTALS**

.1 Shop drawings: Submit shop drawings of finish carpentry work in accordance with Section 01 33 00 indicating:
- .1 Materials, thicknesses, sizes, finishes, wood species, grades, profiles, connection attachments, shop jointing, field jointing, reinforcing, anchorage, fastener types and sizes, location of exposed fastenings, mechanical and electrical service routes, service outlets, cutout locations, and sizes.
- .2 Include erection drawings, plans, elevations, sections, and details as applicable.

.2 Samples: Submit samples of the following in accordance with the requirements of Section 01 33 00:
- .1 Two of each colour, pattern, gloss, and texture of plastic laminate, in manufacturer's standard tag size.
- .2 Two samples of laminated plastic joints, edging, cutouts and postformed profiles.
- .3 Two samples of solid surfacing, in 100 x 75 x 12 mm samples.
- .4 Two samples of melamine surfaced board, edging and postformed profiles.
- .5 One of each item of finish carpentry hardware.

.3 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.

1.4 **QUALITY ASSURANCE**

.1 Execute work of this Section by member of AWMAC, with 5 years experience in finish carpentry work of comparable complexity and scope. Submit proof of experience upon Consultant's request.

.2 Fabricate finish carpentry work in accordance with NAAWS, Premium Quality materials and installation unless otherwise indicated. Perform work in accordance with the definition of Good Workmanship as defined in the NAAWS.

.3 Remove and replace finish carpentry work which does not conform to the NAAWS or as amended by these Specifications.

.4 Mock-up:
- .1 Shop fabricate one mock-up of a base cabinet, wall cabinet, and counter top for each type of surfacing specified, complete with hardware and shop applied finishes, installed in location acceptable to Consultant.
- .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with work.
- .3 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.

1.5 **DELIVERY, STORAGE, AND HANDLING**

.1 Deliver, store, and handle finish carpentry in accordance with the NAAWS. Control the temperature and humidity in accordance with the NAAWS recommendations, before, during, and after finish carpentry delivery, and also during storage and installation.

.2 Cover finished plastic laminated work with heavy kraft paper or put in cartons during shipment. Protect installed surfaces by approved means. Do not remove until immediately before final inspection.

1.6 **EXTENDED WARRANTY**

.1 Submit an extended warranty for plastic laminate work of this Section in accordance with General Conditions, except that warranty period is extended to 2 years from date of Ready-for-Takeover.
- .1 Warrant against defects in material and workmanship including but not limited to opening of joints, cracking, shrinkage, warpage, and delamination of plastic laminate.
- .2 Coverage: Complete replacement including affected adjacent Work.

2 Products

2.1 **MATERIALS**

.1 General:
- .1 All materials under work of this Section, including but not limited to, adhesives and mastics, are to have low VOC content limits.
- .2 Adhesives - Urea-formaldehyde-free glues.
- .3 All composite wood and/or agrifibre products (including core materials) and adhesives used to fabricate laminated assemblies used in building must not contain added urea-formaldehyde.

.2 Concealed framing lumber and plywood:
- .1 Eastern Spruce, Balsam Fir, or Jack Pine, to CAN/CSA O141, NLGA, and NAAWS Custom Grade, S4S, average moisture content 7% +/- 2% at installation.
- .2 Softwood plywood: CSA O151-M; 19 mm unless indicated otherwise, (G2S).

.3 Veneer core plywood (substrate): APA plywood, Grade A-D, in sizes, thickness and shapes as indicated.

.4 Plastic laminate (PLM-1): Provide plastic laminates conforming to ANSI/NEMA LD 3 as follows:
- .1 Flatwork face sheet: 1.2 mm thick, heavy wear resistance.
- .2 Vertical interior face sheets: 0.8 mm thick.
- .3 Postformed face sheet: 0.8 mm thick.
- .4 Backing sheet: thickness to match face sheet, high pressure laminate, manufactured by same manufacturer as face sheet.
- .5 Plastic laminate: As manufactured by Arborite, Forbo, Formica, Nevamar, Pionite or Wilsonart.
- .6 Edge banding: Edging to be done in minimum 3 mm thin PVC to match laminate colour
- .7 Colours: Allow for three (3) colours selected by the Consultant from manufacturer's full colour range.

5. Melamine surfaced particleboard (MEL): ANSI A208.1, Grade M2, contains 100% post-industrial wood fibres, no urea-formaldehyde. Edging to be done in minimum 0.5 mm thin PVC to match melamine colour. 'Nu Green Particleboard' by Uniboard Canada Inc. or approved equal, having the following minimum criteria:
- .1 Density: 635 kg/m^3.
- .2 Modulus of rupture: 14.5 N/mm^2.
- .3 Modulus of elasticity: 2, 250 N/mm^2.
- .4 Internal bond: 0.45 N/mm^2.
- .5 Hardness: 2,225 N.
- .6 Linear expansion: < 35%.
- .7 Formaldehyde emissions: 0.00-0.01 ppm.
- .8 Melamine facing: 'Panval Melamine' by Uniboard Canada Inc. or approved equal.
- .9 Colour: Interior millwork surfaces in white colour.

.6 Solid surfacing (SSM-1):
- .1 12 mm thick sheet stock, provide with bullnose edge and all cutouts as required. 'Corian' solid surfacing by DuPont or approved equal.
- .2 Colour: Colour to be selected by the Consultant from manufacturer's full colour range.
- .3 Installation and seam adhesives to be as recommended by solid surfacing manufacturer, colour matched to solid surfacing.

.7 Laminating adhesive: CSA O112 Series, water resistant type, low VOC content, selected by laminate manufacturer for intended end use.

.8 Draw bolts and splines: Type as recommended by fabricator.

.9 Nails and staples: Conforming to ASTM F1667; Size and type to suit application, galvanized for exterior work, interior humid areas and for treated lumber; plain finish elsewhere.

.10 Bolts, nuts, washers, blind fasteners, lags and screws: Size and type to suit application. Stapling is not acceptable.

.11 Adhesive and bituminous mastic: Selected by the millwork fabricator with low VOC content.

.12 Miscellaneous metals: In accordance with Section 05 50 00.

.13 Resilient base: In accordance with Section 09 65 19.

.14 Insect repellant powder: Diatomaceous earth insect powder and additional pest control requirements as outlined in Section 01 57 16.

2.2 HARDWARE

.1 The following hardware is the minimum quality standard for the work of this Section. Alternatives may be considered provided they are approved by Consultant prior to ordering of products.

.2 Pilasters: Clear anodized aluminum recessed shelf standards with 12 mm divisions, Model 233 by Knape & Vogt.

.3 Clips: Bright zinc plated, adjustable height shelf supports, Model 256 by Knape & Vogt.

.4 Cabinet hinges: Heavy duty, concealed, 100 degree, clip, soft closing, self closing, Model MODUL by Blum.

.5 Magnetic catches: Model 918 by Knape & Vogt.

.6 Cabinet and drawer pulls: 150 mm long x 38 mm deep, 'Modern Stainless Steel Edge Pull - 576 (Item No. BP57606170)' by Richelieu.

.7 Locks: Cam locks/deadbolt locks complete with lock core by Hafele, type to suit application and installation.

.8 Grommets:
- .1 Power cable grommet, 'MM6/SET 2 1/2" MM6 Desk Grommet Cap + Liner Set' by Doug Mockett & Company, Inc.
- .2 Finish/colour: To be selected by the Consultant from manufacturer's full range.

2.3 PLASTIC LAMINATE WORK

.1 Perform plastic laminate work in accordance with NAAWS and ANSI/NEMA LD 3.

.2 Ensure adjacent parts of continuous laminate work match in colour and pattern.

.3 Laminate plastic laminates to veneer core plywood, unless otherwise specified or indicated, in accordance with manufacturer's instructions. Laminate postformed laminates to particle board core in accordance with manufacturer's instructions.

.4 Fabricate core surfaces and profiles with continuous support and bond over entire surface to receive plastic laminate.

.5 Apply plastic laminate backing sheets to balance shrinkage stresses induced by plastic laminate face sheets.

.6 Joints:
- .1 Install joints in accordance with reviewed shop drawings.
- .2 Jointing shall be placed at logical locations in intended millwork item and shall meet the overall aesthetic intent of the Consultant.
- .3 Minimize joints in plastic laminate work.
- .4 Do not install joints in plastic laminate work in less than 2400 mm o.c.
- .5 Locate joints minimum 610 mm from cut-outs.
- .6 Offset core and plastic laminate facing joints.

.7 Form shaped profiles and bends as indicated, using postformed grade laminate to laminate manufacturer's instructions.

.8 Edging to be done using 3 mm thick PVC to match plastic laminate colour to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.

.9 Apply laminated plastic liner sheet to interior of cabinetry and where indicated.

2.4 **FABRICATION**

.1 Finish carpentry work required by this Section is to include but not be limited to the following items:
- .1 Cabinets and countertops.
- .2 Shelving.
- .3 Pass-thru ledge.
- .4 Window sills.
- .5 Benches.

.2 Be responsible for methods of construction and for ensuring that materials are rigidly and securely attached and will not be loosened by the work of other sections.

.3 Coordinate locations of concealed supports and blocking with other parts of work. Provide cutouts for outlet boxes and other fixtures.

.4 Fabricate work in a manner which will permit expansion and contraction of the materials without visible open joints. Conceal joints and connections in wherever possible.

.5 Set nails and countersink screws, apply wood filler to indentations, sand smooth and leave ready to receive finish.

.6 Mitre exposed corners, no end grain shall be visible in completed installation.

.7 Finished millwork shall be free from bruises, blemishes, mineral marks, knots, shakes and other defects and shall be selected for uniformity of colour, grain and texture.

.8 Shelving to cabinetwork to be adjustable unless otherwise noted.

.9 Recess shelf standards, unless noted otherwise. Stagger recessed shelf standards on opposite sides of divider.

.10 Do not exceed maximum 760 mm unsupported span for 19 mm thick shelving. House fixed shelving into gables and divisions.

.11 Shop assemble finish carpentry to accommodate delivery and handling and to ensure passage through building openings.

.12 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Install finish carpentry work in accordance with NAAWS and tolerances for architectural woodwork and reviewed shop drawings.

.2 Set and secure finish carpentry in place, rigid, plumb, square, and level.

.3 Conform to Section 01 57 16 for pest control requirements for finish carpentry work. Provide insect repellant powder under all millwork prior to installation.

.4 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate columns, fixtures, outlets, or other projecting, intersecting or penetrating objects leaving a 0.8 mm gap maximum.

.5 Coordinate cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures, in finish carpentry. Round internal corners of cut-outs and seal exposed cores.

.6 Form joints to conceal shrinkage.

.7 Install draw bolts and splines in laminated plastic counter top joints at maximum spacing 450 mm o.c., and 75 mm from edge. Make joints flush, hairline butt joints.

.8 Install finishing hardware accurately and securely in accordance with manufacturer's directions, adjust and clean.

.9 Install prefinished millwork at locations shown on drawings. Position accurately, level, plumb straight.

.10 Apply bituminous coating over wood framing members in contact with masonry or cementitious construction.

.11 Melamine panels: Assemble melamine millwork using dowelled/wafered-and-glue construction. Installed melamine panels shall not show any exposed fasteners on finished/exposed surfaces.

.12 Solid surfacing:
- .1 Install solid surfacing in accordance with manufacturer's instructions.
- .2 Align work plumb and level.
- .3 Seal perimeter of fabrication to adjacent construction in accordance with Section 07 92 00.

.13 Stainless steel counter and base: Laminate stainless steel sheet to exterior grade plywood with acceptable laminating adhesive as outlined above for plastic laminate. Follow stainless steel requirements as indicated in Section 05 50 00.

.14 Benches:
- .1 Construct benches of sizes and details as noted.
- .2 Anchor wood to supports in a concealed manner.
- .3 Mitre joints at corners. Keep joints to a minimum.
- .4 Round all corners, edges and ends.
- .5 Install bench brackets and supports supplied under work of Section 05 50 00.

.15 Sills: Install window sills level, plumb and even in locations as indicated and ensure that sills are securely fastened.

.16 Fastening:
- .1 Coordinate wall securement, anchorage, and blocking for finish carpentry items.
- .2 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
- .3 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
- .4 Provide heavy duty fixture attachments for wall mounted cabinets.
- .5 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round cleanly cut hole and plug with wood plug to match material being secured.

.17 Remove and replace damaged, marked, or stained finish carpentry.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for water repellent sealer work in accordance with the Contract Documents.

1.2 **SUBMITTALS**

.1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, limitations, preparation and installation requirements.
  - .2 Product transportation, storage, and handling requirements.

.2 Reports/certificates:
- .1 Submit manufacturer's written acceptance of substrate prior to installation.
- .2 Submit applicator’s current certificate of approval, for installation of sealer, by the material manufacturer as proof of compliance.
- .3 Submit letter certifying that materials proposed for use on this project meet criteria specified, are compatible with each other, and that the manufacturer had recommended the product for it’s intended end use.
- .4 Submit inspection report after application of sealer.
- .5 Submit certification from sealer manufacturer that installation meets specified and manufacturer’s requirements.

.3 Closeout submittals: Submit maintenance data for incorporation into Operations and Maintenance Manuals in accordance with Section 01 78 00.

.4 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.

1.3 **QUALITY ASSURANCE**

.1 Installers qualifications: Perform work of this Section by a company that has a minimum of five years proven experience in work of similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator’s current certificate of approval by the material manufacturer as proof of compliance.

.2 Pre-installation meetings: Arrange with manufacturer's representative and Consultant to inspect substrates, and to review installation procedures 48 hours in advance of installation.

1.4 **DELIVERY, STORAGE, AND HANDLING**

.1 Deliver products in original factory packaging bearing identification of product, manufacturer, and batch number. Provide Material Safety Data Sheets for each product.

.2 Store product in location protected from freezing, damage, construction activity, precipitation, and direct sunlight, in strict accordance with manufacturer's recommendations.

.3 Prior to application, condition products in accordance with manufacturer's recommendations.

.4 Handle all products with appropriate precautions and care as stated on Material Safety Data Sheet.

1.5 **SITE CONDITIONS**

.1 Do not install work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
- .1 Ambient air and surface temperature: 5°C to 38°C
- .2 Precipitation: None.

.2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 24 hours before, during, and 24 hours after installation.

1.6 **EXTENDED WARRANTY**

.1 Submit an extended warranty for the work of this Section in accordance with General Conditions, except that warranty period is extended to five years from date of Ready-for-Takeover.
- .1 Warrant against loss of water repellency when tested as follows:
  - .1 Modified ASTM C642 procedure: Treated concrete shall not absorb more than 0.75% water for a period of 24 hours.
  - .2 AASHTO T259: Concrete shall not absorb more than 250 ppm of chlorides at the 11/2 inch level over baseline conditions.
- .2 Coverage: Complete repair of defective areas and reapplication of sealer.

2 Products

2.1 **MATERIALS**

.1 Water repellent sealer (CON1): Clear, penetrating, water based, breathable, minimum 40% active silane based sealer:
- .1 ‘Protectosil Aqua-Trete 40' by DRE Industries Inc.
- .2 ‘MasterProtect H 400' by Master Builders Solutions.

.2 Cleaning agents: As recommended by material manufacturer, harmless to substrates and adjacent finished surfaces.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

.2 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, and any other foreign matter detrimental to performance. Obtain manufacturer's approval of substrate in writing, submit copy to Consultant.

3.2 **PREPARATION**

.1 Supply and install temporary protection to adjacent surfaces to prevent damage resulting from work of this Section.

.2 Thoroughly clean all surfaces to receive sealer by steel shotblasting or other method approved by the manufacturer.

3.3 **SEALER APPLICATION**

.1 Apply sealer in accordance with manufacturer's written instructions.

.2 Apply sealer without dilution or alteration in any way.

.3 Apply sealer with low pressure airless spray equipment (15 Psi) capable of flooding the surface to obtain uniform coverage and extending sealer 100 mm up walls.

.4 Apply sealer at a minimum application rate of 4.3 m^2/L, unless otherwise recommended by manufacturer to suit intended application.

.5 Apply sealer by method other than spray application only at locations where overspray would affect adjacent materials.

3.4 **FIELD QUALITY CONTROL**

.1 Immediately after sealing has been completed, have the sealer manufacturer’s representative visit the site to inspect, test, and approve the application. Submit written inspection report to Consultant.

.2 Deficiencies in the application shall be repaired at no cost to Owner.

3.5 **PROTECTION**

.1 Prevent traffic over sealed areas, and protect work of this Section from precipitation, freezing, and debris after installation.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for thermal insulation work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM C665, Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

.2 CAN/ULC-S702, Mineral Fibre Thermal Insulation for Buildings.

.3 CAN/ULC-S710.1, Standard for Thermal Insulation – Bead-Applied One Component Polyurethane Air Sealant Foam, Part 1: Material Specification.

.4 CAN/ULC-S710.2, Standard for Thermal Insulation – Bead-Applied One Component Polyurethane Air Sealant Foam, Part 2: Installation.

1.3 **SUBMITTALS**

.1 Product data: Submit manufacturer's Product data in accordance with Section 01 33 00 indicating characteristics, performance criteria, and limitations. Indicate installation requirements and techniques, storage, and handling criteria and installation procedure acceptable to manufacturer.

.2 Certification: Submit installer's certification verifying compliance with specification requirements.

1.4 **QUALITY ASSURANCE**

.1 Qualifications: Execute work of this Section by company specializing in thermal insulation work with minimum of three years, recent, documented experience, on work of comparable complexity and scope.

2 Products

2.1 **MATERIALS**

.1 All materials under work of this Section, including but not limited to, adhesives are to have low VOC content limits.

2. Batt insulation:
   .1 Batt insulation (non-rated): CAN/ULC-S702, Type 1, friction fit; fibreglass insulation, 'Unfaced Fibreglass Thermal and Sound Control Batts' by Johns Manville or 'Pink Next Gen Fiberglas Insulation' by Owens Corning Canada.
   .2 Batt insulation (fire-rated/acoustic): ASTM C665, Paperless, semi-rigid, spun stone wool fibre mats, of thickness as indicated on Contract Drawings, 'MinWool SAFB' by Johns Manville, 'SAFB Thermafiber' by Owens Corning Inc. or 'Rockwool AFB' by Rockwool.

3. Sprayed air sealant foam: CAN/ULC-S710.1, closed cell, polyurethane foam-in-place moisture cured sealant insulation, CFC free, 16 kg per m^3 to 32 kg per m^3 density; injected from prepackaged pressurized containers.

4. Cavity wall insulation: Where existing cavity wall insulation is disturbed or damaged as a result of Work of this Project, provide new insulation and fasteners to match existing type.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

.2 Ensure substrate surfaces are dry, clean, suitable to receive adhesive and free from other deleterious substances.

3.2 **INSTALLATION**

.1 Install thermal insulation in longest panel sizes possible in accordance with manufacturer's instructions.

.2 Butt insulation with moderate contact and, cut and fit them tightly around other construction elements. Offset single layer vertical joints and both vertical and horizontal joints in multiple layer applications.

.3 Make thermal insulation continuous, maintain thermal protection continuity and secure to prevent displacement. Ensure that insulation is tight to substrate without air gaps.

.4 Cut and fit thermal insulation tightly around electrical boxes, plumbing and heating pipes and ducts, exterior doors and windows, and other protrusions.

.5 Leave 75 mm separation between thermal insulation and heat emitting devices such as recessed light fixtures.

.6 Cut and trim thermal insulation neatly to fit spaces; do not compress insulation to fit. Install only thermal insulation boards which are free from chipped or broken edges.

.7 Fill miscellaneous cavities with insulation to maintain continuity of thermal barrier. Do not compress insulation to fit.

.8 Arrange for Consultant to review thermal insulation before it is enclosed.

3.3 SECUREMENT

.1 Batt insulation (non-rated, fire-rated/acoustic):
- .1 Install batt insulation in partitions, between studs, and as indicated on Contract Drawings and in accordance with the manufacturer's instructions.
- .2 Fill stud cavities to full height of partitions and carefully cut and fit required batt insulation type around services and protrusions.

.2 Sprayed air sealant foam: Except where otherwise specified in other Sections, install foamed-in-place insulation fully in crevices and frame voids between exterior walls and door frames, and about lintels, and around other items built into exterior walls to prevent air infiltration. Install in accordance with CAN/ULC-S710.2.

.3 Cavity wall insulation:
- .1 Provide new cavity wall insulation to match existing type where existing insulation has been disturbed or damaged.
- .2 Install cavity wall insulation and fasteners in accordance with manufacturer’s written instructions.
- .3 Provide insulation tight to back-up wall construction, starting at base of wall in parallel courses with tight butt joints. Stagger end joints in adjacent course.
- .4 Provide finish work level, plumb and true.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for vapour retarder work in accordance with the Contract Documents.

1.2 **SUBMITTALS**

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Samples: Submit following samples in accordance with Section 01 33 00:
- .1 Two 300 x 300 mm samples of new vapour retarder to demonstrate match with existing vapour retarder.

1.3 **SITE CONDITIONS**

.1 Do not install the work of this Section outside of environmental ranges as recommended by manufacturer without Consultant's and Product manufacturer's written acceptance.

.2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements before, during, and after installation.

2 Products

2.1 **MATERIALS**

.1 All materials under work of this Section, including but not limited to, primers and sealants are to have low VOC content limits.

.2 Vapour retarder and accessories: Where existing vapour retarder has been disturbed or damaged during Work of this Project, provide new vapour retarder to match existing type, complete with accessories as required for complete, air and watertight installation.

3 Execution

3.1 **EXAMINATION AND COORDINATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

.2 Verify that existing substrates to receive vapour retarder are clean, dry, sound, smooth, and continuous.

.3 Coordinate installation of vapour retarders with work of other Sections to achieve a vapour tight building envelope.

3.2 **VAPOUR RETARDER INSTALLATION**

.1 Ensure services are installed and inspected prior to installation of retarder.

.2 Install new vapour retarder to form a continuous and seamless vapour retarder assembly with existing vapour retarder material.

.3 Use sheets of largest practical size to minimize joints.

.4 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

.5 At exterior surface openings, cut vapour retarder to form openings and ensure material is lapped and sealed to frame.

.6 Ensure continuity of vapour retarder is maintained at junctures with other materials.

.7 Seal areas that penetrate vapour retarder as required for a watertight installation.

3.3 **FIELD QUALITY CONTROL**

.1 Inspect vapour retarder continuity immediately prior to installation of subsequent construction. Repair punctures, rips and tears to ensure continuity of vapour retarder.

.2 Where punctures and tears are extensive, replace entire damaged section.

.3 Do not cover or permit to be covered any portion of vapour retarder until it has been inspected by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for fibre concrete panel cladding work in accordance with the Contract Drawings.

1.2 **REFERENCES**

.1 ASTM C920, Specification for Elastomeric Joint Sealants.

.2 CAN/CSA G40.20/G40.21M, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.

.3 CSA S136, Cold Formed Steel Structural Members.

.4 CSA S136.1, Commentary on CAN/CSA S136-M, Cold Formed Steel Structural Members.

1.3 **DESIGN REQUIREMENTS**

.1 Design fibre concrete panel system in accordance with CSA S136, S136.1, and to withstand live, dead, lateral, wind, seismic, handling, transportation, and erection loads.

.2 Design fibre concrete panel system in accordance with following Climatic Design Data for Toronto contained in Ontario Building Code.
- .1 Design Temperature: January 1%, July 2 ½%.
- .2 Wind (Hourly Wind Pressures): 1 in 50 year occurrence.
- .3 Earthquake: Seismic Data as listed.

.3 Design miscellaneous, additional structural framing members as required to complete panel system, where not indicated on Contract Drawings.

1.4 **SUBMITTALS**

.1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 33 00 indicating:
  - .1 Dimensions, profiles, Products, wall elevations, details, arrangements of panels and joints, thicknesses, dimensions, locations of supports and fasteners and special shapes.

.3 Samples:
.1 Submit samples in accordance with Section 01 33 00 of the following:
.1 600 x 600 mm samples of panel system showing fully assembled components including panels, sub-girts and concealed sealant. Sample to be fabricated using exact colour specified.

.4 Reports: Submit written field inspection and test report results after each inspection.

1.5 **QUALITY ASSURANCE**

.1 Retain a licensed Professional Engineer, registered to practice in the Province of Ontario, to perform following services for panel work:
.1 Design of fibre cement panel work, including thermal spacer clip, girt support structure, and complete anchorage devices.
.2 Review, stamp, and sign shop drawings.
.3 Conduct shop and field inspections and prepare and submit inspection reports.

.2 Pre-installation meeting: Arrange with manufacturer's representative, Contractor, and Consultant to inspect substrates, and to review installation procedures 48 hours in advance of installation.

1.6 **DELIVERY, STORAGE, AND HANDLING**

.1 Stockpile panels tilted to provide water run-off, free from ground contact on firm, level, non-staining supports extending full width of sheet and spaced not more than 450 mm apart. Cover components with opaque polyethylene sheet. Vent to allow air movement.

2 Products

2.1 **MATERIALS**

.1 Glass fibre cement slats (FCP-1):
.1 13 mm thick, glass fibre concrete panels with through colour, sized at 302 mm wide x 1800 mm long. 'Fibre C, oko Skin' cladding manufactured by Rieder or approved equal.
.2 Colour and surface texture: To be selected by Consultant.

.2 Structural shapes, plates, sag rods, and similar items: CAN/CSA-G40.20-G40.21-M, Grade 300W.

.3 Hollow structural sections: CAN/CSA-G40.20/G40.21-M Grade 350W, Class H.

.4 Z girts and C channels: CAN/CSA S136-M; Minimum 1.2 mm thick, Z275 galvanized. Depth as indicated on Contract Drawings. Z-girts to be thermally broken at mid-point of insulation thickness.

.5 Thermal spacer clip system:
- .1 Thermal spacer:
  - .1 Thermal spacer clip system with thermal break material, as designed by third party Professional Engineer.
  - .2 Thermal spacer clips manufactured by Advanced Architectural Products, Cascadia Windows & Doors, Engineered Assemblies, Northern Facades Ltd or Soprema.
- .2 Fasteners for spacers and attachment to back-up construction: Corrosion resistant, types as recommended by thermal spacer manufacturer.

.6 Fasteners: 8 mm diameter blind weld nuts cast into panels, galvanized steel hook clips bolted to panels.

.7 Joint backing: Product as recommended by sealant manufacturer.

.8 Panel sealant: ASTM C920, Type S, Grade NS; One-part, neutral cure silicone sealant, 'Dowsil 795' by Dow Consumer Solutions or Spectrem 2 by Tremco Ltd. Colour: To match panels.

.9 Metal flashing: In accordance with Section 07 62 00.

3 Execution

3.1 EXAMINATION

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 STRUCTURAL FRAMING

.1 Supply and install miscellaneous, additional structural framing members, required to complete panel system, where not indicated on Contract Drawings.

3.3 THERMAL SPACERS, GIRTS AND CHANNELS

.1 Thermal spacers, girts, and channels:
- .1 Install thermal spacer in accordance with reviewed shop drawings and manufacturer's written instructions.
- .2 Pre-drill concrete or concrete masonry unit substrate to 13 mm deeper than anticipated embedment depth of fastener into substrate.
- .3 Confirm thermal clip accommodates orientation of vertical and horizontal sub-framing.
- .4 Clip thermal spacer to sub-framing and fasten clip and sub-framing to back-up structure, fastening through thermal spacer clip and into structure.
- .5 Position sub-framing directly over thermal spacer before installation of fasteners.

.6 Completely install spacers, screws and sub-framing, prior to installing insulation.

.7 Install C channels to frame openings such as doors, windows, and louvre openings, and orient channel webs to form heads, jambs and sills of openings.

3.4 FIBRE CEMENT PANELS

.1 Install fibre cement panels in accordance with reviewed shop drawings and manufacturer's written instructions.

.2 Erect fibre cement panels in straight lines, true, level and plumb. All vertical and horizontal panel joints shall be supported continuously by a framing member.

.3 Use abrasive carborundum saw blades and carbide tipped masonry drills for making modifications to panels on site. Paint all exposed cut edges.

.4 Cut and flash wall penetrations with metal flashing.

3.5 JOINT BACKING AND SEALANT

.1 Prepare substrate surface and mask as recommended by sealant manufacturer.

.2 Install joint backing and sealant at panel system joints and perimeter for weathertight installation. Tool sealant to concave profile.

3.6 TOUCH UP

.1 Touch up marred surfaces with air dry formulation to match pre-finished panels if approved by Consultant, otherwise remove and replace damaged metal panel.

.2 Clean and touch up marred galvanized surfaces after installation, with zinc rich primer.

END OF SECTION

1.0 GENERAL

1.1 Section Includes

.1 Provide the necessary labour and materials to remove and replace the complete roofing system, sheet metal flashings, and wood blocking down to the structural deck.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3 Canadian Roofing Contractors Association (CRCA) Roofing Practices Manual

.4	CGSB 37-GP-56M	Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing (Withdrawn)
.5	ASTM D6162/D6162M	Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements
.6	ASTM D6164/D6164M	Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements
.7	CAN/CGSB-51.33	Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction (Withdrawn)
.8	CSA B111	Wire Nails, Spikes and Staples (Withdrawn)
.9	CSA A231.1/A231.2	Precast Concrete Paving Slabs / Precast Concrete Pavers
.10	CAN/ULC-S770	Standard Test Method for Determination of Long-Term Thermal Resistance of Closed-Cell Thermal Insulating Foams
.11	CAN/ULC-S701.1	Standard for Thermal Insulation, Polystyrene Boards

.12	CAN/ULC-S704.1	Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced
.13	ASTM D5957	Standard Guide for Flood Testing Horizontal Waterproofing Installations
.14	ASTM D41/D41M	Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
.15	ASTM E108	Standard Test Methods for Fire Tests of Roof Coverings

1.3 Submittals

.1 Submit insurance confirming hot work and torching coverage.

.2 Submit product data on material characteristics, performance criteria, and limitations, for each product to be used.

.3 Submit certificate that installer is certified by membrane manufacturer for the methods specified.

.4 Submit written inspection report, if requested by Consultant, from the membrane manufacturer stating that materials used on site meet the specified criteria and are compatible with each other. Submit report to the Consultant within 48 hours of visit.

1.4 Quality Assurance

.1 **Contractor must be a member in good standing with the OIRCA.**

.2 Foreperson shall have minimum 10 years of experience in roofing industry.

.3 Use only Redseal trades people for roofing installation.

.4 Do work in accordance with applicable standard in CRCA Roofing Specifications Manual, except where specified otherwise.

.5 Membrane manufacturer representative to perform site visits as indicated below and submit a report to the Consultant within 3 days of the visit:

.1 First day of roofing work

.2 25% completion

.3 50% completion

.4 100% completion

1.5 Mock-Up

.1 Construct a minimum 10 sq. m mock-up of roof system in location acceptable to Consultant showing typical lap joint, gusset, corner, penetration, drain, parapet, and mechanical curb prior to installation of roofing system.

.2 Arrange for Consultant's review during construction of the mock-up a minimum of 48 hours in advance.

.3 Mock-up may remain as part of the Work if accepted by Consultant.

.4 Do not commence roof installation until Consultant has reviewed mock-up.

.5 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the Work of this Section.

1.6 Notification and Testing

.1 Notify Consultant at least 48 hours before commencement of any roofing work.

.2 Notify the Consultant each morning that work is occurring.

.3 Consultant reserves the right to have cut tests made to establish quality of work. Such tests shall be made in the presence of the Contractor. Cost of tests and subsequent repairs shall be borne by the Contractor.

.4 The review and testing service does not relieve the Contractor of their responsibility for quality control of production and for errors made by them.

1.7 Environmental and Safety Conditions

.1 Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Labour Canada.

.2 Roofing application shall not be carried out when materials are damp or when ambient temperatures are less than manufacturer's specifications.

.3 Be responsible for the safe disposal of all debris from the job site and in compliance with the Environmental Protection Act.

.4 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of products including special conditions governing use.

.5 Provide a minimum two-hour fire watch, including infrared thermography when torches are used; it shall include checking the roof's underside for smouldering (whenever possible), as well as the top side. Walk the day's entire production area to check for smoke and hot spots.

1.8 Delivery, Storage, and Handling

.1 Deliver and store all materials in their original packaging bearing the manufacturer's name, grade, weight, and applicable standards.

.2 Ensure shelf life of all materials has not elapsed.

.3 Store material in accordance with manufacturer's directions.

.4 Remove from site any material damaged or exposed to wet weather.

.5 Do not overload structure or adjacent structures, including suspended slabs.

.6 Store rolls on ends with selvage edge up, one pallet high only.

.7 Ensure all rolled base sheet membranes are maintained at a temperature between 10°C and 40°C prior to use.

.8 Store solvent based liquids, adhesives, and primers away from excessive heat and open flames and at temperatures between 15°C and 26°C.

.9 Metal Flashings and Trim

.1 Transport, handle, and store assembled units and/or their component parts in a manner to preclude damage of any nature.

.2 Stack preformed material in manner to prevent twisting, bending, and rubbing.

.3 Remove all units or components that are stained, watermarked, cracked, bent, chipped, scratched, or otherwise unsuitable for installation and replace with new.

.4 Protect finish and edges in accordance with manufacturer's directions.

.5 Prevent contact of dissimilar metals during storage and protect from acids, flux, and other corrosive materials and elements.

1.9 Warranty

.1 Contractor Warranty

.1 OIRCA Warranty: Remedy all material and workmanship defects in the modified bituminous membrane roofing system, including but not limited to roof assembly, membrane flashings, metal flashings, and sealants, that appear within two years from date of Substantial Performance of the Work.

.1 To be standard form of warranty issued on letterhead from Ontario Industrial Roofing Contractors Association (OIRCA).

.2 Provide extended warranty stating that all labour and material will be provided at no cost to Owner to remedy all material and workmanship defects in modified bituminous membrane roofing and related membrane flashings which appear within 20 years from the date of Substantial Performance of the Work. Defects include but are not limited to: ponding in excess of manufacturer limits unless otherwise noted (whichever is more stringent), blisters, ridges, open seams, fish mouths, excessive degranulation, any defect resulting in water penetration into the roof assembly or the interior. Contractor to provide for all field review required from manufacturer to supply above warranty.

.1 Warranty to be issued on letterhead by field membrane manufacturer listing Owner, Installer, and General Contractor. Warranty to be signed and sealed by an authorized signing officer.

.3 Make all necessary repairs and replacements within 48 hours of receipt of written notification.

.4 Nothing contained in this article shall be construed as in any way restricting or limiting the liability in common law and statutory liability of the Contractor.

2.0 PRODUCTS

2.1 Approved Roof Membrane Manufacturers

.1 Soprema

.2 Siplast

.3 Henry Company

2.2 Primers

.1 Asphalt Primer: To CGSB 37-GP-9Ma, VOC content as recommended by manufacturer.

.2 Primer for Reinforced Liquid Flashing Membrane: Translucent cloudy two-component polymethyl methacrylate-based (PMMA) primer. Acceptable products:

.1 ALSAN RS 276 by Soprema

.2 Pro Primer W by Siplast

.3 Approved alternative

2.3 Base Insulation

.1 Tapered Insulation

.1 Isocyanurate insulation to CAN/ULC-S704, thickness as indicated on Drawings, Type 2, Class 1**,** polymer bonded glass fibre, 20-psi compression to ASTM C1289 manufactured using HCFC-free blowing agents and integrally laminated to heavy, non-asphaltic, fiber reinforced, non-organic glass fibre facers. Maximum panel dimension shall be 1,219 mm (48”). Install in two layers minimum, with joints staggered 300 mm (12”) between layers. Acceptable Products:

.1 Sopra-Iso by Soprema

.2 AC Foam by Atlas Roofing Corp.

.3 IKOTherm by IKO Industries Ltd.

.2 Modules shall be factory-cut to correct slopes and clearly marked to match shop drawings.

.3 All valley corners shall be factory mitred.

2.4 Overlay/Recovery Board

.1 Recovery Board: Asphaltic core between asphalt saturated fibreglass facers to CAN/ULC-S706, Type 1, square edges,6.4 mm (1/4”) thick. Acceptable Products:

.1 Sopraboard by Soprema

.2 IKO Protectoboard

.3 IKO IKOTherm CoverShield

.4 Approved substitution

2.5 Modified Bitumen Membrane

.1 Two ply system made from prefabricated modified bitumen membranes containing minimum 11% of elastomer Styrene Butadiene Styrene (SBS) and reinforced with non-flammable, fireproof and stress-resistant insert of glass fibre and polyester composite.

.1 Cap Sheet and Cap Sheet Flashing/Stripping:

.1 Properties:

.1 Application: Torch Application.

.2 Type 1, Class A, Grade 2 material

.3 Reinforcing: Composite polyester/glass fibre mat

.4 Thickness: Minimum individual membrane thickness of 4.0 mm to CGSB 37-GP-56M.

.5 Bottom Surface: Thermofusible plastic film.

.6 Top Surface: Granulated.

.7 Colour: Selected by Owner.

.2 Acceptable Products:

.1 Sopraply Traffic Cap 560 by Soprema Inc.

.2 Approved alternative

.2 Base Sheet:

.1 Properties:

.1 Application: Torch Application.

.2 Type 2, Class C, Grade 2 material

.3 Reinforcing: Composite polyester/glass fibre mat

.4 Thickness: Minimum individual membrane thickness of 3.0 mm to CGSB 37-GP-56M.

.5 Bottom Surface: Polyethylene surfaced.

.6 Top Surface: Polyethylene.

.2 Acceptable Products:

.1 Sopraply Base 520 by Soprema Inc.

.2 Approved alternative

.3 Base Sheet Stripping: Self-adhesive, Type II in accordance with ASTM D6162, Class A in accordance with ASTM E108, Grade S in accordance with ASTM D6162 material, reinforced with composite polyester/glass fibre mat with a minimum individual membrane thickness of 3.0 mm to CGSB 37-GP-56M. Bottom surface to be silicone release film.

.1 Sopralene Flam Stick by Soprema Inc.

.2 Approved alternative

2.6 Reinforced Liquid Flashing Membrane

.1 Two-component polymethyl methacrylate-based (PMMA) liquid membrane combined with fleece fabric to form a reinforced membrane for flashings and parapets. Acceptable products:

.1 Alsan RS 230 Flash, by Soprema

.2 Parapro 123 Flashing System by Siplast

.3 Approved alternative

2.7 Fabric Reinforcement for Liquid Flashing Membrane

.1 Non-woven, needle-punched polyester fabric used as fabric reinforcement in liquid-applied membrane systems. Acceptable products:

.1 Alsan RS Fleece by Soprema

.2 Pro Fleece by Siplast

.3 Approved alternative

2.8 Drains

.1 Insert Drain: RD-4C Vandalproof Copper Roof Drain by Thaler or approved substitution.

2.9 Accessories

.1 Roofing Nails: To CSA B111, Table 12, of galvanized steel or aluminum, sufficient length to penetrate wood substrate at least 25 mm.

.2 Vent Stack Flashings: Spun aluminum sleeve to fit over vent stack. A spun aluminum cap to fit outside sleeve and inside vent stack. Cap shall not restrict vent stack's inside diameter. Acceptable products:

.1 Stack Jack Flashing by Thaler

.3 Metal Securing Strips: 25 mm wide, 0.67 mm galvanized steel or 1.5 mm aluminum, double hemmed, fastened at 200 mm (8") o.c., installed at all vertical or overhead terminations.

.4 Adjustable Paver Pedestals: Polyethylene with integral spacer ribs on upper surface. To include 6"x6" loose laid cap sheet below each pedestal

.1 Pedestals by BlackJack

.2 Pedestals by Pave-El

.5 Wire and Cable Flashing: Prefabricated, insulated, seamless spun aluminum

.1 Stack Jack Mechanical and Electrical Flahsings by Thaler

.6 Material Fasteners: Corrosion-resistant screws and hexagonal steel plates. Stainless steel, DT2000 coating by Leland or similar. HDPE, PVC, or Galvalume insulation plates.

.7 Self-adhesive flame screen membrane composed of glass mat reinforcing and SBS modified bitumen for joints in non-laminated asphalt overlay boards. Acceptable products:

.1 Sopraguard Tape by Soprema

.2 Approved Alternative

3.0 EXECUTION

3.1 Pre-Installation Meeting

.1 Convene one (1) week before commencing work of this Section.

3.2 Protection

.1 Dispose of rainwater away from face of building until drains or hoppers are installed and connected.

.2 Protect new and existing roofing from traffic and damage.

.3 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed work and materials out of storage.

.4 Seal and protect exposed edges.

3.3 Precautions

.1 Do not carry out roofing application when materials are damp, or when ambient temperatures are less than –15°C. Postpone roofing work when inclement weather appears imminent. Minimum temperature for solvent-based adhesive is –5°C.

.2 Apply each part of roofing system only when surfaces are clean and dry.

.3 Locate equipment and materials in areas designated by Consultant or Owner.

.4 Conduct operations to leave deck exposed for minimum period of time. Protect, as required, to prevent water infiltration or environmental damage to building interior.

.5 All aspects of roofing operation shall follow in close sequence. No part of the operation shall be far ahead of succeeding part such that the latter cannot be finished that working day.

.6 Erect and maintain safety fences around tall equipment and material. Kettles shall be attended at all times.

.7 Take precautions to minimize introduction of asphalt fumes to interior space. Coordinate with Owner to close air intakes where practical.

.8 Contractor is responsible for disconnection, relocation, and reinstallation of all existing mechanical and electrical services and equipment.

Ensure that Owner is aware of any such work that may impact the interior environment of the building, prior to disconnection or shut down.

.9 Disconnection and reconnection of all electrical services to meet latest regulations of Canadian Electrical Code and applicable Municipal and Provincial Codes and Regulations. In each and every instance of application, Code, Regulation, Statute, By-Law, or Specification, the most stringent requirements shall apply.

.10 Provide Owner with a schedule indicating time and dates for any work creating a disruption to interior environment and obtain Owner's written approval.

.11 All adjacent parts of the building shall be protected from damage caused by roofing operations. Cover walls and other surfaces in the vicinity of hoisting apparatus with heavy canvas or other suitable protective material. Any damage caused under this contract shall be repaired to match the original materials and appearance.

.12 Fire Extinguishers: Maintain at least one fully charged fire extinguisher with shutoff nozzle, ULC labelled for A, B, and C class per torch applicator, within 6 m of torch applicator. Strictly adhere to all safety guidelines for the torching of modified bituminous membrane.

.13 Any sharp projections that may penetrate the membrane, in the opinion of the Consultant, shall be grounded smooth and flush.

3.4 Substrate Preparation

.1 Roof deck and existing roof construction shall be structurally sound to provide support for new roof system. Notify Consultant of any rusted or deteriorated decking to determine method of treatment or replacement.

.2 Remove all existing membrane, flashings, cants, and wood blocking and sweep clean. Remove only amount of roofing and flashing that can be made watertight with new materials during the workday or before the onset of inclement weather.

.3 Substrate surface shall be firm and free from dust, loose material, excess moisture, and oil-based curing agents.

.4 Prepare substrate surface in accordance with membrane manufacturer's written instructions or this Specification, whichever is more stringent.

3.5 Primer Application

.1 Apply by brush or spray at rate designated by manufacturer.

3.6 Survey

.1 Survey roof deck during installation to locate low points not associated with drains and notify Consultant of findings.

3.7 Insulation Overlay Board Installation

.1 Install overlay over wood sheathing as detailed on Drawings.

.2 Secure board to wood sheathing with nails.

.3 Stagger all joints in boards. Secure to CSA 123.21.

.4 Seal all joints in accordance with manufacturer’s recommendations and flame stop all upturns and penetrations with fire tape membrane.

.5 Where non-laminated overlay board is used, seal all joints, penetrations and upturns in the asphalt board with screen tape as a flame stop.

3.8 Base Sheet Installation

.1 For Torch-Applied Base Sheet:

.1 Plan membrane application so that laps are not superimposed over laps of the underlying gypsum board. Mark a chalk line where first course is to start. Unroll 2.0 m to 3.0 m of membrane and line it up to chalk line or selvage edge. Reroll and commence application. If roll goes out of line by more than 12 mm, cut and realign.

.2 With a torch, adhere underside of membrane. Carefully heat underside of membrane and slowly unroll. Constantly check adhesion to ensure proper bonding is achieved.

.3 Side laps must cover selvage edge and be a minimum of 75 mm, end laps must be 150 mm.

.4 Using a torch and round nosed roofing trowel, embed surface granules (if present) into heated and soft bitumen, from chalk line to edge of base sheet at top of horizontal surface (minimum distance of 200 mm from edge of sheet).

3.9 Cap Sheet Installation

.1 For torch applied cap sheet:

.1 Plan membrane application so that laps are not superimposed over laps of base sheet. Mark a chalk line where first course is to start. Unroll 2.0 m to 3.0 m of membrane and line it up to chalk line or selvage edge. Reroll and commence application. If roll goes out of line by more than 12 mm, cut and realign.

.2 With a torch, adhere one-ply of membrane, granule side up. Carefully heat underside of membrane and slowly unroll. Constantly check adhesion to ensure proper bonding is achieved.

.3 Side laps shall cover selvage edge and be a minimum of 75 mm. End laps must be 150 mm.

.4 Using a torch and round nosed roofing trowel, embed surface granules into heated and soft bitumen, from chalk line to edge of cap sheet at top of horizontal surface (a minimum distance of 200 mm from edge of cap sheet).

3.10 Membrane Flashings and Sheet Stripping Installation

.1 Install flashing membrane in accordance with specific system requirements using longest pieces practical. Terminate flashing as shown on Drawings in accordance with manufacturer’s instructions.

.2 Plan for flashing membrane installation so laps are not superimposed over laps of underlying membrane.

.3 Extend flashing/stripping vertically a minimum of 200 mm beyond the horizontal field surface.

.4 Overlap base sheet flashing over horizontal field base sheet membrane a minimum of 100 mm.

.5 Overlap cap sheet flashing over horizontal field cap sheet membrane a minimum of 200 mm.

.6 Overlap flashing membrane side laps a minimum of 75 mm.

.7 Install reinforcing gussets at all inside and outside corners in accordance with manufacturer’s recommendations.

.8 Base sheet flashing/stripping shall be fully adhered over roof membrane and vertical surface in accordance with manufacturer's instructions. Cap sheet flashing shall be torched over base sheet membrane with specified overlap in accordance with manufacturer's instructions.

.9 Nail flashings to exterior face of parapet, mechanical curb, and wall at location and spacing shown on Drawings.

.10 Secure all membrane flashings to verticals with continuous securement strips installed along top edge of membrane flashings and fastened at 200 mm (8") o.c. Lap all strips to the selvage a minimum of 75 mm and seal laps securely.

.11 Embed granules for preparation of the salvage edges where membrane will overlap the mineral surface.

.12 Using a propane torch, heat back of flashing strip until coating flows and bonds to roof and up the vertical. Press in firmly for proper adhesion. Continue by bonding upper portion to wall, taking precautions not to stretch membrane.

.13 At all head laps, where "T" joints occur, cut corner of membrane to be overlapped, on a 45 degree angle. Apply manufacturer-approved mastic to cover granule portion at overlap areas and to fill step where membrane "T" overlaps.

3.11 Primer for Reinforced Liquid Applied Flashing Membrane Installation

.1 Mask off application area with masking tape.

.2 All wood and concrete surfaces to be primed.

.3 Comply with manufacturer's written application instructions for surface preparation and priming requirements.

.4 Thoroughly mix primer resin and catalyst components to manufacturer's written instructions. Add catalyst only to amount of material that can be used within 10 to 15 minutes.

.5 Apply resin to substrate using rollers, brushes, or notched squeegees for this purpose.

.6 Spread primer evenly to completely saturate substrate with a single application.

3.12 Reinforced Liquid Applied Membrane Flashing Installation

.1 Thoroughly mix resin and catalyst components to manufacturer's written instructions.

.2 Add catalyst only to amount of material that can be used within 10 to 15 minutes.

.3 Apply first layer of resin to substrate using rollers, brushes, or notched squeegees for this purpose in accordance with manufacturer's written coverage rate.

.4 Lay out and fully saturate polyester reinforcement on resin. Prevent the formation of wrinkles, swellings, or fish mouths and remove wrinkles and air bubbles under reinforcement.

.5 Apply second resin layer on top of reinforcement in accordance with manufacturer's written coverage rate.

.6 The final resin coating shall be smooth and even.

.7 Overlap each reinforcement sheet over previous sheets a minimum of 50 mm (2").

.8 Extend flashing 200 mm (8") onto horizontal field surface or as required by membrane manufacturer's written application instructions.

.9 Extend flashing vertically a minimum of 200 mm (8") beyond horizontal field surface.

.10 Extend liquid membrane a minimum of 6 mm (1/4") past edge of reinforcing fabric at end laps.

.11 Remove masking tape before membrane cures.

3.13 Vent Flashings Installation

.1 Install vent stack covers at all existing vent pipes. Extend existing vent pipes as required to a minimum height of 400 mm (16") above completed membrane surface. Provide sufficient allowance for pipe expansion or contraction.

.2 Prime vent stack flange, centre over existing vent stack, and set into heated base sheet membrane. Flash with one ply of base sheet membrane for reinforcement, to extend a minimum of 200 mm beyond flange. Complete installation with application of cap sheet membrane.

.3 Install batt insulation between vent stack and aluminum stack flashing.

.4 Caulk as detailed on Drawings.

.5 Secure vent caps with self-tapping screws.

3.14 Metal Flashings

.1 Refer to Section 07 62 00.

3.15 Roof Drains Installation

.1 Refer to and coordinate with Section 22 01 10.

.2 Ensure the integrity of the vapour barrier is maintained by sealing vapour barrier directly to the drain with sealant.

.3 Install roof drain flange on the base sheet.

.4 Trim roofing membrane and set clamping ring.

.5 Prime the drain flange and install a 1m x 1m reinforcing ply of base sheet flashing material centred over the drain and then complete the operation with the field cap sheet.

.6 Permanently plumb roof drains into existing plumbing in accordance with code and local standards, and without reducing flow capacity.

3.16 General

.1 Patch cap sheet membrane utilizing patches with a minimum size of 400 mm (16”) by 900 mm (3 ft.)

.2 Minimum length of cap sheet on flat run of roof shall not be less than 900 mm (3 ft.)

.3 Discard any cap sheet rolls with or deformed ends.

.4 Following completion of new roofing, **[**torch**]** soften and apply a liberal application of manufacturer-approved bulk type mineral granules to cap sheet membrane edges where asphalt has extruded or flowed beyond clean lines and to all surface damage.

.5 Remove splices in delivered rolls. Cut back the roll 400 mm (16”) on both sides of the splices.

3.17 Completion of Day's Work

.1 Install water cut-offs at end of each day's work. Construct water cut-off as a permanent insulation cell wall. Note location of each insulation cell on (as-built) record drawings. Where a day's work is more than 200 sq. m, construct additional cell walls in order to keep insulation cells to 200 sq. m maximum.

.2 Construct cell dividers using base sheet or vapour barrier.

.3 Do not incorporate temporary roofing membranes into main roof system. Remove all membranes utilized for this purpose and discard.

.4 Inspect all laps of membrane application to ensure they are properly bonded. Repair any deficiencies before leaving the site for the day.

.5 Leave no openings for water ingress into the roof assembly.

.6 Leave no base sheet exposed overnight unless all seams are sealed before leaving site.

.7 Progressively remove from the site all debris created by the execution of Work and dispose of at a certified disposal location. Contractor may be asked to produce proof of disposal location.

3.18 Field Quality Control

.1 Review and testing of membrane roofing and associated work will be done by an agency appointed and paid for by Owner. Notify Consultant at least 48 hours before commencement of any roofing work.

.2 Consultant may have cut tests made to establish quality of work. Such tests will be made in presence of Contractor. Cost of tests and subsequent repairs shall be borne by the Contractor.

.3 Notify Consultant in event that Specifications conflict with manufacturer's recommendations.

.4 Review and testing service does not relieve Contractor of responsibility for quality control.

END OF SECTION

1.0 GENERAL

1.1 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3 Canadian Roofing Contractors Association (CRCA) Roofing Practices Manual

.4 SMACNA Architectural Sheet Metal Manual

.5	ASTM A653/A653M	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
.6	ASTM B32	Standard Specification for Solder Metal
.7	CAN/CGSB 37.5	Cutback Asphalt Plastic Cement (Withdrawn)
.8	CSA B111	Wire Nails, Spikes and Staples (Withdrawn)
.9	AA Aluminum Standards and Data	
.10	AAMA 1402	Standard Specifications for Aluminum Siding, Soffit and Fascia
.11	CSSBI S8	Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products

1.2 Submittals

.1 Samples:

.1 Submit samples of each condition including cap flashing, upturn flashing, etc.

.2 Submit samples of each type of material and colour to be used.

.2 Product Data: Provide manufacturer's technical data for each type of material to be used.

1.3 Mock-Up

.1 Assemble a mock-up of each condition, including cross-cavity flashing, sill, head, cap, saddle, etc.) on site for Consultant review.

.2 Mock-up shall include all components of the system, including typical joints and connection hardware, and typical tie-ins to adjoining systems, all finished as specified.

.3 Modify mock-ups as Consultant may direct to meet specified requirements.

.4 Mock-up may not remain as part of the Work.

.5 Allow 24 hours for Consultant review of mock-up before proceeding with work.

1.4 Delivery, Storage, and Handling

.1 Do not expose stored products to wetting or damage. Store neatly and properly stacked.

.2 Transport, handle, and store products so as to prevent damage. Stack preformed products in manner to prevent twisting, bending, and rubbing.

.3 Remove all units or components that are stained, watermarked, cracked, bent, chipped, scratched, or otherwise unsuitable for installation and replace with new.

.4 Protect finish and edges in accordance with manufacturer’s directions.

.5 Store material in accordance with manufacturer’s directions.

.6 Prevent contact of dissimilar metals during storage and protect from acids, flux, and other corrosive materials and elements.

2.0 PRODUCTS

2.1 Sheet Metal Materials

.1 Carbon Steel:

.1 Z275 galvanized steel sheet to ASTM A653/A653M, commercial quality coating. Thickness: 24 gauge (0.6070 mm).

.2 Finish:

.1 Prefinished steel with factory applied silicone modified polyester on primer, both paint and primer back cured. Include paint system coating to reverse side of coil stock to prevent corrosion of backside surfaces and uniform colour.

.2 Performance Level: “CSSBI S8. Coating thickness not less than 25 µm ± 3 µm (1.0 mils ± 0.1 mils).

.3 Product: Perspectra Plus Series

.3 Colour: The Consultant will select colours from manufacturer’s standard colour range.

2.2 Accessories

.1 Plastic Cement: Cutback asphalt type, to CAN/CGSB 37.5.

.2 Sealants: In accordance with Section 07 92 00.

.3 Cleats and Starter Strips: Of same materials and temper as sheet metal, minimum 50 mm (2”) wide x thickness same as sheet metal being secured.

.4 Fasteners: Of same material as sheet metal, corrosion resistant, to CSA B111, flat head roofing nails of length and thickness suitable for metal flashing and trim application.

.5 Washers: Of same material as sheet metal, 1.0 mm thick with rubber packings.

.6 Solder: To ASTM B32, alloy composition 50% pig lead and 50% block tin.

.7 Flux: Commercial quality as recommended by sheet metal manufacturer.

.8 Touch-Up Paint: As recommended by prefinished material manufacturer.

2.3 Fabrication

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable SMACNA details and specifications.

.2 Form to maximum 2400 mm (8 ft.) lengths using one piece for each flashing section. Make allowance for expansion at joints.

.3 Hem exposed edges on underside 12 mm; mitre and seal corners with sealant.

.4 Form sections square, true, and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.5 Ends of thru-cavity flashing shall have 1/2" folded upturn, creating an end dam. Do not cut and caulk upturns.

.6 Form metal flashing on a bending brake with shaping trimmed. Perform hand seaming on a bench, as far as practicable, with proper sheet metal working tools. Make angles of bends and folds for interlocking metal with full regard to expansion and contraction to avoid buckling and damage to metal.

.7 Form flashings, copings, and fascia to profiles indicated on Drawings and as required to complement and finish membrane roofing and wall systems.

3.0 EXECUTION

3.1 Examination

.1 Examine surfaces to receive flashings. Notify the Consultant of surfaces that are considered unacceptable to receive work of this Section.

3.2 Preparation

.1 Protect work of other Sections from damage by work of this Section.

3.3 Installation - General

.1 Install sheet metal work in accordance with CRCA standards.

.2 Use concealed fastenings throughout, except where approved by the Consultant prior to the start of work.

.3 Counter-flash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flashing joints using standing seams forming tight fit over hook strips.

.4 Use flat-lock joints for all metal flashing except roof. S-pocket and standing seams are acceptable. Lock end joints and caulk with sealant.

3.4 Counter Flashings

.1 Install metal counter flashings as soon as possible after membrane flashings are in place and reviewed by Consultant.

.2 Counter flashing shall have crimped bottom edge, stiffening break, and extend at least 400 mm (16”) up verticals or as detailed on Drawings and extend down to horizontal plane of roof surface.

.3 Where detailed on Drawings, turn top edge of flashing into walls, secure with lead wedge or friction fit pins into reglet, and caulk at joint to wall.

.4 Secure sections in S-pocket joints and allow sufficient tolerance for expansion and contraction between each piece.

.5 Secure metal counter flashing a minimum of 300 mm (12”) above roof membrane. Use fasteners of sufficient length to penetrate at least 25 mm (1”) into substrate.

3.5 Cap Flashings

.1 Supply and install continuous metal starter strips, secure at 600 mm o.c. (24” o.c.), maximum of 50 mm above drip edge, with fastener of sufficient length to penetrate a minimum of 25 mm (1”) into substrate.

.2 Supply and install metal cleats at 600 mm o.c. (24” o.c.) and as detailed. Use fastener of sufficient length to penetrate a minimum of 25 mm (1”) into substrate.

.3 Form cap flashings to profiles shown on Drawings and ensure positive drainage to interior roof surface areas.

3.6 Touch-Up and Cleaning

.1 Remove grime and dirt from flashing materials by dry wiping as material is erected.

.2 Remove all excess solder. Remove excess sealant with sealant manufacturer recommended solvent that will not harm finish.

.3 Wipe off all handprints, smudges, and other superficial stains.

.4 Remove and replace all dented and damaged materials.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for intumescent fireproofing work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM D2240, Standard Test Method for Rubber Property - Durometer Hardness.

.2 ASTM D4541, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

.3 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.

.4 ASTM E761, Standard test method for Compressive Strength of Sprayed Fire-Resistive Materials Applied to Structural Members.

.5 AWCI, Association of the Wall and Ceiling Industries - International.

.6 AWCI Technical Manual 12-B, Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire-Resistive Materials; an Annotated Guide.

.7 SSPC SP6, Commercial Blast Cleaning.

.8 Technical Manual 12-B, 'Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire-Resistive Materials by Association of the Wall and Ceiling Industry (AWCI)

.9 ULC, Underwriter's Laboratories of Canada.

1.3 **SYSTEM DESCRIPTION**

.1 Provide intumescent fireproofing to provide a fire resistance rating of 60 minutes for structural steel items as indicated on drawings and as required to meet requirements of authorities having jurisdiction.

1.4 **SUBMITTALS**

.1 Product data:
  .1 Submit duplicate copies of manufacturer's Product data for each material used in accordance with Section 01 33 00 indicating:
    .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, and limitations.
    .2 Product transportation, storage, handling and installation requirements.

.2 Samples:
.1 Submit following samples in accordance with Section 01 33 00.
.1 Two 150 x 300 mm samples of intumescent fireproofing applied to 3 mm steel plate cut back to show primer, intumescent coating and topcoat demonstrating colour and finish for Consultant approval. Samples to demonstrate smooth finishes available for exposed areas.

.3 Certificates: Submit ULC certification for designs of fire resistive coating application to substrate materials required and test reports showing compliance with specified physical performance characteristics and physical properties.

1.5 QUALITY ASSURANCE

.1 Installers qualifications:
.1 Perform work of this Section by a company that has a minimum of five years proven experience in the installation of intumescent fireproof coatings on project of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.

.2 Inspection and Testing:
.1 An independent testing laboratory/company may be selected by the Consultant to test random samples as applied, to verify thickness of thin-film intumescent fire-resistive coating in accordance with AWCI Technical Manual 12-B. Inspection shall be carried out prior to application of topcoat.
.2 Correct deficiencies and have such corrected work approved by Inspection/Testing Company before work is continued.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Ship, store and deliver at temperatures not less than 50°F (10°C); protect from freezing.

.2 Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

1.7 SITE CONDITIONS

.1 Do not install work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
.1 Ambient air and surface temperature: 10^0C minimum.
.2 Precipitation: None.
.3 Relative Humidity: 40-60%.

.2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 24 hours before, during, and 24 hours after installation.

2 Products

2.1 **MATERIALS**

.1 All materials under work of this Section, including but not limited to, coatings are to have low VOC content limits.

.2 Intumescent fireproofing system: 'A/D Firefilm III System' by A/D Fire Protection Systems, 'Sprayfilm' by Cafco or approved equal by StonCor, consisting of the following components.

.1 Primer: Recommended by manufacturer for substrate being fireproofed.

.2 Intumescent coating: A/D Firefilm III, conforming to:

.1 Hardness (Shore "D"): Durometer D65-70 in accordance with ASTM D2240.

.2 Surface Burning Characteristics: Class "A", in accordance with ASTM E84.

.3 Density 1425 kg/m^2.

.4 Bond strength: 861 kPa in accordance with ASTM D4541.

.5 Compressive strength: 5.2 MPa at 10 % deformation, in accordance with ASTM E761.

.3 Top coat: A/D TC-55 Sealer, colour as selected by the Consultant, to have smoothest possible finish and to match Consultant approved samples.

2.2 **MIXES**

.1 Mix intumescent fireproof coating components in accordance with manufacturer's written instructions.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Verify that all clips, hangers, sleeves and similar devices have been attached. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **PREPARATION**

.1 Protect work of other trades against overspray and make good at own expense any such damage. Provide adequate covering by drop cloths, masting or tarpaulins to surfaces, or on fitments in contact with, or adjacent to, surfaces to be fireproofed.

.2 Clean surfaces, to be fireproofed, free of dust, grease, oils, etc. in accordance with manufacturer's recommendations. Ensure surfaces are free of any extraneous matter which could be detrimental to a satisfactory and acceptable finish.

.3 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, projections and any other foreign matter detrimental to performance. Obtain manufacturer's approval of substrate in writing, submit copy to Consultant.

.4 Prime surfaces to be fireproofed with specified primer in accordance with manufacturer's recommendations.

.5 Inspect primed surfaces to be fireproofed for gouges, marks, pinholes, nibs, etc. Properly prepare same by patching, filling, smoothing or any other surface preparation necessary to ensure a satisfactory surface finish.

.6 Ensure written confirmation is received from steel fabricators of the specific surface preparation procedures and primers used for the application of fireproofing materials to ascertain compatibility with work of this Section:

.1 Verify that substrate surfaces are ready to receive work. Commercial blast cleaning (SSPC SP6) is required for minimum surface preparation. Weld flashes should be ground smooth prior to commencement of application. Select primer from manufacturer's list of approved primers.

3.3 APPLICATION

.1 Install intumescent fireproofing in accordance with manufacturer's written instructions.

.2 Install intumescent fireproofing at the proper consistency to ensure a satisfactory surface finish.

.3 Use-up materials within shelf life period recommended by manufacturer.

.4 Ensure finished work is uniform as to sheen, gloss, colour, and texture.

.5 Patching: Patch and repair any fire resistive coating that has been damaged in accordance with patching recommendations of material manufacturer. If coating becomes damaged, rebuild thickness by spray or brush. Fill small areas with trowel. When dry, smooth and finish to match adjacent surfaces.

3.4 FIELD QUALITY CONTROL

.1 Perform field tests as required by Authorities having Jurisdiction. Tests to be carried out as outlined in Technical Manual 12-B by AWCI.

3.5 CLEANING

.1 Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions. Remove and legally dispose of construction debris.

.2 Work will not be considered complete until all spatters, drippings, smears and overspray have been cleaned and removed to the satisfaction of Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for firestopping and smoke seals work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM C303, Standard Test Method for Dimensions and Density of Preformed Block and Board–Type Thermal Insulation.

.2 ASTM C920, Standard Specification for Elastomeric Joint Sealants.

.3 ASTM C1104, Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.

.4 ASTM E814, Test Method for Fire Tests of Through-Penetration Fire Stops.

.5 ASTM E2174, Standard Practice for On-Site Inspection of Installed Fire Stops.

.6 CAN/ULC S102, Surface Burning Characteristics of Building Materials and Assemblies.

.7 CAN/ULC S114, Standard Method of Test for Determination of Non-Combustibility in Building Materials.

.8 CAN/ULC S115, Standard Method of Fire Tests of Firestop Systems.

.9 CAN/ULC S129, Standard Method Of Test For Smoulder Resistance Of Insulation (Basket Method).

.10 CAN/ULC S702, Thermal Insulation, Mineral Fibre for Buildings.

1.3 **DEFINITIONS**

.1 Fire Separation: A construction assembly, plane or device, either vertical or horizontal, which is required to prevent the passage of fire and smoke for a prescribed period of time. Proof of compliance to required time rating shall be by ULC, Warnock Hersey (or similar approved) certification or shall be as listed in the Ontario Building Code Supplementary Standard SB-2.

.2 Smoke Separation: A construction assembly, plane or device, either vertical or horizontal, which is not required to prevent the passage of fire for a prescribed period of time but is required to prevent the passage of smoke. A "Smoke Separation" is also known as a "Fire Separation with No Rating" or a "Zero Hour Rated Separation".

.3 Non-Rated Separation: A construction assembly, plane or device, either vertical or horizontal, which is not required to prevent the passage of fire for a prescribed period of time and is not required to prevent the passage of smoke.

1.4 **SYSTEM DESCRIPTION**

.1 Firestopping and smoke seals: ULC or Intertek Testing Services listed Products and systems in accordance with CAN/ULC S115 suitable to actual application and installation conditions.

.2 Firestop applications that exist for which no ULC or cUL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar ULC or cUL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council.

.3 Firestop and smoke seal system shall achieve a fire resistance rating and smoke seal rating equal to that of assemblies into which they are installed.

.4 Provide smoke sealants over firestopping materials or combination smoke seal/firestop seal material to form air tight barriers to retard the passage of gas and smoke.

.5 Firestopping and smoke seals located at movement joints shall be designed with movement capability.

.6 Firestopping and smoke seals are to be installed by one installer/trade only.

1.5 **SUBMITTALS**

.1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
  - .1 Performance criteria, compliance with appropriate cUL or ULC reference standard, characteristics, limitations.
  - .2 Product transportation, storage, handling and installation requirements.
  - .3 Submit firestop and smoke seal manufacturer's Product data for materials and prefabricated devices, including manufacturer's printed installation instructions.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 33 00 indicating:
  - .1 Fire rated and smoke sealed systems for each typical application.
  - .2 Construction details, accurately reflecting actual job conditions.
  - .3 ULC or Intertek Testing assembly listing.
  - .4 Each floor and wall assembly requiring firestop system with each corresponding ULC firestop system.

.3 Certification:
.1 Submit certified documentation from manufacturer for each worker performing work of this Section.
.2 Submit installer's and Product manufacturer's certification verifying compliance with the Contract Documents and conformance with ASTM E814 and CAN/ULC S115.

1.6 **QUALITY ASSURANCE**

.1 Source limitations: All firestopping materials shall be from a single manufacturer.

.2 Installers qualifications and requirements:
.1 Perform work of this Section by a company that has a minimum of five years proven experience in the installation of firestopping and smoke seal work of a similar size and nature and that is approved by manufacturer.
.2 Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.
.3 All firestopping work shall be performed by a single Subcontractor.

.3 Manufacturer's direct representative and/or fire protection specialist shall be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures conforming to manufacturer's written recommendations published in their literature and drawing details.

.4 Pre-construction meetings: Arrange with manufacturer's representative, Contractor, Consultant and Field Engineer to determine responsibility for handling such issues as FT rated partitions, firestop custom details, compatibility, mixed penetrations, and to review installation procedures 48 hours in advance of installation.

1.7 **DELIVERY STORAGE AND HANDLING**

.1 Deliver materials to Place of Work in manufacturer's unopened containers, containing classification label with labels intact and legible at time of use.

.2 Do not use damaged or adulterated materials exceeding their expiry date.

1.8 **SITE CONDITIONS**

.1 Conform to manufacturer's requirements and maintain a minimum temperature of 5^0 C for a minimum period of 24 h before application, during, and until application is fully cured.

.2 Maintain sealant at a minimum 18° C for best workability.

2 Products

2.1 ACCEPTABLE MANUFACTURERS

.1 All firestopping and smoke seal systems are to be provided by a single manufacturer to ensure a single source of responsibility for the work of this Section.

.2 Acceptable manufacturers of rated systems include:
- .1 3M
- .2 Hilti Canada Corporation.
- .3 Specified Technologies Inc. (STI Firestop)
- .4 Tremco Ltd.

2.2 GENERAL SYSTEM REQUIREMENTS

.1 All materials under work of this Section, including but not limited to, primers and sealants are to have low VOC content limits.

.2 Do not use Products containing asbestos.

.3 Firestopping components shall not contain volatile solvents or require special application to protect plastic pipe from firestopping compound.

.4 Provide smoke seal sealant in following colours:
- .1 Grey or white in finished areas.
- .2 Red in unfinished areas.

.5 Smoke sealant for overhead and vertical joints for floor to be self-levelling and non-sagging sealant.

.6 Smoke sealant at vertical through penetrations in areas with floor drains shall be waterproof type.

2.3 MATERIALS

.1 General:
- .1 Following materials have been provided for convenience. Contractor shall provide complete system with all components and accessories as required for fire resistant and smoke seal installation.
- .2 All firestopping shall be from a single manufacturer.

.2 Firestop sealant: single component, low modulus, silicone rubber, moisture curing sealant to ASTM C920, ULC labelled to CAN/ULC S115.

.3 Pre-Installed firestop devices for use with non-combustible and combustible pipes, conduit and/or cable bundles penetrating concrete floors and walls.
- .1 Cast-in place firestop device complete with aerator adaptor when used in conjunction with aerator system. Model CP 680-P by Hilti or approved equal.
- .2 Cast-in place firestop device for use with noncombustible penetrants. Model CP 680-M by Hilti or approved equal.
- .3 Speed sleeve for use with cable penetrations. Model CP 653 by Hilti or approved equal.
- .4 Firestop block. Model CFS-BL by Hilti or approved equal.

.4 Re-penetrable, round cable management devices for use with new or existing cable bundles penetrating walls:
- .1 Speed sleeve with integrated smoke seal fabric membrane. Model CP 653 by Hilti or approved equal.
- .2 Firestop Sleeve. Model CFS-SL SK by Hilti or approved equal.
- .3 Retrofit sleeve for use with existing cable bundles. Model CFS-SL RK by Hilti or approved equal.
- .4 Gangplate for use with multiple cable management devices. Model CFS-SL GP by Hilti or approved equal.
- .5 Gangplate Cap for use at blank openings in gangplate for future penetrations. Model CFS-SL GP CAP by Hilti or approved equal.

.5 Firestop insulation: to CAN/ULC S702, Type 2; mineral fibre manufactured from rock or slag, suitable for manual application.
- .1 Density: Minimum 64 kg/m^3 when tested to ASTM C303.
- .2 Combustibility: Noncombustible to CAN/ULC S114.
- .3 Melt temperature: >1175 degrees C.
- .4 Surface burning characteristics: to CAN/ULC S102, maximum flame spread of 0, smoke developed of 0.
- .5 Moisture Absorption: 0.04 percent when tested to ASTM C1104.
- .6 Smoulder Resistance: 0.01 percent when tested to CAN/ULC S129.

.6 Damming, back-up, supports, and anchorage: In accordance with manufacturer's fire rated systems and to acceptance of authorities having jurisdiction.

.7 Primer: As recommended by firestopping sealant manufacturer.

3 Execution

3.1 EXAMINATION

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

.2 Verify that substrates and surfaces to receive firestopping and smoke seals are clean, dry, and frost free.

3.2 **PREPARATION**

.1 Prepare, modify, and adjust void sizes, proportions, and conditions to conform to fire rated and smoke sealed assembly requirements such as assembly opening size and dimensional restrictions.

.2 Clean surfaces to remove material detrimental to bond including dust, paint, rust, oil, grease, moisture, frost and other foreign matter to manufacturers recommendations.

.3 Mask adjacent surfaces to avoid spillage and over-coating of adjacent surfaces. Remove stains from adjacent surfaces.

3.3 **INSTALLATION**

.1 Install firestopping and smoke seal systems in accordance with reviewed Shop Drawings, manufacturer's instructions and fire rated assembly to establish continuity and integrity of fire separations.

.2 Install firestop insulation in compacted thicknesses required by ULC design. Compress insulation approximately 50 percent.

.3 Install primers as recommended by firestop and smoke seal Product manufacturers.

.4 Install temporary forming, damming, back-up as required, remove after materials have achieved initial cure and will resist displacement.

.5 Install firestop and smoke seal filler in horizontal joints providing 25% compression fit.

.6 Use resilient, elastomeric firestopping and smoke seal systems in following locations:
- .1 Openings and sleeves for future use.
- .2 Penetration systems subject to vibration or thermal movement.
- .3 Penetration systems in acoustical containment enclosures.

.7 Trowel and tool exposed firestop and smoke seal. Product surfaces to uniform, smooth finish.

.8 Seal joints to ensure an air and water resistant seal capable of withstanding compressions and extensions due to thermal wind or seismic joint movement.

.9 Taped joints will not be acceptable.

.10 Repair damaged firestopped and smoke sealed surfaces to acceptance of Consultant.

.11 Identify each firestop and smoke seal penetration assembly with permanent label listing following:
- .1 Assembly and rating in hours.
- .2 Date of installation.

.3 Installing company's name and telephone number.

.12 Do not cover materials until full cure has taken place.

3.4 INSPECTION AND TESTING

.1 Inspection of through-penetration firestopping shall be performed in accordance with ASTM E2174 to ensure that firestopping and smoke seals have been installed in accordance with Contract documents and to tested and listed firestop system.

3.5 CLEAN-UP

.1 Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

.2 Remove excess materials and debris immediately after application.

3.6 SCHEDULE OF FIRESTOP AND SMOKE SEAL LOCATIONS

.1 Following firestop and smoke seal location schedule is included for convenience and may not be complete. Examine Contract Drawings and other specification sections and determine entire extent of work of this Section. Generally provide systems with required fire and smoke ratings at following locations:

.1 Gaps at intersections of fire-resistance rated walls and partitions.
.2 Control and sway joints in fire-resistance rated walls and partitions.
.3 Gaps at top of fire-resistance rated partitions and walls.
.4 Penetrations through fire-resistance rated walls and partitions including but not limited to mechanical and electrical services and openings and sleeves for future use, and all electrical and junction/outlet-box type penetrations.
.5 Penetrations through fire-resistance rated floor slabs, ceilings, and roofs.
.6 Gaps at edge of floor slabs at exterior walls.
.7 Perimeter of retaining angles on rigid ducts greater than 0.012 m^2, firestopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.
.8 Where indicated on drawings.
.9 At non-rated assemblies that require a smoke seal.
.10 Where required by Ontario Building Code.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for sealant work in accordance with the Contract Documents.

.2 Work of this Section shall include the removal of existing sealant and installation of new sealant where indicated.

.3 Work of this Section does not include sealants in firestopping and smoke sealed assemblies.

.4 Work of this Section does not include sealant work identified in individual specification sections.

1.2 **REFERENCES**

.1 ASTM C834, Specification for Latex Sealants.

.2 ASTM C920, Specification for Elastomeric Joint Sealants.

.3 ASTM C1330, Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

1.3 **SUBMITTALS**

.1 Product data: Submit copies of Product data in accordance with Section 01 33 00 describing type, composition and recommendations or directions for surface preparation, material preparation and material installation.

.2 Samples:
.1 Submit following samples in accordance with Section 01 33 00:
.1 Two samples of sealant/caulking, for colour selection.
.2 Two samples of back-up material and primer for physical characteristics.

.3 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.

1.4 **QUALITY ASSURANCE**

.1 Qualifications: Work of this Section shall be executed by trained applicators approved by sealant manufacturer and having a minimum of 5 years proven experience.

.2 Pre-installation meetings: Arrange with manufacturer's representative and Consultant to inspect substrates, and to review installation procedures 48 hours in advance of installation.

1.5 **SITE CONDITIONS**

.1 Do not install materials when ambient air temperature is less than 5 °C, when recesses are wet or damp, or to manufacturer's recommendations.

1.6 **DELIVERY, STORAGE AND HANDLING**

.1 Arrange delivery of materials in original, unopened packages with labels intact, including batch number, and ensure that on-site storage is kept to a minimum. Do not store materials on site where there exists any danger of damage from moisture, direct sunlight, freezing and other contaminants.

1.7 **EXTENDED WARRANTY**

.1 Submit an extended warranty for Sealant work in accordance with General Conditions, except that warranty period is extended to 2 years from date of Ready-for-Takever.
- .1 Warrant against leakage, cracking, crumbling, melting, shrinkage, running, loss of adhesion and staining adjacent surfaces.
- .2 Coverage: Complete replacement including affected adjacent work.

2 Products

2.1 **MATERIALS**

.1 General:
- .1 All materials under work of this Section, including but not limited to, primers and sealants are to have low VOC content limits.
- .2 Use materials as received from manufacturers, without additives or adulterations. Use one manufacturer's Product for each kind of Product specified.

.2 Sealant **Type A**: ASTM C920, Type S, Grade NS, Class 35; One-part, non-sag type, silicone sealant, in standard colours selected.
- .1 ‘Dowsil CWS’ by Dow Consumer Solutions.
- .2 ‘Sikasil WS-305 CN' by Sika.
- .3 ‘Tremsil 400' by Tremco.

.3 Sealant **Type B**: ASTM C920, Type S, Grade NS; One-part mildew-resistant silicone, in standard colours selected.
- .1 ‘Dowsil 786 Mildew Resistant Silicone Sealant’ by Dow Consumer Solutions.
- .2 ‘Sikasil GP Mildew Resistant' by Sika.
- .3 ‘Tremsil 200 Silicone Sealant’ by Tremco Ltd.

.4 Sealant **Type C**: ASTM C920, Type M, Grade P, Class 25; Multi-component polyurethane-base, elastomeric sealant with self levelling properties, in standard colours selected.
.1 'Sikaflex 2c SL ' by Sika, or approved equal.

.5 Sealant **Type D**: ASTM C834; Pure acrylic siliconized sealant; in standard white colour (paintable).
.1 '950A Siliconized Acrylic Latex Caulk' by Sherwin Williams.
.2 'Tremflex 834 Silconized Sealant' by Tremco Ltd.

2.2 **ACCESSORIES**

.1 Primers: Type recommended by material manufacturers for various substrates, primers to prevent staining of adjacent surfaces encountered on project.

.2 Joint backing: ASTM C1330; Round, solid section, closed cell, skinned surface, soft polyethylene foam gasket stock, compatible with primer and sealant materials, 30 to 50% oversized, Shore A hardness of 20, tensile strength 140 to 200 kPa. Bond breaker type surface.

.3 Bond breaker: Type recommended by material manufacturers.

.4 Void filler around the window frames to be one part expanding polyurethane foam.

.5 Cleaning agents: As recommended by material manufacturer, non-staining, harmless to substrates and adjacent finished surfaces.

2.3 **MIXING**

.1 Follow manufacturers instructions on mixing, shelf and pot life.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **INSPECTION**

.1 Verify that joint sealants, backing, and other materials containing hazardous materials have been removed.

.2 Verify that joint substrates and adjoining materials are structurally sound.

.3 Verify that joints to be renovated can be satisfactorily repaired with the specified methods and materials.

3.3 **PREPARATION**

.1 Sealant replacement work:
- .1 Remove all existing sealant, loose rust and mill scale by hand cutting, power grinding or wire brushing. Completely remove sealant build up in all joints. Remove any loose particles by blowing joint out with compressed air.
- .2 Clean substrate surfaces so that they are free from caulking, dust, grease, soiling, or extraneous matter, which are detrimental to the adhesion of the sealant.
- .3 Chemically clean all non-porous surfaces, such as aluminum and glass, by solvent wipe and drying with a clean cloth.
- .4 Patch, repair, and smooth minor substrate defects and deficiencies. Clean porous surfaces such as masonry and concrete by mechanical abrading.
- .5 Where existing fasteners are loose, tighten or replace as required.
- .6 Substrate moisture tests:
  - .1 Test for moisture content over areas where sealant is to be applied.
  - .2 If any test registers above 10% allow entire substrate surfaces, within the plane, to dry further before sealant system application. Install temporary drying fans if necessary.
  - .3 After drying of the substrate, re-test employing same criteria.
- .7 Mildew removal: Scrub with solution of TSP and rinse with water, and allow to dry completely.

.2 New sealant work:
- .1 Prepare joints to receive sealants to manufacturer's instructions. Ensure that joints are clean and dry and ferrous surfaces are free from rust and oil.
- .2 Clean recesses to receive sealant, to be free of dirt, dust, loose material, oil, grease, form release agents and other substances detrimental to sealant's performance.
  - .1 Remove lacquer or other protective coatings from metal surfaces, without damaging metal finish, using oil-free solvents. Remove rust, mill scale and coatings from ferrous metals by wire brush, grinding or sand blasting.
  - .2 Ensure recess is dry.
  - .3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings. Remove incompatible coatings as required.

.3 Ensure that all materials in contact with sealant are compatible. Test substrate for adhesion.

.4 Depth of recess: Maintain depth to ½ joint width up to a maximum of 13 mm and not less than 6 mm at centre of joint. For greater depth, use joint backing under. Where recess is less than specified depth, cut back surface of recess to specified recess depth.

.5 Install polyethylene backing rod in joints 6 mm or more in width. Roll backing rod into joint. Do not stretch or bend backing rod. Install bond breaker to back of recess.

.6 Prime sides of recess, in accordance with sealant manufacturer's instructions.

.7 Prime all surfaces to ensure proper bond to tile, to eliminate potential staining of porous surfaces, and as required by sealant manufacturer.

.8 Condition products for use in accordance with manufacturer's recommendations.

3.4 INSTALLATION

.1 Apply sealant immediately after adjoining work is in condition to receive such work. Apply sealant in continuous bead using gun with correctly sized nozzle. Use sufficient pressure to evenly fill joint.

.2 Ensure sealant has full uniform contact with, and adhesion to, side surfaces of recess. Superficial painting with skin bead is not acceptable. Tool sealant to smooth surface, free from ridges, wrinkles, sags, air pockets, embedded impurities, dirt, stains or other defects.
- .1 At recesses in angular surfaces, finish sealant with flat profile, flush with face of material at each side.
- .2 At recesses in flush surfaces, finish compound with concave face, flush with face of material at each side.

.3 Make sealant bead uniform in colour.

.4 Cure sealants in accordance with sealant manufacturer's instructions. Do not cover up sealants until proper curing has taken place.

.5 Immediately remove excess compound or droppings which would set up or become difficult to remove from adjacent finished surfaces, using recommended cleaners, as work progresses. Do not use scrapers, chemicals or other tools which could damage finished surfaces. Remove defective sealant.

.6 Clean recesses and re-apply sealant.

.7 Remove masking tape immediately after joints have been sealed and tooled.

3.5 CLEANING

.1 Clean surfaces adjacent to joints, remove sealant smears or other soiling resulting from application of sealants. At metal surfaces, remove residue. Do not mar or damage finishes on materials adjacent to joints. Repair or replace marred or damaged materials.

3.6 SCHEDULE OF LOCATIONS

.1 Following sealant location schedule is included for convenience and may not be complete. Examine Contract Drawings and other specification sections and determine entire extent of work of this Section. Generally seal following locations:
- .1 Concrete, masonry, wood and stone to metal.
- .2 Wood to masonry, concrete and stone.

.3 Metal to metal.
.4 All dissimilar materials.
.5 Where ‘sealant’ or ‘caulking’ in indicated on drawings.

.2 Sealant **Type A**:
.1 Exterior joints between masonry and steel or aluminum.
.2 Exterior joints between masonry and shelf angle.
.3 Exterior joints between steel or aluminum and concrete or masonry.
.4 Interior and exterior control joints, except in floors.
.5 Door frames, interior and exterior side.
.6 Protrusions through interior and exterior walls and floors, interior and exterior side, except where fire rated seals are required.
.7 Seal thresholds.

.3 Sealant **Type B:**
.1 Control joints in vertical tiled areas.
.2 Between vanity and tile.
.3 Between vanity and mechanical fixtures/fittings.
.4 Between access panels and tile.
.5 Between tiles and adjacent materials.

.4 Sealant **Type C:**
.1 Control joints in horizontal tiled areas.

.5 Sealant **Type D:**
.1 Perimeter of millwork counters.
.2 Perimeter of interior windows.
.3 Perimeter of firehose cabinets.
.4 Junction between drywall and masonry.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for hollow metal door, frame and screen (HM) work in accordance with the Contract Documents.

1.2 **REFERENCES**

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

.2 ASTM A924/A924M, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.3 CAN4/ULC-S104M, Standard Method for Fire Test of Door Assemblies.

.4 CAN4/ULC-S105M, Standard Specification for Fire Door Frames, Meeting the Performance Required by CAN4/ULC-S104M.

.5 CAN/CGSB-1.198, Cementitious Primer, (for Galvanized Surfaces).

.6 CAN/ULC-S702, Thermal Insulation, Mineral Fibre for Buildings.

.7 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.8 CSA W59-M, Welded Steel Construction (Metal Arc Welding).

.9 CSDMA, Canadian Steel Door Manufacturers Association.

.10 NFPA 80, Standard for Fire Doors and Other Opening Protectives.

1.3 **SUBMITTALS**

.1 Product data: Submit manufacturer's Product data in accordance with Section 01 33 00 indicating door and frame construction.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 33 00 for each type of door and frame indicating:
  - .1 Thickness and type of steel.
  - .2 Thickness and type of core.
  - .3 Thickness and type of steel stiffeners and location of them within the door.
  - .4 Thickness and type of metal facing on edges of door and method of fastening.
  - .5 Location of mortises, reinforcement, anchorages, joining, welding, sleeving, exposed fasteners, openings and arrangement for hardware.

.2 Include schedule identifying each unit with door marks and numbers relating to numbering on Contract Drawings and in door schedule. Indicate doors and frames to be fire rated.

1.4 **QUALITY ASSURANCE**

.1 Perform work in accordance with requirements of the Canadian Steel Door Manufacturer's Association (CSDMA).

.2 Label and list fire rated doors and frames by an organization acceptable to authorities having jurisdiction and accredited by the Standards Council of Canada in conformance with CAN4/ULC-S104M and CAN4/ULC-S105M for ratings indicated, Labelling shall be in accordance with NFPA 80.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

.1 Hollow metal doors and frames:
- .1 Daybar Industries Limited
- .2 Fleming Doors Products.
- .3 Steelcraft.
- .4 Vision Hollow Metal Limited.

2.2 **MATERIALS**

.1 General: All materials under work of this Section, including but not limited to, primers are to have low VOC content limits.

.2 Steel: ASTM A924/A924M, Class 1; Commercial grade steel, hot dip galvanized to ASTM A653/A653M, ZF120 galvanized coating.

.3 Minimum base steel thickness:

.1	Frames	1.6 mm
.2	Typical doors	1.6 mm
.3	Interior stiffeners	0.9 mm
.4	Lock/strike reinforcements	1.6 mm
.5	Hinge reinforcements	2.7 mm
.6	All other reinforcement	1.6 mm
.7	Top and bottom channels	1.2 mm
.8	Glazing stops	0.9 mm
.9	Guard boxes	0.9 mm
.10	Jamb spreaders	0.9 mm

.4 Primer: CAN/CGSB 1.198.

.5 Core material:
- .1 Interior doors: Mineral fibre insulation with a minimum face density of 24 kg/m^3.
- .2 Fire rated doors: Mineral fibre insulation to CAN/ULC S702, Type 1A; 24 kg/m^3.

.6 Screws: Stainless steel screws with countersunk flat head.

.7 Door silencers: Type 6-180, black neoprene.

.8 Frame anchors:
- .1 Frames in masonry: 1.2 mm minimum, adjustable T-strap jamb anchors.
- .2 Frames in steel stud partitions: 0.9 mm minimum steel anchors of suitable design securely welded inside each jamb.
- .3 Frames in existing walls: 0.9 mm minimum frame anchors to suit design.
- .4 Labeled frames: In accordance with ULC requirements.

.9 Floor anchors: 1.6 mm minimum adjustable floor clip angles with 2 holes for anchorage to floor.

.10 Labels for fire doors and door frame: Brass plate, riveted to door and door frame.

.11 Grilles: Corrosion resistant steel with baked enamel finish. Model 61DG Series by Nailor Industries Inc or approved equal by Hart and Cooley.

.12 Glass and glazing: In accordance with Section 08 80 00.

2.3 FABRICATION

.1 General
- .1 Fabricate doors and frames in accordance with reviewed shop drawings.
- .2 Welding: CSA W59-M to produce a finished unit with no visible seams or joints, square, true and free of distortion.
- .3 Welding: Continuous unless specified otherwise. Execute welding by a firm fully acceptable to the Canadian Welding Bureau to requirements of CSA W47.1.
- .4 Form profiles accurately to details shown on Contract Drawings.
- .5 Ream and remove burrs from drilled and punched holes.
- .6 Grind welded corners and joints to a flat plane and fill with metallic filler and sand to a uniform smooth finish. Apply one coat of primer.

.2 Frames and screens (FS4):
- .1 Fabricate frames of welded construction. Cut mitres and joints accurately and weld continuously on inside of frame profile.
- .2 Construct large frame sections with provision for on Site assembly to suit Site conditions.
- .3 Blank, reinforce, drill and tap frames for mortised, templated hardware. Protect mortised cut-outs with guard boxes.
- .4 Reinforce frames where required for surface mounted hardware.

.5 Reinforce frames over 1200 mm wide with roll formed steel channels or hollow structural sections specified in Section 05 50 00 and as indicated on drawings.

.6 Prepare each door opening for single stud rubber door silencers, 3 for single door openings located in strike jamb, and 2 for double door openings located in head.

.7 Install 2 channel or angle spreaders per frame, to ensure correct frame alignment. Install stiffener plates or spreaders between frame trim where required, to prevent bending of trim and to maintain alignment when setting in place.

.8 Form channel glazing stops minimum 16 mm height, accurately cut, mitred, fitted and fastened to frame sections with stainless steel counter-sunk, flat head screws spaced at maximum 450 mm throughout and 50 mm from each end.

.9 Provide the following requirements for electrified frame applications:

.1 Low voltage wire conduit for required electrified hardware devices.

.2 Junction boxes for all frame mounted electrified hardware devices, complete with required connectors to in frame low voltage wire conduit.

.3 Anchorage:

.1 Anchor units to floor and wall construction. Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb, minimum number of anchors for each jamb:

.1	Frames up to 2285 mm	3 anchors.
.2	Frames from 2285 mm to 2440 mm	4 anchors.

.2 Where frames are to be set in masonry or concrete, supply adjustable anchors to trade installing frame.

.3 Fabricate frames for installation in steel stud partitions with steel anchors of suitable design, minimum number of anchors for each jamb:

.1	Frames up to 2285 mm height	4 anchors.
.2	Frames 2285 mm to 2440 mm	5 anchors.

.4 Frames in previously placed concrete, masonry, precast or structural steel: Anchors located at 150 mm maximum from top and bottom of each jamb, and intermediate anchors at maximum 660 mm o.c.

.4 General Door Requirements:

.1 Hollow steel construction, flush swing type, of sizes to conform to details, schedules and reviewed shop drawings with provisions for cut-outs for glass and grilles and reinforced to receive hardware fastenings.

.2 Blank, reinforce, drill and tap doors for mortised, templated hardware. Where required, reinforce doors for surface mounted hardware and door closers.

.3 Reinforce oversized doors with steel channels and plates specified in Section 05 50 00 and as indicated on drawings.

.4 Where openings are required, form integral cut-outs with framing, glass stop moldings and division bars.

.5 Install grilles to fit tight and secure into openings.

.6 Bevel both stiles of single doors 1 in 16.

.7 Reinforce doors with galvanized metal stiffeners at 150 mm o.c.

.8 Provide the following requirements for electrified door applications:
- .1 In door low voltage wire raceways.
- .2 Steel astragals for hollow metal doors.
- .3 Reinforcement for all door mounted electrified hardware devices as required and as indicated on Contract Drawings.

.5 Interior Doors:
- .1 Supply and install inverted, recessed, fully welded channels at top and bottom of doors.
- .2 Fabricate doors with joints between front and back panels meeting on stile edges. Make joints continuously welded for entire height of door. After welding has been completed, grind joints smooth to match metal. Ensure that no filler is used in joints.
- .3 Fill hollow space within door and vertical stiffeners from top to bottom with mineral fibre batt insulation.

.6 Fire Rated Doors:
- .1 Supply and install inverted, recessed, spot welded channels at top and bottom of doors.
- .2 Fabricate doors with joints between front and back panels meeting on stile edges. Make joints continuously welded for entire height of door. After welding has been completed, grind joints smooth to match metal. Ensure that no filler is used in joints.
- .3 Fabricate doors to achieve fire rating as indicated on drawings and in accordance with ULC. Provide ULC label plate on door at hinged edge midway between top hinge and head of door.

3 Execution

3.1 EXAMINATION

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 HOLLOW METAL DOOR, FRAME AND SCREEN INSTALLATION

.1 Install hollow metal doors, frames and screens in accordance with reviewed shop drawings, manufacturer's written instructions and to meet CSDMA requirements.

.2 Install hollow metal doors, frames and screens plumb, square, level, secure, and at correct elevation.

.3 Install doors clear of floor finishes, and with the correct rebate opening for the door installation. Install door silencers.

.4 Secure anchorages and connections to adjacent construction. Brace frames rigidly in position while building-in. Remove temporary steel shipping jamb spreaders. Install wood spreaders at third points of frame rebate height to maintain frame width. Supply and install vertical supports as indicated on drawings for openings over 1200 mm in width. Remove wood spreaders after frames have been built-in.

.5 Allow for structural deflection and prevent structural loads from being transmitted to hollow metal frames.

.6 Touch-up areas where galvanized coating has been removed or damaged with primer.

.7 Fire rated doors: Install fire rated doors and frames in accordance with requirements of NFPA 80.

3.3 ADJUSTING AND CLEANING

.1 Adjust doors for smooth and balanced door movement.

.2 Clean doors, frames and screens.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, tool, equipment and services necessary for Aluminum work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 AAMA 501, Methods of Test for Exterior Walls.

.2 AAMA 611, Voluntary Standards for Anodized Architectural Aluminum.

.3 AAMA CW-10, Care and Handling of Architectural Aluminum from Shop to Site.

.4 AAMA CW-DG-1, Aluminum Curtain Wall Design Guide Manual.

.5 AAMA/WDMA/CSA 101/I.S.2/A440, Standard Specification for Windows, Doors, and Unit Skylights.

.6 ANSI H35.1M, Alloy and Temper Designation Systems for Aluminum (Metric).

.7 ASTM A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

.8 ASTM B209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.9 ASTM B221M, Specification for Aluminum-Alloy Extruded Bars, Rods, Wires, Profiles and Tubes.

.10 ASTM C920, Specification for Elastomeric Joint Sealants.

.11 ASTM E283, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

.12 ASTM E330, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

.13 ASTM E331, Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

.14 ASTM F738M, Specification for Stainless Steel Metric Bolts, Screws, and Studs.

.15 CAN/CGSB 1.108-M, Bituminous Solvent Type Paint.

.16 CAN/ULC-S710.1, Standard for Thermal Insulation – Bead-Applied One Component Polyurethane Air Sealant Foam, Part 1: Material Specification.

.17 CAN/ULC-S710.2, Standard for Thermal Insulation – Bead-Applied One Component Polyurethane Air Sealant Foam, Part 2: Installation.

.18 NFRC 100, Procedure for Determining Fenestration Product U-factors.

.19 NFRC 200, Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.

1.3 **DEFINITION(S)**

.1 Aluminum work: Shall mean aluminum curtain wall/entrances, windows, vestibules, doors, and framing mentioned in Part 2 of this Specification Section.

1.4 **DESIGN REQUIREMENTS**

.1 Design Aluminum work to meet requirements of AAMA/WDMA/CSA 101/I.S.2/A440, AAMA CW-DG-1, ASTM E283, ASTM E330, ASTM E331, NFRC 100, NFRC 200 and to meet performance and energy requirements specified herein and as required by authorities having jurisdiction.

.2 Design Aluminum work in accordance with following Climatic Design Data for Toronto contained in the Ontario Building Code:
- .1 Design temperature: January 1%, July 2 1/2%.
- .2 Hourly wind pressures: 1 in 50 year occurrence.

.3 Design Aluminum work to accommodate following without producing detrimental effect:
- .1 Cyclic 40°C daily thermal swing of components.
- .2 Cyclic, dynamic loading and release of loads such as wind loads.
- .3 19 mm vertical deflection in supporting structure and movement of supporting structure due to live, dead load, and creep or deflections, seismic load, sway displacement and similar items.

.4 Design to prevent accumulation of condensate on interior side of Aluminum work framing under the following service conditions:
- .1 Interior summer temperature: 21°C.
- .2 Interior winter temperature: 21°C.
- .3 Exterior temperature: -20°C.
- .4 Interior RH: 35%.

.5 Design windows in accordance to AAMA/WDMA/CSA -101/I.S.2/ A440, to the following performance levels:
- .1 Performance class: AW.
- .2 Minimum performance grade (PG): 35.
- .3 Minimum positive design pressure: 1680 Pa.
- .4 Minimum negative design pressure: - 1680 Pa.
- .5 Minimum water penetration test pressure: 300 Pa.
- .6 Minimum air infiltration/exfiltration: 0.12 L/s m^2 .
- .7 Condensation resistance: I57.

.6 Restrict air infiltration/exfiltration, through Aluminum work in accordance with ASTM E283 at pressure differential as indicated:
.1 Curtain walls/entrance assemblies: 0.003 L/s m^2 at differential of 300 Pa.
.2 Doors (per door): 2.92 L/s m^2 at differential of 75 Pa.

.7 Design and detail controlled drainage path to actively discharge water, which enters into or forms within Aluminum work, to exterior; prevent accumulation or storage of water within Aluminum work. Prevent water from entering interior when tested in accordance with ASTM E331 at a pressure differential of 700 Pa..

.8 Design and detail air barrier, vapour retarder, and rainscreen products and assemblies into continuous and integrated Aluminum work envelope. Optimize Aluminum work design to align envelope layers and to minimize thermal bridges.

.9 Prevent deflection and permanent or progressive glazing displacement. Restrict horizontal and vertical mullion deflection to less than L/175 and 19 mm maximum for heights under 4115 mm and L/240 and 25 mm maximum for heights over 4115 mm.

.10 When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span in accordance with ASTM E330.

.11 Design anchorage inserts for installation as part of other Sections of work. Design anchorage assemblies to accommodate construction and installation tolerances.

.12 Provide all reinforcing within aluminum members as required by design and OBC to provide structurally sound assembly. In any case, mullion size shall not be increased due to provision of reinforcing.

.13 Design Aluminum work and connections to substrate where the bottom of the Aluminum work extends to a point below 1070 mm above finished floor level and separates a floor level from an adjacent interconnected space to withstand the required guard and handrail loads in accordance with the OBC and applicable local regulations. When requested by Consultant, provide a letter signed and sealed by a Professional Engineer certifying that the Aluminum work conforms to the OBC requirements.

.14 Design operable windows within reach of occupants with limiting stops conforming to requirements of OBC.

1.5 **SUBMITTALS**

.1 Shop drawings:
.1 Submit shop drawings for mock-ups and Aluminum Work in accordance with Section 01 33 00 indicating:
.1 Plans, sections, details, type of extrusions, profiles, finishes, panels, spandrels, operating components, doors, related flashings, closures, fillers, and end caps, and sealants.

.2 Products and glazing types.
.3 Calculations or modelling confirming Aluminum work conforms to specified performance and energy requirements.
.4 Structural integrity of Aluminum work, anchorage inserts, and system installation tolerances.
.5 Section and hardware reinforcement, anchorage, assembly fixings.
.6 Detailing, locations, and allowances for movement, expansion, contraction
.7 Air barrier and vapour retarder continuity and path of cavity drainage and air pressure equalization.

.2 Samples:
.1 Submit two samples of following in accordance with Section 01 33 00.
.1 250 x 200 mm samples of insulating glass unit.

.3 Reports:
.1 Submit substantiating engineering data, and independent test results of pre-tested, Aluminum work to substantiate compliance with the design criteria including air leakage and water penetration conforming to ASTM E283 and ASTM E331.
.2 Engineering data demonstrating compliance with test procedures outlined in AAMA 501 including as a minimum air leakage resistance, static pressure water penetration resistance, dynamic pressure water penetration resistance, wind load resistance, vertical live load deflection movement and lateral (horizontal) movement, and condensation resistance.
.3 Submit documentation to substantiate ten years of experience in Aluminum work manufacture and installation of similar size and nature.

.4 Close-out submittals: Submit Aluminum work data for incorporation into the Operations and Maintenance Manual as part of Section 01 78 00.

.5 Extended warranties: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.

1.6 **QUALITY ASSURANCE**

.1 Retain a Professional Engineer, licensed in Province of Ontario, with experience in Aluminum work of comparable complexity and scope to perform the following services as part of the work of this Section:
.1 Design of Aluminum work.
.2 Review, stamp, and sign shop drawings.
.3 Conduct on-Site inspections and prepare and submit inspection reports. Number and frequency of inspection to be sufficient to satisfy Engineer that Window Wall Work is being fabricated and installed in accordance with reviewed shop drawings and design intent.

.2 Shop mock-up:

.1 Provide one, full scale mock-up in shop of Aluminum work for shop testing, including air leakage, water penetration, and deflection in accordance with AAMA/WDMA/CSA 101/I.S.2/A440, AAMA 501, ASTM E283, ASTM E330, and ASTM E331. If a test fails, additional testing may be required by Consultant to ensure performance of Aluminum Work at no additional cost to Owner.

.2 Demonstrate conformance to specified design requirements.

.3 Mock-up shall show full range of Products, finishes, textures, quality of fabrication, and workmanship including, but not limited to, framing members, glazing units, anchorage, opening units, doors and transitions to adjoining assemblies and materials.

.3 Pre-installation meetings:

.1 Mock-ups: Prior to installation of mock-ups, arrange meeting at the shop and on Site to be attended by Consultant, Contractor, and aluminum work Engineer and site superintendent to inspect substrates, and to review installation procedures 48 hours in advance of installation.

.2 Site: Prior to installation of aluminum work, arrange meeting at the Site to be attended by Consultant, Contractor, and aluminum work Engineer and site superintendent to inspect substrates, and to review installation procedures 2 weeks in advance of installation.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, and handle Aluminum Work in accordance with AAMA CW-10 and manufacturer's written recommendations.

.2 Protect aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather. Do not remove before final cleaning of building.

1.8 EXTENDED WARRANTY

.1 Aluminum work: Submit an extended warranty for Aluminum work in accordance with General Conditions, except that warranty period is extended to 5 years from date of Ready-for-Takeover.

.1 Warrant against failure to meet the design criteria and requirements such as interior leakage, finish degradation and frame condensation.

.2 Coverage: Labour and materials to repair or replace Aluminum Work as required to correct deficient work and meet specified requirements including affected adjacent work.

.2 Glazing:

.1 Provide a 10 year warranty, commencing from date of Ready-for-Takeover, against defects in the insulating glass units and warrant them to be free from material obstruction of vision as a result of dust or film formation on the internal glass surfaces by any cause, under normal design conditions. Warrant the following:

.1 The insulating glass units shall be free from condensation, fogging material obstruction of vision as a result of dust or film formation on the internal glass surfaces by any cause under design conditions.

.2 The insulating glass units shall not change their mechanical design properties and shall not in any way deteriorate, degrade, delaminate or change their visual appearance.

.3 The glass units will not break due to thermal shock and temperature differential due to inherent glass faults, other than extrinsic glass breakage.

.4 Internal fogging shall be deemed to occur when light transmission of the glass is reduced by 5% in any 50 mm x 50 mm area.

.5 Failure will be deemed to occur when the internal dew point exceeds -40oC in a 21oC ambient temperature (when tested in accordance with ASTM E576).

.2 Warrant that glazing work is water and weather tight and free from distortion; that glazing materials will not deteriorate from exposure to the atmosphere and weather, will not be displaced, and will be free from permanent deformation under load; and that glass and insulating glass units will not be broken, cracked or scratched by causes resulting from defects in material, workmanship or design of glazing installation.

.3 Cracked or scratched glass, shrinking, cracking, staining, hardening, sagging of glazing materials; loosening or rattling of glass; and leaking of glazed joints will be considered defective work.

.4 Warranty shall provide for the removal of defective Products, replacement with new Products conforming to the specifications, and restoration of work damaged by removal and replacement including labour and installation costs.

2 Products

2.1 **ACCEPTABLE MANUFACTURER(S) AND SYSTEM(S)**

.1 All Aluminum work systems and components are to be provided by a single manufacturer to ensure a single source of responsibility for the work of this Section.

.2 Curtain wall/entrance and vestibule framing system (CW01): To match existing system by Oldcastle BuildingEnvelope (Fulton Windows) or approved equal by Alumicor Limited or Kawneer.

.3 Aluminum windows (fixed and operable): To match existing system by Oldcastle BuildingEnvelope (Fulton Windows) or approved equal by Alumicor Limited or Kawneer.

.4 Aluminum doors: Insulated, aluminum door, '600A Insuldoor' by Alumicor Limited or Kawneer or Oldcastle BuildingEnvelope (Fulton Windows).

2.2 MATERIALS

.1 All materials under work of this Section, including but not limited to, sealants are to have low VOC content limits.

.2 Aluminum extrusions and channels: ASTM B221 and ANSI H35.1 AA6063 alloy, T6 temper.
- .1 Profile and dimensions: Refer to Contract Drawings.
- .2 Thermal breaks in frame members: Vertically aligned with glazing.

.3 Aluminum sheet: ASTM B209 and ANSI H35.1 AA1100 aluminum alloy, H14 temper, minimum 1.29 mm for sheets less than 610 mm wide and minimum 2.05 mm for sheets of a greater dimension.

.4 Reinforcements and anchors: ASTM A167, Type 304 to AISI No. 2B finish. Size as shown.

.5 Glass and glazing materials: As specified in Section 08 80 00.

.6 Airseal and Aluminum work sealant: ASTM C920, Type S, Grade NS, Class 100/50; One-part, low-modulus, moisture-curing, silicone. 'Dowsil 790' by Dow Consumer Solutions; 'Spectrem 1' by Tremco. Verify compatibility with insulating glass unit manufacturer's secondary sealant. Colour as selected by Consultant. Primer as recommended by manufacturer.

.7 Frame sealant: Type as recommended by the Aluminum work manufacturer.

.8 Joint backing: Closed cell foam polyethylene rod, outsized minimum 30-50% larger than joint width and compatible with joint sealant. Product as recommended by sealant manufacturer.

.9 Airseal transition membrane: 'Sopraseal Stick 1100' by Soprema Inc., 'Exoair 110' by Tremco or 'Air-Shield' by W.R. Meadows. Membrane to come complete with applicable primer.

.10 Anchors, clips, and angles: Extruded aluminum or stainless steel.

.11 Shims and blocking for frame: Rigid plastic, wood is not permitted.

.12 Flashings, closures and trim: 1.0 mm minimum aluminum sheet, finish to match Aluminum Work extrusion finish.

.13 Screws, bolts and other fasteners: ASTM F738M; Stainless Steel Type 304.

.14 Isolation coating: CAN/CGSB-1.108-M; Bitumastic coating, acid and alkali resistant material.

.15 Spray air sealant foam: CAN/ULC-S710.1, CFC free, polyurethane foam in place, closed cell, low expansion, one component air sealant, minimum density 15 kg/m^3.

.16 Window hardware: Manufacturer's standard heavy duty corrosion resistant hardware.

.17 Door hardware: Manufacturer's standard heavy duty hardware, based on the following:

.1 Hinging device: extruded aluminum continuous gear hinge or 1 1/2 pair of heavy duty stainless steel butts complete with back up plates.
.2 Closing device: LCN 4021 ST3179 LH 689.
.3 Pull handles: Alumicor 1180, 25 mm diameter, anodized aluminum offset pull handles
.4 Push bars (for doors without panic hardware): Alumicor 246, 25 mm diameter, anodized aluminum push bar.
.5 Locking (basic locking): Adams Rite MS1850 Dead Lock with manufacturers standard cylinder on exterior and thumbturn on interior.
.6 Locking (panic hardware): Von Duprin 33/35A rim panic or Von Duprin 3547 vertical rod panic.

.18 Insect screen (windows): Extruded aluminum frames containing heavy duty, fine fibreglass mesh in accordance with AAMA/WDMA/CSA 101/I.S.2/A440. Screen to be retained in place with turn clip type fixings. Provide samples for the Consultant's approval.

.19 Weatherstripping: Manufacturer's standard weatherstripping, durable, non-absorbing material resistant to deterioration by aging and weathering.

2.3 FABRICATION

.1 Fabricate sections true to detail, free from defects impairing appearance, strength and durability. Fabricate extrusions with sharp, well defined corners.

.2 Fabricate Aluminum work in accordance with reviewed shop drawings and manufacturer's written instructions.

.3 Fabricate, fit, and secure framing joints and corners accurately, with flush surfaces, and hairline joints. Apply frame sealant at joints to provide continuity of water and air barrier.

.4 Conceal anchors, reinforcement and attachments from view. Fabricate reinforcement in accordance with design requirements.

.5 Do not expose manufacturer's identification labels on aluminum assemblies.

.6 Fabricate continuous sill flashings with intermediate anchor clips, and joint reinforcing, form to profile shown. Fabricate filler and closure pieces as necessary for a complete and weather tight installation.

.7 Certify aluminum windows as complying with the AAMA/WDMA/CSA 101/I.S.2/A440 design criteria and requirements using an easily removable label located on the inside face of glazing.

.8 Position operable windows on main frame to provide direction of opening specified, free and smooth operation, without binding or sticking against main frame members.

.9 Fabricate doors and frames complete with internal reinforcements, cut-outs, and recesses to accommodate finish hardware. Reinforce cut-outs to assure adequate strength.

.10 Fabricate Aluminum work closures and trim from aluminum sheet. Form to profile shown. Make weathertight.

.11 Double weatherstrip windows and doors. Install weatherstripping in specially extruded ports and secure to prevent shrinkage or movement.

.12 Fabricate glazing recess with drainage to exterior.

2.4 **ALUMINUM DOORS**

.1 Fabricate doors of welded construction.

.2 Glazing stop: Aluminum, square, snap-on type, designed for glazing system.

2.5 **FINISH**

.1 Extrusion finish: Clear anodized to AAMA 611 per Aluminum Association Designation System for Aluminum Finishes AA-M12C22A31.

.2 Doors: Clear anodized to AAMA 611 per Aluminum Association Designation System for Aluminum Finishes AA-M12C22A41.

.3 Sheet finish: As indicated on drawings to match adjacent extrusion finish.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Install Aluminum work in accordance with reviewed shop drawings, manufacturer's instructions, AAMA/WDMA/CSA 101/I.S.2/A440 and to meet requirements of authorities having jurisdiction.

.2 Install work of this Section securely, in correct location, level, square, plumb, at proper elevations, free of warp or twist.

.3 Apply isolation coating at 0.8 mm dry film thickness to prevent corrosive or electrolytic action between dissimilar materials such as aluminum to concrete, masonry, galvanized steel and similar conditions.

.4 Install flashings, closures, and trim pieces.

.5 Fill voids between aluminum framing and adjacent construction with foam insulation. Install in accordance with CAN/ULC-S710.2.

.6 Install sills in maximum lengths possible. For sills over 1200 mm in length, maintain 3 mm to 6 mm space at each end.

.7 Refer to Contract Drawings for glazing type locations. Install glazing in accordance with Section 08 80 00.

.8 Automatic door operators to be supplied and installed by Section 08 70 00. Install doors and hardware to manufacturers' written instructions. Clean and adjust hardware for correct performance.

.9 Install aluminum door manufacturer's standard weatherstripping at door frame perimeter. Install weatherstripping throughout entire length and width of doors at jambs and heads.

.10 Install doors and hardware to manufacturers' written instructions. Clean and adjust hardware for correct performance.

.11 Adjust operable parts for correct function.

.12 Remove damaged or unacceptable Products and assemblies from Site and replace to Consultant's acceptance.

.13 Install glass presence markers, in two cross stripes extending from diagonal corners. Maintain markers until final clean-up.

3.3 **ERECTION TOLERANCES**

.1 Tolerances: Non-cumulative.
- .1 Maximum variation from plumb: 1.5 mm/3 m non-cumulative or 12 mm/30 m, whichever is less.
- .2 Maximum misalignment of two adjoining members abutting in plane: 0.8 mm.

.3 Vertical and horizontal positions: +/- 3 mm.
.4 Racking of face: 6 mm, nil in elevation.
.5 Operable components: Consistent with smooth operation and weatherproof performance.
.6 Maximum perimeter sealant joint between Aluminum work and adjacent construction: 13 mm.

3.4 GLAZING PERIMETER AIRSEAL

.1 Install glazing perimeter airseal at entire perimeter of each insulating glass unit to achieve an airseal from insulating glass unit to curtain wall frame. Do not obstruct path of cavity drainage and air pressure equalization.

.2 Perform sealant work in accordance with manufacturer's written requirements.

3.5 AIRSEAL TRANSITION MEMBRANE

.1 Install primer and airseal transition membrane in accordance with manufacturer's instructions and reviewed shop drawings.

.2 Overlap airseal transition membrane 75 mm minimum and lap in direction of waterflow. Hand roll membrane to ensure 100% contact and adhesion to substrates.

.3 Coordinate airseal transition to adjacent parts of Work. Continuity of weather and air seal to be maintained throughout curtain wall and at interface with adjacent components or systems.

.4 Provide terminations fabricated from same material as airseal transition membrane or material recommended by membrane manufacturer at sills, lintels, openings, and where horizontal surfaces intersect with vertical surfaces to ensure moisture is shed to exterior.

3.6 JOINT BACKING AND ALUMINUM WORK SEALANT

.1 Prepare substrate surface and mask as recommended by sealant manufacturer.

.2 Install joint backing and sealant at Aluminum work and perimeter joints for weather tight installation in accordance with sealant manufacturer's instructions. Tool sealant. Remove excess sealant.

3.7 CLEANING

.1 Maintain Aluminum work, inside and outside, in clean condition throughout construction period.

.2 Remove labels, protective material, and glass presence markers from prefinished surfaces.

.3 Remove certification labelling when directed by Consultant, in writing.

.4 Wash Aluminum work with solution of mild detergent in warm water, with particular attention to recesses and corners. Wipe surfaces clean and dry.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for finish hardware work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 BHMA, Builders Hardware Manufacturing Association.

.2 NFPA 80, Standard for Fire Doors and Other Opening Protectives.

1.3 **SUBMITTALS**

.1 Product data: Submit manufacturer's Product data in accordance with Section 01 33 00 indicating compliance with reference standards, transportation, storage, handling and installation requirements.

.2 Shop Drawings:
- .1 Submit Shop Drawings and 3 complete hardware lists in accordance with Section 01 33 00 indicating:
  - .1 Door locations, sizes, hardware manufacturer's catalogue numbers, finish symbols and quantities required.
  - .2 Locations and mounting heights of each type of hardware.
- .2 Supply templates and required information to door and frame manufacturer to enable accurate sizes, locations of cut-outs and reinforcement for hardware.
- .3 Submit templates to required trade to arrange for provisions for accurate setting and fitting of hardware.

.3 Closeout submittals:
- .1 Submit the following in accordance with Section 01 78 00 for each Product for incorporation into Operation and Maintenance Manual:
  - .1 Maintenance data.
  - .2 Operating instructions and safety precautions.
  - .3 Parts list with name and address of supplier.
  - .4 Lubrication schedule and type of lubricant recommended.
  - .5 Keys, tools and special devices.
  - .6 Inspection procedures related to preventive maintenance.

1.4 **QUALITY ASSURANCE**

.1 General:
- .1 Manufacturers: Companies specializing in manufacturing door hardware and registered with BHMA.
- .2 Hardware supplier: Company specializing in supplying commercial door hardware and acceptable to manufacturer.

.2 Certifications:
.1 Employ an Architectural Hardware Consultant to inspect completed installation and certify that hardware has been installed in accordance with manufacturer's printed instructions, Authorities having Jurisdiction and as specified.
.2 Submit manufacturer's certificate that finish hardware and fire rated hardware meets specified requirements.

1.5 **DELIVERY, STORAGE, AND HANDLING**

.1 Be responsible for packaging of hardware, on a set by set basis. As material is received from various manufacturers identify it to correspond to Hardware List symbols.

.2 Label packages legibly, indicating manufacturer's number, types, sizes, opening number and Hardware List reference number. Wrap hardware and include in package, screws, bolts and fastening necessary for correct installation. If hardware package is not complete, pay additional charges incurred by installer.

.3 Deliver hardware to Site packaged, labelled and cross-referenced to hardware list for each item and its scheduled installation location.

.4 Accept Products of this Section on Site and ensure that each item is undamaged.

.5 Catalogue and store hardware in secure area.

2 Products

2.1 **MATERIALS, GENERAL**

.1 General:
.1 Metal finishes: Free from defects, clean, unstained and of a uniform colour for each type of finish required. Exposed surfaces and anchors: Specified finish symbol of item.
.2 Items to be attached to masonry or concrete with expandable shields, lag screws, bolts or other fastening devices as required. Exposed screws: Stainless steel, Phillips or Robertson heads.

.2 Aluminum door hardware: Supplied and installed under the work of Section 08 44 00.

2.2 **FINISH HARDWARE, GENERAL**

.1 Carefully check and verify Hardware List against Contract Drawings to ensure that hardware listed can be used as specified. Inform Consultant of concerns regarding quality, quantity, operation or function of hardware selected:
.1 Verify hand of doors, examine details on Contract Drawings and at Site to ensure hardware supplied can be correctly installed and is correct for work as constructed.

.2 Select hardware in accordance with applicable codes and regulations and to approval of local Fire Marshal.
.3 Replace and pay for defective hardware including hardware which was incorrectly selected, and remedial and installation costs.

.2 Ensure that hardware selected will function correctly, meets Contract requirements and Ontario Building Code and authorities having jurisdiction.

.3 Ensure that each hardware item is of same type, design and by same manufacturer.

.4 Manufacturer's names or trade marks are not permitted on exposed surfaces of hardware.

.5 Include in packing slip a list of parts, name of supplier and door number in which lock is to be installed.

.6 Hardware for fire rated and labelled door and frame assemblies: ULC listed or as accepted by authorities having jurisdiction.

.7 Fire rated assemblies:
.1 Hardware: Selected and installed in accordance with applicable codes and regulations, NFPA-80 and to approval of Ontario Fire Marshal.
.2 Fire rated doors: ULC labelled hardware. Submit written certification of conformance to ULC requirements for each type of hardware prior to delivery.
.3 Locksets and latchsets on fire rated doors: 19 mm throw minimum.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Install hardware in accordance with reviewed Shop Drawings, manufacturer's installation instructions, and applicable Codes and regulations.

.2 Install hardware in accordance with hardware templates.

.3 Adjust fixed and operable hardware for correct clearances and function.

.4 Mount hardware measured from finished floor to centre of hardware, unless indicated otherwise or required by Code:
.1 Top hinge: 250 mm from head of door to top.
.2 Bottom hinge: 265 mm from finished floor to bottom of hinge.
.3 Intermediate hinge: Equal distance between top and bottom hinge.

.4 Locksets, latchsets: 1000 mm.
.5 Panic device crossbar: 1000 mm.
.6 Push plates: 1100 mm to bottom of plates.
.7 Guard bars: 1100 mm.
.8 Door pulls: 1100 mm to bottom of pulls.
.9 Blank strike: 1450 mm.
.10 Blank fronts: 1450 mm.

.5 Include for supply and installation of wiring for electric strikes from electrical junction box to electric strike hardware.

.6 Locate door stops to contact doors 75 mm from latch edge.

.7 Install hardware and trim square and plumb to doors.

.8 Replace wrappings for hardware provided by manufacturer after installation.

.9 Safeguard keys to keep them out of unauthorized hands, tag them with door number, and deliver them to person designated by Consultant at building completion.

3.3 **FIELD QUALITY CONTROL**

.1 Have hardware inspected after installation by hardware supplier's representative, obtain certification in writing that hardware has been supplied and installed in accordance with Specifications and hardware manufacturer's instructions and is functioning correctly.

.2 Inspect fire rated openings to ensure they are installed in compliance with NFPA 80 requirements and Authorities having Jurisdiction.

.3 Test access control system and electrified hardware devices for proper operation. Verify electric door release hardware operates properly upon activation of fire alarm system.

3.4 **ADJUSTING**

.1 Verify under work of this Section, that installed hardware functions properly.

.2 Adjust hardware so that latches and locks operate smoothly and without binding, and closers act positively with the least possible resistance in use. Lubricate hardware if required by manufacturer's instructions.

.3 Adjust doors with self closing devices or automatic closing devices for proper operation after the HVAC system is balanced and adjusted. Verify spring power of non sized door closers is properly adjusted.

3.5 CLEANING

.1 Remove wrappings at completion of the Project and clean hardware in accordance with manufacturer's instructions.

3.6 HARDWARE GROUPS/SCHEDULE

.1 Hardware groups/schedule: Refer to hardware groups/schedule appended to this Section.

END OF SECTION

TOTAL
OPENING
CONSULTANTS

FINISHING HARDWARE SCHEDULE

JOB NAME: **EVA'S CANTERBURY SHELTER**
25 CANTERBURY PL
NORTH YORK, ONTARIO,M2N 0E3
CANADA

PROJECT: **TOC0007826**

DATE: **Dec-07-2023**

REVISION HISTORY

REVISED:	Sep-22-2023	Issued for preliminary Review
	Nov-14-2023	Issued for Coordination
	Dec-07-2023	Issued for Tender

1 PAIR OF DOORS D014A LHR/RHRA LOUNGE

2/765mm x 2035mm x 45mm

FRAME TYPE: N/A

DOOR TYPE: B / DOOR DETAIL: FULL GLASS

HOLLOW METAL DOOR
N/A

6	EACH	HINGES	TA786 4.5 X 4 NRP C26D
1	EACH	ELECTRONIC POWER TRANSFER	EL-CEPT C32D
1	EACH	WIRING HARNESS	QC-C1500 15FT HARNESS 8PIN/4PIN DBL CONNECTOR
1	EACH	WIRING HARNESS	QC-C012 12IN HARNESS 8PIN/4PIN DBL CONNECTOR
2	EACH	FLUSH BOLT	GSH401 C26D
1	EACH	DUST PROOF STRIKE	DP2 C26D
1	EACH	ELECTRIC PULLBACK LOCK	LPM180EU L3A 24VAC/DC L/C REX QC-12 RHR 626
2	EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
2	EACH	WALL MOUNT PUSH BUTTON	CM-45/4
1	EACH	AUTOMATIC OPERATOR	SW200-FWH-99-CL-OS w/SILVER ARM
1	EACH	RELAY MODULE	ALT-RB1224
1	EACH	DOOR CLOSER	4021 ST3179 RH 689
		CONCEAL MANUAL CLOSER IN OPERATOR HEADER)	
1	EACH	KEY SWITCH - SINGLE GANG	MKA2 DPDT MAINTAINED KEYSWITCH C32D
1	EACH	RECTIFIER	CX-5024
2	EACH	KICKPLATE	GSH80A 8in X 29in TAPE C32D
2	EACH	CONCEALED OVERHEAD STOP	697S C26D
1	EACH	TECHNICAL DRAWING BY OTHERS	DOOR ELEVATION WIRING
1	EACH	INSTALLATION	INSTALL DOOR OPERATOR & BUTTONS
1	EACH	POWER SUPPLY	PS210 FA 1.5 AMPS @ 24VDC
1	EACH	ASTRAGAL BY OTHERS	BY DOOR SUPPLIER

1 SINGLE DOOR D014B RHR CLOSET

867mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: A

HOLLOW METAL DOOR
HOLLOW METAL FRAME

3	EACH	HINGES	TA714 4.5 X 4 NRP C26D
1	EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1	EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
1	EACH	OVERHEAD STOP	1548S C26D

1 PAIR OF DOORS D100 LHR ACTIVE EXTERIOR - VESTIBULE

1/965mm + 1/686mm x 2135mm x 45mm

FRAME TYPE: B

DOOR TYPE: B / DOOR DETAIL: FULL GLASS

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

6	EACH	HINGES	TA386 5 X 4.5 NRP C32D
1	EACH	ELECTRONIC POWER TRANSFER	EL-CEPT C32D
1	EACH	WIRING HARNESS	QC-C1500 15FT HARNESS 8PIN/4PIN DBL CONNECTOR
1	EACH	WIRING HARNESS	QC-C012 12IN HARNESS 8PIN/4PIN DBL CONNECTOR
1	EACH	CARD READER BY OTHERS	BY SECURITY
1	EACH	ROCKER SWITCH	CM-850 SPDT MO BEIGE
		(REMOTE SWITCH, LOCATE @ RECEPTION DESK)	
1	EACH	PUSH BUTTON	CM-250/3 PUSH TO OPEN
		(REMOTE SWITCH, LOCATE @ RECEPTION DESK)	
2	EACH	KEY OPERABLE FLUSHBOLT	1870HM 628
		(INSTALL F/BOLTS TOP&BOTTOM TO IN-ACTIVE LEAF, CYLINDERS ON INTERIOR SIDE))	
1	EACH	EXIT DEVICE - ELEC.	53 55 56 8904G X ETJ L/C LHR C32D
3	EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
2	EACH	WALL MOUNT PUSH BUTTON	CM-45/4
1	EACH	AUTOMATIC OPERATOR	SW200-FWH-99-CL-OS w/SILVER ARM
1	EACH	RELAY MODULE	ALT-RB1224
1	EACH	DOOR CLOSER	4021 ST3179 LH AL (PUSH SIDE)
		CONCEAL MANUAL CLOSER IN OPERATOR HEADER)	
1	EACH	ACCESS CONTROL RELAY	CX-12 PLUS
1	EACH	RECTIFIER	CX-5024
2	EACH	CONCEALED OVERHEAD STOP	699S C26D
1	EACH	WEATHERSTRIP	315CR 22ft 1/8ft + 2/7ft AL
1	EACH	DOOR SWEEP	18100CNB X 24 IN AL
1	EACH	DOOR SWEEP	18100CNB X 48 AL
1	EACH	THRESHOLD	252 X 3AFG 84 in
2	EACH	DOOR CONTACT	MSS100-4: SPDT BLACK
2	EACH	ASTRAGAL SEAL	18061CNB X 84 AL
1	EACH	TECHNICAL DRAWING BY OTHERS	DOOR ELEVATION WIRING
1	EACH	INSTALLATION	INSTALL DOOR OPERATOR & BUTTONS
1	EACH	REX MOTION DETECTOR BY OTHERS	BY SECURITY
1	EACH	POWER SUPPLY	BPS-24-1 1 AMP

1 PAIR OF DOORS D100A RHR ACTIVE VESTIBULE - DINING

1/965mm + 1/686mm x 2135mm x 45mm

FRAME TYPE: B

DOOR TYPE: B / DOOR DETAIL: FULL GLASS

HOLLOW METAL DOOR
HOLLOW METAL FRAME

6	EACH	HINGES	TA786 5 X 4.5 NRP C26D
1	EACH	ELECTRONIC POWER TRANSFER	EL-CEPT C32D
1	EACH	WIRING HARNESS	QC-C1500 15FT HARNESS 8PIN/4PIN DBL CONNECTOR
1	EACH	WIRING HARNESS	QC-C012 12IN HARNESS 8PIN/4PIN DBL CONNECTOR
1	EACH	CARD READER BY OTHERS	BY SECURITY
1	EACH	ROCKER SWITCH	CM-850 SPDT MO BEIGE
		(REMOTE SWITCH, LOCATE @ RECEPTION DESK)	
1	EACH	PUSH BUTTON	CM-250/3 PUSH TO OPEN
		(REMOTE SWITCH, LOCATE @ RECEPTION DESK)	
2	EACH	KEY OPERABLE FLUSHBOLT	1870HM 628
		(INSTALL F/BOLTS TOP&BOTTOM TO IN-ACTIVE LEAF, CYLINDERS ON INTERIOR SIDE)	
1	EACH	EXIT DEVICE - ELEC.	53 55 56 8904G X ETJ L/C RHR C32D
2	EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
2	EACH	WALL MOUNT PUSH BUTTON	CM-45/4
1	EACH	AUTOMATIC OPERATOR	SW200-FWH-99-CL-OS w/SILVER ARM
1	EACH	RELAY MODULE	ALT-RB1224
1	EACH	DOOR CLOSER	4021 ST3179 RH AL (PUSH SIDE)
1	EACH	RECTIFIER	CX-5024
1	EACH	MULTI-FUNCTION RELAY	CX-EMF-2 MULTI-FUNCTION RELAY
		(EMF-2 SEQUENCING WITH DR.100 & D100B - MAN TRAP)	
2	EACH	CONCEALED OVERHEAD STOP	699S C26D
1	EACH	DOOR SWEEP	18100CNB X 24 IN AL
1	EACH	DOOR SWEEP	18100CNB X 48 AL
2	EACH	DOOR CONTACT	MSS100-4: SPDT BLACK
2	EACH	ASTRAGAL SEAL	18061CNB X 84 AL
1	EACH	TECHNICAL DRAWING BY OTHERS	DOOR ELEVATION WIRING
1	EACH	INSTALLATION	INSTALL DOOR OPERATOR & BUTTONS
1	EACH	REX MOTION DETECTOR BY OTHERS	BY SECURITY
1	EACH	POWER SUPPLY	BPS-24-1 1 AMP

1 SINGLE DOOR D100B LH **HARM REDUCTION/PROGRAM**

965mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: C / DOOR DETAIL: HALF GLASS

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

3	EACH	HINGES	TA786 4.5 X 4 NRP C26D
1	EACH	ELECTRONIC POWER TRANSFER	EL-CEPT C32D
1	EACH	WIRING HARNESS	QC-C300 38IN HARNESS 8PIN/4PIN DBL CONNECTOR
1	EACH	WIRING HARNESS	QC-C1500 15FT HARNESS 8PIN/4PIN DBL CONNECTOR
2	EACH	CARD READER BY OTHERS	BY SECURITY
		(CARD READER BOTHSIDES OF DOOR)	
1	EACH	ROCKER SWITCH	CM-850 SPDT MO BEIGE
		(REMOTE SWITCH, LOCATE @ RECEPTION DESK)	
1	EACH	PUSH BUTTON	CM-250/3 PUSH TO OPEN
		(REMOTE SWITCH, LOCATE @ RECEPTION DESK)	
1	EACH	SGL. MAGLOCK	M62B 12/24VDC MBS C32D
1	EACH	PULL STATION BY OTHERS	PULL STATION BY OTHERS
1	EACH	ELECTRIC PULLBACK PASSAGE	LPM110EU L3A 24VAC/DC L/C REX QC-12 LH 626
2	EACH	WALL MOUNT PUSH BUTTON	CM-45/4
1	EACH	AUTOMATIC OPERATOR	SW200-IS-51-CL
1	EACH	RELAY MODULE	ALT-RB1224
1	EACH	RECTIFIER	CX-5024
1	EACH	ACCESS CONTROL RELAY	CX-12 PLUS
1	EACH	KICKPLATE	GSH80A 8in X 36.5in TAPE C32D
1	EACH	CONCEALED OVERHEAD STOP	698S C26D
1	EACH	AUTO DOOR BOTTOM	420APKL 38in
1	ROLL	DOOR GASKET	S88BL 18FT
1	EACH	DOOR CONTACT	MSS100-4: SPDT BLACK
1	EACH	MAG LOCK SIGNAGE	BC2M "EMERGENCY EXIT UNLOCKED BY FIRE ALARM"
1	EACH	TECHNICAL DRAWING BY OTHERS	DOOR ELEVATION WIRING
1	EACH	INSTALLATION	INSTALL DOOR OPERATOR & BUTTONS
1	EACH	REX MOTION DETECTOR BY OTHERS	BY SECURITY
1	EACH	POWER SUPPLY	PS210 FA 1.5 AMPS @ 24VDC
1	EACH	POWER SUPPLY	BPS-12/24-1 CFAR

1 SINGLE DOOR D101A LH **HARM REDUCTION/PROGRAM**

1100mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

3	EACH	HINGES	TA786 5 X 4.5 NRP C26D
1	EACH	ELECTRONIC POWER TRANSFER	EL-CEPT C32D
1	EACH	WIRING HARNESS	QC-C300 38IN HARNESS 8PIN/4PIN DBL CONNECTOR
1	EACH	WIRING HARNESS	QC-C1500 15FT HARNESS 8PIN/4PIN DBL CONNECTOR
2	EACH	CARD READER BY OTHERS	BY SECURITY
		(CARD READER BOTHSIDES OF DOOR)	
1	EACH	SGL. MAGLOCK	M62B 12/24VDC MBS C32D
1	EACH	PULL STATION BY OTHERS	PULL STATION BY OTHERS
1	EACH	ELECTRIC PULLBACK PASSAGE	LPM110EU L3A 24VAC/DC L/C REX QC-12 LH 626
2	EACH	WALL MOUNT PUSH BUTTON	CM-45/4
1	EACH	AUTOMATIC OPERATOR	SW200-IS-51-CL
1	EACH	RELAY MODULE	ALT-RB1224
1	EACH	ACCESS CONTROL RELAY	CX-12 PLUS
1	EACH	RECTIFIER	CX-5024
1	EACH	KICKPLATE	GSH80A 8in X 41.5in TAPE C32D
1	EACH	FLOOR STOP	GSH209 C26D
1	EACH	AUTO DOOR BOTTOM	420APKL42in
1	ROLL	DOOR GASKET	S88BL 18FT
1	EACH	DOOR CONTACT	MSS100-4: SPDT BLACK
1	EACH	MAG LOCK SIGNAGE	BC2M "EMERGENCY EXIT UNLOCKED BY FIRE ALARM"
1	EACH	TECHNICAL DRAWING BY OTHERS	DOOR ELEVATION WIRING
1	EACH	INSTALLATION	INSTALL DOOR OPERATOR & BUTTONS
1	EACH	POWER SUPPLY	PS210 FA 1.5 AMPS @ 24VDC
1	EACH	POWER SUPPLY	BPS-12/24-1 CFAR

1 SINGLE DOOR D102 RHR **BF BEDROOM**

965mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

3	EACH	HINGES	TA714 4.5 X 4 C26D
1	EACH	CARD READER BY OTHERS	BY SECURITY
1	EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1	EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
1	EACH	ELECTRIC STRIKE	1500 C 630
1	EACH	DOOR CLOSER	1431 PS EN - SURFACE MOUNTED
1	ROLL	DOOR GASKET	S88BL 18FT
1	EACH	DOOR CONTACT	MSS100-4: SPDT BLACK
1	EACH	TECHNICAL DRAWING BY OTHERS	DOOR ELEVATION WIRING
1	EACH	REX MOTION DETECTOR BY OTHERS	BY SECURITY

1 SINGLE DOOR D106 RH **WASHROOM/SHOWER**

965mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

3	EACH	HINGES	TA314 4.5 X 4 NRP C32D
1	EACH	INSTITUTIONAL PRIVACY W/INDICATOR	V21 EMB 8257 LNJ L/C C32D
1	EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
1	EACH	DOOR CLOSER	1431 OT EN
2	EACH	COAT HOOK	GSH307B C32D
		(PRIOR TO ORDERING COAT HOOKS, SITE VERIFY, TO MATCH TYPICAL BATHROOM, REFER TO ARCH DRWG FOR MOUNTING HEIGHT - REFER TO BATHROOM ACCESSORIES SPECIFICATIONS)	
1	EACH	KICKPLATE	GSH80A 8in X 36.5in TAPE C32D
1	EACH	CONCEALED OVERHEAD STOP	1538S C26D
1	SET	REMOTE ALARM & TIMER BY OTHERS	BY SECURITY
		(REFER TO SPECIFICATIONS, SPECIALTY SECTION)	

1 SINGLE DOOR D114 RH **WASHROOM/SHOWER BF**

965mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

3	EACH	HINGES	TA314 4.5 X 4 NRP C32D
1	EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C32D
1	EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
1	EACH	ELECTRIC STRIKE	1500 C 630 LM
1	EACH	RELAY MODULE	ALT-RB1224
1	EACH	AUTOMATIC OPERATOR	SW100-51-IS-CLEAR w\SILVER ARM
1	SET	PUSH TO LOCK SYSTEM	CX-WC13AXSM ADO-ILLUM- SURFACE MOUNT COMBO
1	EACH	TRANSFORMER	CX-TRX-4024 24VAC FUSED 40VA
1	EACH	RECTIFIER	CX-5024
2	EACH	COAT HOOK	GSH307B C32D
		(PRIOR TO ORDERING COAT HOOKS, SITE VERIFY, TO MATCH TYPICAL BATHROOM, REFER TO ARCH DRWG FOR MOUNTING HEIGHT - REFER TO BATHROOM ACCESSORIES SPECIFICATIONS)	
1	EACH	KICKPLATE	GSH80A 8in X 36.5in TAPE C32D
1	EACH	CONCEALED OVERHEAD STOP	1538S C26D
1	EACH	DOOR CONTACT	MSS100-4: SPDT BLACK
1	EACH	INSTALL ELECTRIC STRIKE	INSTALL ELECTRIC STRIKE
1	EACH	TECHNICAL DRAWING BY OTHERS	DOOR ELEVATION WIRING
1	EACH	INSTALLATION	INSTALL DOOR OPERATOR & BUTTONS
1	SET	REMOTE ALARM & TIMER BY OTHERS	BY SECURITY
		(REFER TO SPECIFICATIONS, SPECIALTY SECTION)	

1 SINGLE DOOR D115 RH **WASHROOM/SHOWER**

965mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

3	EACH	HINGES	TA314 4.5 X 4 NRP C32D
1	EACH	INSTITUTIONAL PRIVACY W/INDICATOR	V21 EMB 8257 LNJ L/C C32D
1	EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
1	EACH	DOOR CLOSER	1431 OT EN
2	EACH	COAT HOOK	GSH307B C32D
		(PRIOR TO ORDERING COAT HOOKS, SITE VERIFY, TO MATCH TYPICAL BATHROOM, REFER TO ARCH DRWG FOR MOUNTING HEIGHT - REFER TO BATHROOM ACCESSORIES SPECIFICATIONS)	
1	EACH	KICKPLATE	GSH80A 8in X 36.5in TAPE C32D
1	EACH	CONCEALED OVERHEAD STOP	1538S C26D
1	SET	REMOTE ALARM & TIMER BY OTHERS	BY SECURITY
		(REFER TO SPECIFICATIONS, SPECIALTY SECTION)	

1 SINGLE DOOR D119 LH **BEDROOM**

865mm+- x 2035mm+- x 45mm

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

20 MIN LABEL

3	EACH	HINGES	TA714 4.5 X 4 C26D
1	EACH	KICKPLATE	GSH80A 8in X 32.5in TAPE C32D
1	EACH	OVERHEAD STOP 630	2-336 630
1	ROLL	DOOR GASKET	S88BL 17FT
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

1 SINGLE DOOR D120 LH **WASHROOM BF**

965mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

3	EACH	HINGES	TA314 4.5 X 4 NRP C32D
1	EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C32D
1	EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
1	EACH	ELECTRIC STRIKE	1500 C 630 LM
1	EACH	RELAY MODULE	ALT-RB1224
1	EACH	AUTOMATIC OPERATOR	SW100-51-IS-CLEAR w\SILVER ARM
1	SET	PUSH TO LOCK SYSTEM	CX-WC13AXSM ADO-ILLUM- SURFACE MOUNT COMBO
1	EACH	TRANSFORMER	CX-TRX-4024 24VAC FUSED 40VA
1	EACH	RECTIFIER	CX-5024
1	EACH	COAT HOOK	GSH307B C32D
		(PRIOR TO ORDERING COAT HOOKS, SITE VERIFY, TO MATCH TYPICAL BATHROOM, REFER TO ARCH DRWG FOR MOUNTING HEIGHT - REFER TO BATHROOM ACCESSORIES SPECIFICATIONS)	
1	EACH	KICKPLATE	GSH80A 8in X 36.5in TAPE C32D
1	EACH	CONCEALED OVERHEAD STOP	1538S C26D
1	EACH	DOOR CONTACT	MSS100-4: SPDT BLACK
1	EACH	INSTALL ELECTRIC STRIKE	INSTALL ELECTRIC STRIKE
1	EACH	TECHNICAL DRAWING BY OTHERS	DOOR ELEVATION WIRING
1	EACH	INSTALLATION	INSTALL DOOR OPERATOR & BUTTONS
1	SET	REMOTE ALARM & TIMER BY OTHERS	BY SECURITY
		(REFER TO SPECIFICATIONS, SPECIALTY SECTION)	

1 SINGLE DOOR D121 RHR **RECEPTION INTAKE**

965mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: D / DOOR DETAIL: NARROWLITE

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

3	EACH	HINGES	TA714 4.5 X 4 C26D
1	EACH	CARD READER BY OTHERS	BY SECURITY
1	EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1	EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
1	EACH	ELECTRIC STRIKE	1500 C 630
2	EACH	WALL MOUNT PUSH BUTTON	CM-45/4
1	EACH	AUTOMATIC OPERATOR	SW100-51-OS-CLEAR w\SILVER ARM
1	EACH	KICKPLATE	GSH80A 8in X 36.5in TAPE C32D
1	EACH	CONCEALED OVERHEAD STOP	1538S C26D
1	ROLL	DOOR GASKET	S88BL 18FT
1	EACH	DOOR CONTACT	MSS100-4: SPDT BLACK
1	EACH	INSTALL ELECTRIC STRIKE	INSTALL ELECTRIC STRIKE
1	EACH	TECHNICAL DRAWING BY OTHERS	DOOR ELEVATION WIRING
1	EACH	INSTALLATION	INSTALL DOOR OPERATOR & BUTTONS
1	EACH	REX MOTION DETECTOR BY OTHERS	BY SECURITY

1 SINGLE DOOR D123 RH **OPEN LOUNGE**

965mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: C / DOOR DETAIL: HALF GLASS

HOLLOW METAL DOOR
HOLLOW METAL FRAME

3	EACH	HINGES	TA786 4.5 X 4.5 C26D
1	EACH	MORTISE CLASSROOM LOCKSET	8237 LNJ C32D
1	EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
1	EACH	DOOR CLOSER	1431 O EN
1	EACH	KICKPLATE	GSH80A 8in X 36.5in TAPE C32D
1	EACH	CONCEALED OVERHEAD STOP	698S C26D
1	EACH	AUTO DOOR BOTTOM	420APKL 38in
1	ROLL	DOOR GASKET	S88BL 18FT

1 SINGLE DOOR D125 LH **PRIVATE OFFICE**

965mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

3	EACH	HINGES	TA714 4.5 X 4 C26D
1	EACH	CARD READER BY OTHERS	BY SECURITY
1	EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1	EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
1	EACH	ELECTRIC STRIKE	1500 C 630
1	EACH	DOOR CLOSER	1431 O EN
1	EACH	FLOOR STOP	GSH209 C26D
1	EACH	DOOR CONTACT	MSS100-4: SPDT BLACK
1	EACH	TECHNICAL DRAWING BY OTHERS	DOOR ELEVATION WIRING
1	EACH	REX MOTION DETECTOR BY OTHERS	BY SECURITY

1 SINGLE DOOR D203 LHR **WASHROOM/SHOWER BF**

965mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

3	EACH	HINGES	TA314 4.5 X 4 NRP C32D
1	EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1	EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
1	EACH	ELECTRIC STRIKE	1500 C 630 LM
1	EACH	AUTOMATIC OPERATOR	SW100-51-OS-CLEAR w\SILVER ARM
1	EACH	RELAY MODULE	ALT-RB1224
1	EACH	RECTIFIER	CX-5024
1	SET	PUSH TO LOCK SYSTEM	CX-WC13AXSM ADO-ILLUM- SURFACE MOUNT COMBO
1	EACH	TRANSFORMER	CX-TRX-4024 24VAC FUSED 40VA
2	EACH	COAT HOOK	GSH307B C32D
		(PRIOR TO ORDERING COAT HOOKS, SITE VERIFY, TO MATCH TYPICAL BATHROOM, REFER TO ARCH DRWG FOR MOUNTING HEIGHT - REFER TO BATHROOM ACCESSORIES SPECIFICATIONS)	
1	EACH	KICKPLATE	GSH80A 8in X 36.5in TAPE C32D
1	EACH	CONCEALED OVERHEAD STOP	1538S C26D
1	EACH	DOOR CONTACT	MSS100-4: SPDT BLACK
1	EACH	INSTALL ELECTRIC STRIKE	INSTALL ELECTRIC STRIKE
1	EACH	TECHNICAL DRAWING BY OTHERS	DOOR ELEVATION WIRING
1	SET	REMOTE ALARM & TIMER BY OTHERS	BY SECURITY
		(REFER TO SPECIFICATIONS, SPECIALTY SECTION)	
1	EACH	INSTALLATION	INSTALL DOOR OPERATOR & BUTTONS

1 SINGLE DOOR D204 LHR **WASHER/DRYER**

867mm x 2035mm x 45mm

FRAME TYPE: A

DOOR TYPE: E / DOOR DETAIL: LOUVRE @ DR BOTTOM

HOLLOW METAL DOOR
HOLLOW METAL FRAME

3	EACH	HINGES	TA714 4.5 X 4 NRP C26D
1	EACH	MORTISE PASSAGE SET	8215 LNJ C26D
1	EACH	DOOR LOUVRE AL	CDL-18 X 12
1	EACH	OVERHEAD STOP	1546S C26D
1	ROLL	DOOR GASKET	S88BL 17FT

1 SINGLE DOOR D219 RH **SHARED OFFICE**

965mm x 2135mm x 45mm

FRAME TYPE: A / FRAME DETAIL: S219

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

3 EACH	HINGES	TA714 4.5 X 4 C26D
1 EACH	CARD READER BY OTHERS	BY SECURITY
1 EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1 EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
1 EACH	ELECTRIC STRIKE	1500 C 630
1 EACH	DOOR CLOSER	1431 O EN
1 EACH	KICKPLATE	GSH80A 8in X 36.5in TAPE C32D
1 EACH	FLOOR STOP	GSH209 C26D
1 ROLL	DOOR GASKET	S88BL 18FT
1 EACH	DOOR CONTACT	MSS100-4 SPDT BLACK
1 EACH	TECHNICAL DRAWING BY OTHERS	DOOR ELEVATION WIRING
1 EACH	REX MOTION DETECTOR BY OTHERS	BY SECURITY

1 SINGLE DOOR D221A LHR **SHOWER**

867mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

1 EACH	HINGES	TA314 4.5 X 4 NRP C32D
	(INSTALL REG. HINGE AT TOP LOCATION)	
2 EACH	SPRING HINGE	1552 4.5 X 4 C32D
1 EACH	INSTITUTIONAL PRIVACY W/INDICATOR	V21 EMB 8257 LNJ L/C C32D
1 EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
2 EACH	COAT HOOK	GSH307B C32D
	(PRIOR TO ORDERING COAT HOOKS, SITE VERIFY, TO MATCH TYPICAL BATHROOM, REFER TO ARCH DRWG FOR MOUNTING HEIGHT - REFER TO BATHROOM ACCESSORIES SPECIFICATIONS)	
1 EACH	CONCEALED OVERHEAD STOP	1538S C26D
1 SET	REMOTE ALARM & TIMER BY OTHERS	BY SECURITY
	(REFER TO SPECIFICATIONS, SPECIALTY SECTION)	

1 SINGLE DOOR D221B LHR SHOWER

867mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

1 EACH	HINGES	TA314 4.5 X 4 NRP C32D
	(INSTALL REG. HINGE AT TOP LOCATION)	
2 EACH	SPRING HINGE	1552 4.5 X 4 C32D
1 EACH	INSTITUTIONAL PRIVACY W/INDICATOR	V21 EMB 8257 LNJ L/C C32D
1 EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
2 EACH	COAT HOOK	GSH307B C32D
	(PRIOR TO ORDERING COAT HOOKS, SITE VERIFY, TO MATCH TYPICAL BATHROOM, REFER TO ARCH DRWG FOR MOUNTING HEIGHT - REFER TO BATHROOM ACCESSORIES SPECIFICATIONS)	
1 EACH	CONCEALED OVERHEAD STOP	1538S C26D
1 SET	REMOTE ALARM & TIMER BY OTHERS	BY SECURITY
	(REFER TO SPECIFICATIONS, SPECIALTY SECTION)	

1 SINGLE DOOR D221C RHR SHOWER

867mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

1 EACH	HINGES	TA314 4.5 X 4 NRP C32D
	(INSTALL REG. HINGE AT TOP LOCATION)	
2 EACH	SPRING HINGE	1552 4.5 X 4 C32D
1 EACH	INSTITUTIONAL PRIVACY W/INDICATOR	V21 EMB 8257 LNJ L/C C32D
1 EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
2 EACH	COAT HOOK	GSH307B C32D
	(PRIOR TO ORDERING COAT HOOKS, SITE VERIFY, TO MATCH TYPICAL BATHROOM, REFER TO ARCH DRWG FOR MOUNTING HEIGHT - REFER TO BATHROOM ACCESSORIES SPECIFICATIONS)	
1 EACH	CONCEALED OVERHEAD STOP	1538S C26D
1 SET	REMOTE ALARM & TIMER BY OTHERS	BY SECURITY
	(REFER TO SPECIFICATIONS, SPECIALTY SECTION)	

1 SINGLE DOOR D221D LHR SHOWER

867mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

1 EACH	HINGES	TA314 4.5 X 4 NRP C32D
	(INSTALL REG. HINGE AT TOP LOCATION)	
2 EACH	SPRING HINGE	1552 4.5 X 4 C32D
1 EACH	INSTITUTIONAL PRIVACY W/INDICATOR	V21 EMB 8257 LNJ L/C C32D
1 EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
2 EACH	COAT HOOK	GSH307B C32D
	(PRIOR TO ORDERING COAT HOOKS, SITE VERIFY, TO MATCH TYPICAL BATHROOM, REFER TO ARCH DRWG FOR MOUNTING HEIGHT - REFER TO BATHROOM ACCESSORIES SPECIFICATIONS)	
1 EACH	CONCEALED OVERHEAD STOP	1538S C26D
1 SET	REMOTE ALARM & TIMER BY OTHERS	BY SECURITY
	(REFER TO SPECIFICATIONS, SPECIALTY SECTION)	

1 SINGLE DOOR D221W LHR WATER CLOSET

820mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

1 EACH	HINGES	TA314 4.5 X 4 NRP C32D
	(INSTALL REG. HINGE AT TOP LOCATION)	
2 EACH	SPRING HINGE	1552 4.5 X 4 C32D
1 EACH	INSTITUTIONAL PRIVACY W/INDICATOR	V21 EMB 8257 LNJ L/C C32D
1 EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
2 EACH	COAT HOOK	GSH307B C32D
	(PRIOR TO ORDERING COAT HOOKS, SITE VERIFY, TO MATCH TYPICAL BATHROOM, REFER TO ARCH DRWG FOR MOUNTING HEIGHT - REFER TO BATHROOM ACCESSORIES SPECIFICATIONS)	
1 EACH	CONCEALED OVERHEAD STOP	1537S 26D
1 SET	REMOTE ALARM & TIMER BY OTHERS	BY SECURITY
	(REFER TO SPECIFICATIONS, SPECIALTY SECTION)	

1 SINGLE DOOR D221X LHR WATER CLOSET

820mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

1 EACH	HINGES	TA314 4.5 X 4 NRP C32D
	(INSTALL REG. HINGE AT TOP LOCATION)	
2 EACH	SPRING HINGE	1552 4.5 X 4 C32D
1 EACH	INSTITUTIONAL PRIVACY W/INDICATOR	V21 EMB 8257 LNJ L/C C32D
1 EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
2 EACH	COAT HOOK	GSH307B C32D
	(PRIOR TO ORDERING COAT HOOKS, SITE VERIFY, TO MATCH TYPICAL BATHROOM, REFER TO ARCH DRWG FOR MOUNTING HEIGHT - REFER TO BATHROOM ACCESSORIES SPECIFICATIONS)	
1 EACH	CONCEALED OVERHEAD STOP	1537S 26D
1 SET	REMOTE ALARM & TIMER BY OTHERS	BY SECURITY
	(REFER TO SPECIFICATIONS, SPECIALTY SECTION)	

1 SINGLE DOOR D221Y LHR WATER CLOSET

820mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

1 EACH	HINGES	TA314 4.5 X 4 NRP C32D
	(INSTALL REG. HINGE AT TOP LOCATION)	
2 EACH	SPRING HINGE	1552 4.5 X 4 C32D
1 EACH	INSTITUTIONAL PRIVACY W/INDICATOR	V21 EMB 8257 LNJ L/C C32D
1 EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
2 EACH	COAT HOOK	GSH307B C32D
	(PRIOR TO ORDERING COAT HOOKS, SITE VERIFY, TO MATCH TYPICAL BATHROOM, REFER TO ARCH DRWG FOR MOUNTING HEIGHT - REFER TO BATHROOM ACCESSORIES SPECIFICATIONS)	
1 EACH	CONCEALED OVERHEAD STOP	1537S 26D
1 SET	REMOTE ALARM & TIMER BY OTHERS	BY SECURITY
	(REFER TO SPECIFICATIONS, SPECIALTY SECTION)	

1 SINGLE DOOR D221Z LHR **WATER CLOSET**

820mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: A

HOLLOW METAL INSULATED DOOR
HOLLOW METAL FRAME

1	EACH	HINGES	TA314 4.5 X 4 NRP C32D
		(INSTALL REG. HINGE AT TOP LOCATION)	
2	EACH	SPRING HINGE	1552 4.5 X 4 C32D
1	EACH	INSTITUTIONAL PRIVACY W/INDICATOR	V21 EMB 8257 LNJ L/C C32D
1	EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
2	EACH	COAT HOOK	GSH307B C32D
		(PRIOR TO ORDERING COAT HOOKS, SITE VERIFY, TO MATCH TYPICAL BATHROOM, REFER TO ARCH DRWG FOR MOUNTING HEIGHT - REFER TO BATHROOM ACCESSORIES SPECIFICATIONS)	
1	EACH	CONCEALED OVERHEAD STOP	1537S 26D
1	SET	REMOTE ALARM & TIMER BY OTHERS	BY SECURITY
		(REFER TO SPECIFICATIONS, SPECIALTY SECTION)	

1 SINGLE DOOR D222 LH **JANITOR/STORAGE**

867mm x 2135mm x 45mm

FRAME TYPE: A

DOOR TYPE: E / DOOR DETAIL: LOUVRE @ DR BOTTOM

HOLLOW METAL DOOR
HOLLOW METAL FRAME

3	EACH	HINGES	TA714 4.5 X 4 C26D
1	EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1	EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
1	EACH	DOOR CLOSER	1431 O EN
1	EACH	DOOR LOUVRE AL	CDL-18 X 12
1	EACH	FLOOR STOP	GSH209 C26D

EXISTING DOOR EX_D001

915mm x 2035mm x 45mm

NOTE:

- replace top 2 hinges
- REPLACE bottom f/bolt as required
- install wall stops

2	EACH	HINGES	TA786 4.5 X 4.5 C26D
1	EACH	FLUSH BOLT	GSH401 C26D
2	EACH	WALL STOP	GSH 240B C26D
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D001A

2/900mm x 2150mm x 45mm

NOTE:

- replace hinges
- Replace f/bolts
- clean rust off door pulls

6	EACH	HINGES	TA386 4.5 X 4.5 NRP C32D
2	EACH	FLUSH BOLT	GSH401 C26D
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D001B

2/900mm x 2150mm x 45mm

NOTE:

- replace hinges
- Replace f/bolts
- clean rust off door pulls

6	EACH	HINGES	TA386 4.5 X 4.5 NRP C32D
2	EACH	FLUSH BOLT	GSH401 C26D
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D001C

2/900mm x 2150mm x 45mm

NOTE:

- REPLACE HINGES
- REPLACE F/BOLTS
- CLEAN RUST OFF DOOR PULLS

6	EACH	HINGES	TA386 4.5 X 4.5 NRP C32D
2	EACH	FLUSH BOLT	GSH401 C26D
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

NOTE:

- SITE REVIEW EXISTING MAGLOCK IF FUNCTIONAL

EXISTING DOOR EX_D002

915mm x 2035mm x 45mm

3/4HR FIRE LABEL

NOTE:

- REMOVE KICK STOP
- ADJUST DOOR

1	EACH	HARDWARE BY OTHERS	EXISTING TO REMAIN

EXISTING DOOR EX_D003

915mm x 2035mm x 45mm

3/4HR FIRE LABEL

NOTE:

- replace hinges
- REMOVE KICK STOP
- ADJUST DOOR

3	EACH	HINGES	TA714 4.5 X 4 NRP C26D
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D004

915mm x 2035mm x 45mm

1	EACH	HARDWARE BY OTHERS	EXISTING TO REMAIN

EXISTING DOOR EX_D005

915mm x 2035mm x 45mm

1	EACH	HARDWARE BY OTHERS	EXISTING TO REMAIN

EXISTING DOOR EX_D006

915mm x 2035mm x 45mm

NOTE:

- REPLACE DOOR STOP

1	EACH	FLOOR STOP	GSH209 C26D
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D007 STORAGE

760mm x 2035mm x 45mm

1	EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1	EACH	MORTISE CYLINDER	BASE BUILDING KEYWAY
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D008

760mm x 2035mm x 45mm

1 EACH	HARDWARE BY OTHERS	EXISTING TO REMAIN

EXISTING DOOR EX_D009

915mm x 2035mm x 45mm

1 EACH	HARDWARE BY OTHERS	EXISTING TO REMAIN

EXISTING DOOR EX_D011

915mm x 2035mm x 45mm

1 EACH	DOOR CLOSER COVER	8445 - 8501 689
1 EACH	HARDWARE BY OTHERS	EXISTING TO REMAIN

EXISTING DOOR EX_D012

915mm x 2035mm x 45mm

1 EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1 EACH	DOOR CLOSER COVER	8445 - 8501 689
1 EACH	FLOOR STOP	GSH209 C26D
1 EACH	DOOR SWEEP	18100CNB X 36 TK BL
1 ROLL	DOOR GASKET	S88BL 17FT
1 LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D013

915mm x 2035mm x 45mm

1 EACH	HARDWARE BY OTHERS	EXISTING TO REMAIN

EXISTING DOOR EX_D014

915mm x 2035mm x 45mm

1 EACH	HARDWARE BY OTHERS	EXISTING TO REMAIN

EXISTING DOOR EX_D014C

2/760mm+- x 2135mm x 45mm

1 EACH	HARDWARE BY OTHERS	EXISTING TO REMAIN

EXISTING DOOR EX_D014D

2/760mm+- x 2135mm x 45mm

1 EACH	HARDWARE BY OTHERS	EXISTING TO REMAIN

EXISTING DOOR EX_D014E

2/760mm+- x 2135mm x 45mm

1 EACH	HARDWARE BY OTHERS	EXISTING TO REMAIN

EXISTING DOOR EX_D015

1220mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- replace hinges
- ADJUST DOOR

3 EACH	HINGES	TA714 4.5 X 4 NRP C26D
1 EACH	MORTISE PASSAGE SET	8215 LNJ C26D
1 EACH	DOOR SWEEP	18100CNB X 48 AL
1 ROLL	DOOR GASKET	S88BL20
1 LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D015B

915mm x 2035mm x 45mm

20 MIN LABEL

1 EACH	DOOR SWEEP	18100CNB X 36 TK BL
1 ROLL	DOOR GASKET	S88BL 17FT
1 LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D015C

900mm x 2150mm x 45mm

NOTE:

- REPLACE HINGES

3 EACH	HINGES	TA386 4.5 X 4.5 NRP C32D
1 LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D101

915mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- remove chalking from lockset and make good

1 ROLL	DOOR GASKET	S88BL 17FT
1 LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D103

915mm x 2035mm x 45mm

NOTE:

- replace hinges
- REPLACE LOCKSET
- REPLACE KICKPLATE

3	EACH	HINGES	TA714 4.5 X 4 NRP C26D
1	EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1	EACH	KICKPLATE	GSH80A 8in X 34.5in TAPE C32D
1	EACH	FLOOR STOP	GSH209 C26D
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D103A

2/915mm x 1135mm x

1	EACH	HARDWARE BY OTHERS	EXISTING TO REMAIN

EXISTING DOOR EX_D104

2/900mm x 2150mm x 45mm

NOTE:

- replace hinges
- REPLACE FLUSHBOLTS
- REPLACE DEADLOCK
- rEPLACE ONE LEAKING CLOSER

6	EACH	HINGES	TA714 4.5 X 4 NRP C26D
2	EACH	FLUSH BOLT	GSH401 C26D
1	EACH	DEAD LATCH	4900-35- 201-628
1	EACH	DOOR CLOSER	UNI-J-7500 689
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D105

915mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- ADJUST DOOR

1	EACH	FLOOR STOP	GSH209 C26D
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D107

865mm x 2035mm x 45mm

20 MIN LABEL

1	EACH	HARDWARE BY OTHERS	EXISTING TO REMAIN

EXISTING DOOR EX_D108

865mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- replace TOP hinge
- ADJUST DOOR CLOSER

1	EACH	HINGES	TA714 4.5 X 4 C26D
1	ROLL	DOOR GASKET	S88BL 17FT
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D109

867mm x 2135mm x 45mm

NOTE:

- replace hinges
- ADJUST DOOR CLOSER

3	EACH	HINGES	TA386 4.5 X 4.5 NRP C32D
1	EACH	KICKPLATE	GSH80A 8in X 34in TAPE C32D
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D109A

900mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- ADJUST DOOR, DOOR, BINDING ON FLOOR AT 90 DEGREE
- DOOR BOTTOM CORRODING, REPAIR AND MAKE GOOD

1	EACH	WALL STOP	GSH 240B C26D
1	ROLL	DOOR GASKET	S88BL 17FT
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

1 SINGLE DOOR EX_D116

867mm+- x 2135mm+- x 45mm

HOLLOW METAL DOOR
EX. HOLLOW METAL FRAME

NOTE:

SITE REVIEW OPENING - RECOMMENDATION IS TO REPLACE DOOR

3	EACH	HINGES	TA386 4.5 X 4.5 NRP C32D
1	EACH	EXIT DEVICE	8888F C32D
1	EACH	DOOR CLOSER	351 CPS EN
1	EACH	KICKPLATE	GSH80A 8in X 34.5in TAPE C32D
1	EACH	THRESHOLD	252 X 3AFG 36in
1	EACH	WEATHERSTRIP	315CR 17ft 1/3ft + 2 X 7ft AL
1	EACH	DOOR SWEEP	18100CNB X 36 TK BL
1	EACH	DOOR CONTACT	MSS100-4 SPDT /WHITE

NOTE:

EXIT ONLY, NO EXTERIOR ACCESS

EXISTING DOOR EX_D116A

810mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- ADJUST DOOR, DOOR, BINDING ON FLOOR AT 90 DEGREE
- remove chalking from lockset and make good

1	EACH	WALL STOP	GSH 240B C26D
1	ROLL	DOOR GASKET	S88BL 17FT
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D116B

2/1220mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- replace hinges
- REPLACE FLUSHBOLTS
- remove chalking from lockset and make good

6	EACH	HINGES	TA714 5 X 4.5 C26D
1	SET	AUTOFLUSH BOLT	FB51P 630
1	ROLL	DOOR GASKET	S88BL 25FT
1	EACH	ASTRAGAL SEAL	18061CNB X 84 AL
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D117

865mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- ADJUST DOOR CLOSER

1	ROLL	DOOR GASKET	S88BL 17FT
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D118

865mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- ADJUST DOOR CLOSER

1	ROLL	DOOR GASKET	S88BL 17FT
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D124

915mm x 2135mm x 45mm

1	EACH	FACE PLATE	50-8805-7219 630
1	EACH	FLOOR STOP	GSH209 C26D
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D200

1220mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- ADJUST DOOR FOR PROPER OPERATION
- remove chalking from lockset and make good

3	EACH	HINGES	TA786 5 X 4.5 C26D
1	EACH	TRANSFORMER FOR SENTRONIC CLOSER	4040SE-3210
1	EACH	DOOR CLOSER HOLD OPEN	4040SE TBWMS 24V 689
1	EACH	FLOOR STOP	GSH209 C26D
1	EACH	DOOR SWEEP	18100CNB X 48 AL
1	ROLL	DOOR GASKET	S88BL20
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D200A

1220mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- ADJUST DOOR FOR PROPER OPERATION
- remove chalking from lockset and make good

3	EACH	HINGES	TA786 5 X 4.5 C26D
1	EACH	TRANSFORMER FOR SENTRONIC CLOSER	4040SE-3210
1	EACH	DOOR CLOSER HOLD OPEN	4040SE TBWMS 24V 689
1	EACH	FLOOR STOP	GSH209 C26D
1	EACH	DOOR SWEEP	18100CNB X 48 AL
1	ROLL	DOOR GASKET	S88BL20
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D200B

2/1200mm x 2150mm x 45mm

6	EACH	HINGES	TA386 5 X 4.5 NRP C32D
2	EACH	FLUSH BOLT	GSH401 C26D
1	EACH	DEAD LATCH	4900-35- 201-628
1	EACH	PUSH PADDLE	4591-02-00-628
2	SET	DOOR PULL	GSH1180-2 #5-MTG BTB C32D
2	EACH	DOOR SWEEP	18100CNB X 48 AL
2	EACH	DOOR CONTACT	MSS100-4 SPDT /WHITE
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D200C

2745mm x 1330mm x

NOTE:

FIRE SHUTTER

1	EACH	HARDWARE BY OTHERS	EXISTING TO REMAIN

EXISTING DOOR EX_D201

865mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- ADJUST DOOR CLOSER

1	EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1	EACH	FLOOR STOP	GSH209 C26D
1	ROLL	DOOR GASKET	S88BL 17FT
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D202

865mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- ADJUST DOOR CLOSER

3	EACH	HINGES	TA714 4.5 X 4 C26D
1	EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1	ROLL	DOOR GASKET	S88BL 17FT
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D206

760mm x 2035mm x 45mm

NOTE:

- ADJUST DOOR CLOSER

1	EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1	EACH	DOOR SWEEP	18100CNB X 36 TK BL
1	ROLL	DOOR GASKET	S88BL 17FT
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D207

915mm x 2035mm x 45mm

1	EACH	DOOR LOUVRE AL	CDL-18 X 12
1	EACH	OVERHEAD STOP	1548S C26D
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D210

865mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- ADJUST DOOR CLOSER
- REVIEW DOOR FOR REPLACEMENT

1 EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1 ROLL	DOOR GASKET	S88BL 17FT

EXISTING DOOR EX_D211

965mm x 2135mm x 45mm

20 MIN LABEL

NOTE:

- ADJUST DOOR CLOSER

1 EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1 EACH	DOOR CLOSER COVER	8445 - 8501 689
1 LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D212

865mm x 2035mm x 45mm

20 MIN LABEL

3 EACH	HINGES	TA714 4.5 X 4 C26D
1 EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1 EACH	OVERHEAD STOP 630	2-336 630
1 ROLL	DOOR GASKET	S88BL 17FT
1 LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D213

865mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- ADJUST DOOR CLOSER

3 EACH	HINGES	TA714 4.5 X 4 C26D
1 EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1 EACH	OVERHEAD STOP 630	2-336 630
1 ROLL	DOOR GASKET	S88BL 17FT
1 LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D214

865mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- ADJUST DOOR CLOSER
- REVIEW DOOR FOR REPLACEMENT

1 EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1 ROLL	DOOR GASKET	S88BL 17FT
1 LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D215

865mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- ADJUST DOOR CLOSER
- REVIEW DOOR FOR REPLACEMENT

3 EACH	HINGES	TA714 4.5 X 4 C26D
1 EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1 ROLL	DOOR GASKET	S88BL 17FT
1 LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D216

865mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- ADJUST DOOR CLOSER
- REVIEW DOOR FOR REPLACEMENT

1 EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1 ROLL	DOOR GASKET	S88BL 17FT
1 EACH	DOOR CONTACT	MSS100-4 SPDT /WHITE
1 LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D217

865mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- ADJUST DOOR CLOSER
- REVIEW DOOR FOR REPLACEMENT
- ADJUST OVERHEAD STOP AS REQUIRED

1	EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1	ROLL	DOOR GASKET	S88BL 17FT
1	EACH	DOOR CONTACT	MSS100-4 SPDT /WHITE
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D218

810mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- remove chalking from lockset and make good

1	EACH	WALL STOP	GSH 240B C26D
1	ROLL	DOOR GASKET	S88BL 17FT

EXISTING DOOR EX_D218A

915mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- remove chalking from lockset and make good

1	EACH	DOOR SWEEP	18100CNB X 36 TK BL
1	ROLL	DOOR GASKET	S88BL 17FT
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D220

915mm x 2035mm x 45mm

NOTE:

- ADJUST DOOR CLOSER

1	EACH	FACE PLATE	50-8805-7219 630
1	EACH	KICKPLATE	GSH80A 8in X 34.5in TAPE C32D
1	EACH	FLOOR STOP	GSH209 C26D
1	EACH	DOOR SWEEP	18100CNB X 36 TK BL
1	ROLL	DOOR GASKET	S88BL 17FT
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D228

865mm x 2035mm x 45mm

20 MIN LABEL

NOTE:

- ADJUST DOOR CLOSER

3	EACH	HINGES	TA714 4.5 X 4 C26D
1	EACH	KICKPLATE	GSH80A 8in X 32.5in TAPE C32D
1	ROLL	DOOR GASKET	S88BL 17FT
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D229

865mm x 2035mm x 45mm

1	EACH	MORTISE STOREROOM LOCKSET	8204 LNJ C26D
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D300A

915mm x 2035mm x 45mm

NOTE:

- remove chalking from lockset and make good
- ADJUST DOOR CLOSER
- ADJUST DOOR FOR PROPER CLOSING

1	EACH	KICKPLATE	GSH80A 8in X 34.5in TAPE C32D
1	EACH	FLOOR STOP	GSH209 C26D
1	ROLL	DOOR GASKET	S88BL 17FT
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D300B

1220mm x 2035mm x 45mm

NOTE:

- ADJUST DOOR CLOSER

1	EACH	DEAD LATCH	4900-35- 201-628
1	EACH	PUSH PADDLE	4591-02-00-628
1	EACH	WALL STOP	GSH 240B C26D
1	EACH	DOOR CONTACT	MSS100-4 SPDT /WHITE
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

EXISTING DOOR EX_D300C

915mm x 2035mm x 45mm

1	EACH	WALL STOP	GSH 240B C26D
1	LOT	HARDWARE BY OTHERS	BALANCE OF EXISTING TO REMAIN

END OF SCHEDULE

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment, tools, and services necessary for glass and glazing work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ANSI Z97.1, For Safety Glazing Materials used in Buildings - Safety Performance Specifications and Methods of Test.

.2 ASTM C920, Specification for Elastomeric Joint Sealants.

.3 ASTM C1376, Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass.

.4 ASTM D2240, Test Method for Rubber Property - Durometer Hardness.

.5 ASTM E2190, Standard Specification for Insulating Glass Unit Performance and Evaluation.

.6 CAN/CGSB-12.1-M, Tempered or Laminated Safety Glass.

.7 CAN/CGSB-12.8, Insulating Glass Units.

.8 Glass Association of North America (GANA) Glazing Manual.

.9 UL 972, Burglary-Resisting Glazing Material.

1.3 **DESIGN REQUIREMENTS**

.1 Glass design:
- .1 Design glass using a probability of breakage of 8 lites per 1000 at the first application of design load.
- .2 Perform stress analysis. Design units to accommodate live, dead, lateral, wind, seismic, handling, transportation, and erection loads.
- .3 Perform a thermal stress analysis on each glass unit with Low-E coating and provide heat strengthening and/or tempered units as necessary to prevent thermal breakage.
- .4 Perform a thermal stress analysis on each insulating thermal unit and provide heat strengthening and/or tempered units as necessary to prevent thermal breakage.
- .5 Where required, design glazing units so as not to allow thermal stress fracture due to heat build-up behind insulating units.
- .6 Roller wave:
  - .1 Heat treated flat glass to be by horizontal (roller hearth) process with inherent roller wave distortion parallel to the bottom edge of the glass as installed.

.2 Maximum peak to valley roller wave 0.08 mm in the central area and 0.20 mm within 267 mm of the leading and trailing edge or 100 millidiopter over 95% of the glass surface.
.3 Maximum bow and warp 0.79 mm per 300 mm.
.4 Roll distortion is to run parallel to the width dimension when installed in the building.

.7 Coordinate with applicable Sections as required to meet intended energy and performance requirements for insulating glass units.

.2 Limit glass deflection to flexural limit of glass with full recovery of glazing materials.

.3 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.

1.4 SUBMITTALS

.1 Shop drawings:
.1 Submit shop drawings in accordance with Section 01 33 00 indicating as a minimum:
.1 Fabrication and erection of glazing elements indicating materials, thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

.2 Samples:
.1 Submit following samples in accordance with Section 01 33 00.
.2 Submit one sample of each type of glass.
.1 300 x 300 mm of each type of insulating glass unit, complete with each different Low-E coating.
.2 300 x 300 mm of each type of laminated glass.
.3 300 x 300 mm of each type of glass film.

.3 Certificates: Submit manufacturer's certification that glass and glazing materials are compatible.

.4 IGMAC Compliance Audit: Submit in accordance with Section 01 33 00, a written certification of successful completion of a Compliance Audit within the last six months.

.5 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.

1.5 QUALITY ASSURANCE

.1 Insulating glass unit fabricators shall be a certified member of the Fenestration and Glazing Industry Alliance (FGIA). FGIA members must participate in the certification program and shall have successfully passed a Compliance Audit within the last six months.

.2 Installers qualifications: Perform work of this Section by a company that has a minimum of five years proven experience in the installation of glazing units of a similar size and nature.

1.6 **SITE CONDITIONS**

.1 Glaze with compounds, sealants, or tapes only when glazing surfaces are at temperatures over 4°C, and when positive that no moisture is accumulating on them from rain, mist, or condensation.

.2 When temperature of glazing surfaces is below 4°C, obtain from Consultant and material manufacturer approval of glazing methods and protective measures which will be used during glazing operations.

1.7 **EXTENDED WARRANTY**

.1 In accordance with Section 08 44 00.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

.1 Glass manufacturers:
- .1 AGC Flat Glass.
- .2 Cardinal Glass Industries.
- .3 Guardian Industries.
- .4 Pilkington Glass of Canada Ltd.
- .5 Viracon Inc.
- .6 Vitro Architectural Glass (formerly PPG Industries Ltd.)

2.2 **MATERIALS**

.1 General:
- .1 All materials under work of this Section, including but not limited to, primers, coatings, sealers, sealants, adhesives and cleaners are to have low VOC content limits.
- .2 All coatings of a similar type shall be applied in a single production run to ensure colour match.
- .3 Edges of glass shall be free from spalls, flake chips or rough chips which would be either visible or compromise the adhesion of the exterior weather seal or reduce the strength of glass when subjected to temperature differentials.

.2 Tempered glass **(TGL)**: CAN/CGSB-12.1-M, Type 2, Class B, Category II, clear, minimum 6 mm thick.

.3 Tempered/laminated glass **(LGL)**:
- .1 Tempered/laminated glass **(LGL1)**: To CAN/CGSB-12.1, Category II, consisting of 3 mm thick clear tempered glass (TGL) panes, sandwiching a 0.8 mm thick clear PVB interlayer. Approximate thickness of 6.8 mm (nominal thickness of 7 mm).
- .2 Tempered/laminated glass **(LGL2)**: To CAN/CGSB-12.1, Category II, consisting of 3 mm thick clear tempered glass (TGL) panes, sandwiching a 1.14 mm thick clear PVB interlayer, for an STC rating of 35. Approximate thickness of 7.14 mm (nominal thickness of 7 mm).
- .3 PVB interlayer to be 'Butacite PVB' film by Dupont or approved alternative.

.4 Privacy glass film **(GF)**: Privacy glass film in style as selected by Consultant and manufactured by 3M or approved equal. Application pattern as indicated on drawings.

.5 Security film **(SF)**:
- .1 Glass surface area 1.8 sq. m. or greater: ANSI Z97.1, Class A, UL 972; 8 mil micro-layered polyester film. 'ScotchShield Ultra S800 Series' by 3M Film or approved equal.
- .2 Glass surface less than 1.8 sq. m.: ANSI Z97.1, Class A, UL 972; 14 mil monolithic polyester film. 'Safety S140' by 3M Film or approved equal.
- .3 Perimeter anchoring system for film as recommended by film manufacturer for intended end use.

.6 Insulating glass units:
- .1 To CAN/CGSB-12.8-M, ASTM E2190 and IGMA requirements utilizing approved stainless steel edge spacer. Dual seal with a PIB primary seal and silicone secondary seal.
- .2 To comply with IGMA labelling requirements to be considered certified. Materials, excluding the glass, shall be from the same manufacturer as those employed for the certification of the insulating glass units.

.7 Argon gas: 100% pure. Argon gas to be used to fill air space at all insulated glass units.

.8 Low-E coating: ASTM C1376, high performance sputtered low-E coating. Provide insulating glass units with low-E coating edge deletion and low-E coating. Apply low-E coating to second surface unless otherwise indicated. 'Solarban 60' Clear by Vitro Architectural Glass (formerly PPG Industries Ltd.) or approved equal by AGC Flat Glass, Cardinal Glass Industries or Guardian Industries.

.9 Glazing and rebate primers, sealants, sealers, and cleaners: Compatible with each other. Type as recommended by sealant, spline, and glass manufacturer.

.10 Glazing sealant: Silicone sealant as recommended by glazing manufacturer. Verify compatibility with insulating glass unit secondary sealant.

.11 Glazing sealant (structural glazing - interior):
- .1 Silicone, One Part in accordance with ASTM C920, Type S or M, Grade NS, Class 25.
- .2 Structural glazing tensile bead: 'Proglaze SSG' by Tremco or 'Dowsil 795' by Dow Consumers Solution.
- .3 Structural glazing (factory glazed): Two-part, neutral cure silicone sealant, 'Proglaze II' by Tremco or 'Dowsil 983' by Dow Consumers Solution.
- .4 Colour: Colour to be selected by the Consultant from full colour range.

.12 Heel & toe bead: Silicone sealant as recommended by glazing manufacturer.

.13 Glazing gasket: 'Visionstrip' or Polyshim II' by Tremco Ltd., glazing seal, size as recommended by manufacturer.

.14 Glazing tape: 'Polyshim II' glazing tape EPDM shim.

.15 Glazing splines: EPDM, neoprene or silicone, extruded shape to suit glazing channel retaining slot, colour as selected.

.16 Setting blocks (regular): EPDM, 80 - 90 Shore A durometer hardness to ASTM D2240, sized to suit glazing method, glass unit weight and area.

.17 Setting Block (Structural Glazing): Silicone setting blocks with Shore, Type A durometer hardness of 85, plus or minus 5 to ASTM D2240, sized to suit glazing method, glass unit weight and area.

.18 Edge blocks: EPDM, 60-70 Shore A Durometer hardness, self adhesive on face, sized with 3 mm clearance from glass edge and spanning glass thickness(es).

.19 Glass presence markers: Easily removable, non-residue depositing.

.20 Screws, bolts and fasteners: Type 304 stainless steel.

.21 Speaker port: Stainless steel speaker port with diameter of 125 mm, consisting of plates with slots and gaskets and having a brushed finish, 'CRL Stainless Steel Speak-Thru' by C.R. Laurence Co., Inc. or approved equal.

2.3 GLAZING AND FILM SCHEDULE

.1 General: Glass types shall be as indicated below unless otherwise required due to thermal stress analysis.

.2 **Glazing Type GL1**:
- Minimum 6 mm thick clear tempered glass (TGL) outside, argon filled air space, minimum 6 mm thick clear tempered glass (TGL) inside, complete with low E coating and security film (SF) to meet security requirements of the Project.
- Standard throughout for IGU units at curtain wall/entrance framing, windows, vestibule and exterior doors. 25 mm overall thickness.

.3 **Glazing Type GL2**: Minimum 12 mm thick clear tempered glass (TGL), complete with security film (SF) to meet security requirements of the Project, for interior transaction windows and screens.

.4 **Glazing Type GL3**: Nominal 7 mm thick clear tempered/laminated glass (LGL1), for vision panels of non-rated interior doors.

.5 **Glazing Type GL4:** Minimum 12 mm thick clear tempered glass (TGL), for interior glazed screens.

.6 **Glazing Type GL5**: Nominal 7 mm thick clear tempered/laminated glass (LGL2), for use in acoustic glazing where STC rating of 35 is required.

.7 **Film Type 1**: Privacy film (GF) where indicated.

.8 **Film Type 2**: Security film (SF) for application to new glazing in IGUs and existing glazing as required to meet security requirements of the Project.

2.4 **FABRICATION**

.1 Verify glazing dimensions on Site.

.2 Clearly label each glass lite with maker's name and glass type. Ensure labels are easily removable, non-residue depositing type. Do not remove labels until after Work is accepted by Consultant.

.3 Fabricate glazing not less than 3 mm smaller than rebate size in either dimension; allow for edge spacers, shims, and setting blocks as necessary.

.4 Work shall have smooth finished surfaces free from distortion and defects detrimental to appearance and performance.

.5 Carefully make and fit details. Take special care with exposed finished work to produce a neat and correct appearance to the Consultant's acceptance.

.6 Grind and polish a 1.5 mm arris to both edges of exposed glazing at locations where glazing is not encapsulated in framing and where edges are exposed to occupants.

.7 Fabricate argon filled thermal units with air space filled minimum 90% with argon gas.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

.2 Verify that openings for glazing are correctly sized and within tolerance.

.3 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

.4 Laminated glass edges shall be completely covered by tape to protect against sealants and water if required by manufacturer.

3.2 **PREPARATION**

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.3 **INSTALLATION**

.1 Provide glazing in accordance with FGIA recommendations. Provide continuous contact between glazing tapes and gasket to the glazing.

.2 Install glazing to the work of Sections 08 11 13 and 08 44 00.

.3 Provide neat, straight sight lines. Trim excess glazing tape flush with top of stops and fixed leg of frames.

.4 Remove protective coatings, glazing stops, clean rebate and glass contact surfaces with solvent, wipe dry.

.5 Apply primer/sealer to contact surfaces, prior to glazing.

.6 Apply glazing tape as per manufacturer’s instructions including recommended corner sealant.

.7 Use setting blocks at 1/4 points and spacers to centre glass unit in frame.

.8 Install glazing in accordance with reviewed shop drawings and manufacturer's written instructions. Install glazing with full contact and adhesion at perimeter. Maintain edge clearance recommended by glass manufacturer.

.9 Apply a continuous heel bead of sealant around perimeter of inboard lite of the sealed unit and the metal framing.

.10 Re-install glazing stops ensuring continuous contact and rattle-free installation. Do not distort glass. Trim tape protruding more than 2 mm above stop.

.11 Install glazing gasket in accordance with manufacturer's recommendations.

.12 Do not cut or abrade tempered, heat treated, or coated glass.

.13 Install glass presence markers in two cross stripes extending from diagonal corners. Maintain markers until final clean-up.

.14 Remove, dispose of, and replace broken, cut, abraded glass, and defective glass including but not limited to production dimples, roller wave or marks, tong marks, chips, cracks, etc.

.15 Exterior glass: Glaze units with gasket on exterior side and glazing tape on interior side. Seal gap between glazing and stop with sealant to depth equal to bite of frame. Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

.16 Structural glazing: Glaze units in accordance with reviewed shop drawings and in accordance with manufacturer's written instructions.

.17 Interior glass: Glaze interior glass using glazing gasket glazing tape.

.18 Glass film
- .1 Install glass film with adhesive, applied in accordance with film manufacturer's instructions.
- .2 Place without air bubbles, creases or visible distortion.
- .3 Fit tight to glass perimeter with razor cut edge.

.19 Security film:
- .1 Install security film with adhesive, applied in accordance with film manufacturer's instructions.
- .2 Place without air bubbles, creases or visible distortion.
- .3 Fit tight to glass perimeter with razor cut edge.
- .4 Apply security sealant from perimeter of glass units in accordance with manufacturers written instructions to achieve specified level of security.

3.4 CLEANING

.1 Immediately remove sealant and compound droppings from finished surfaces.

.2 Remove labels, protective material, and glass presence markers from prefinished surfaces.

.3 Clean glass surfaces with cleaning agents and methods in accordance with manufacturer's written instructions.

.4 Do not wash glass film for 30 days after installation.

.5 Do not use bristle brushes on glass film.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for gypsum board work.

1.2 **REFERENCES**

.1 ASTM A653/A653M, Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

.2 ASTM C475, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.3 ASTM C645, Specification for Nonstructural Steel Framing Members.

.4 ASTM C754, Specification for Steel Framing Members to Receive Screw-Attached Gypsum Board.

.5 ASTM C834, Standard Specification for Latex Sealants.

.6 ASTM C840, Specification for Application and Finishing of Gypsum Board.

.7 ASTM C1002, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.8 ASTM C1178, Specification for Glass Mat Water-Resistant Gypsum Backing Board.

.9 ASTM C1278, Specification for Fiber-Reinforced Gypsum Panel.

.10 ASTM C1396, Specification for Gypsum Board.

.11 CAN/ULC-S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.3 **DESIGN REQUIREMENTS**

.1 Design gypsum board wall and ceiling systems with a maximum deflection of l/360.

.2 Design ceiling system for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

.3 Design hanger anchor and entire ceiling system static loading not to exceed 25% of their ultimate capacity including lighting fixture dead loads.

.4 Design ceiling system to support weight of mechanical and electrical items such as air handling boots and lighting fixtures, and with adequate support to allow rotation/relocation of light fixtures.

.5 Design subframing as necessary to accommodate, and to circumvent, conflicts and interferences where ducts or other equipment prevent the regular spacing of hangers.

.6 Design wall framing system and reinforce as necessary to accommodate and support items attached to and supported by wall framing system.

.7 Design wall framing system for wall assemblies with a height greater than 3000 mm and those assemblies incorporating non-standard gypsum board assemblies including, but not limited to, abuse resistant gypsum board, large format tile applications, etc.

1.4 REGULATORY REQUIREMENTS

.1 Provide fire separations and fire protection exactly as specified in test design specification that validates the specified rating. Verify that work specified in other Sections, as a part of the entire assembly, meets applicable validating test design specification.

1.5 SUBMITTALS

.1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop Drawings:
- .1 Submit Shop Drawings in accordance with Section 01 33 00 indicating:
  - .1 Wall and ceiling assemblies, adjacent construction, elevations, sections and details, dimensions, thickness, finishes and relationship to adjacent construction.
  - .2 Framing and blocking for items being supported of wall systems.
  - .3 Fire rated designs.

.3 Certifications: Submit written certification stating that suspended ceiling system is designed for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

1.6 **QUALITY ASSURANCE**

.1 Qualifications: Execute the work of this Section by skilled, qualified, and experienced workers trained in the installation of the work of this Section.

.2 Retain a Professional Engineer, licensed in Province of Ontario, with experience in work of comparable complexity and scope, to perform following services as part of work of this Section:
- .1 Design of wall systems with height greater than 3000 mm and at non-standard gypsum board assemblies including, but not limited to, assemblies incorporating abuse resistant gypsum board, large format tile applications, etc.
- .2 Design of gypsum board ceiling assemblies.
- .3 Review, stamp, and sign Shop Drawings and design calculations.
- .4 Conduct shop and on-site inspections, prepare and submit written inspection reports verifying that this part of Work is in accordance with Contract Documents and reviewed Shop Drawings.

1.7 **SITE CONDITIONS**

.1 Do not begin work of this Section until:
- .1 Mechanical and electrical work above the ceiling is complete.
- .2 Substrate and ambient temperature is above 15°C.
- .3 Relative humidity is below 80 %.
- .4 Ventilation is adequate to remove excess moisture.

.2 Install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements 24 h before, during, and 24 h after installation.

2 Products

2.1 **MATERIALS**

.1 General: All materials under work of this Section, including but not limited to, sealants, adhesives, and primers are to have low VOC content limits.

.2 Steel framing: ASTM C754; ASTM A653/A653-M, Z275; cold rolled, galvanized steel sheet.
- .1 Bailey Metal Products Limited.
- .2 Corus Metal Profiles.

.3 Steel studs and track runners: ASTM C645; Galvanized steel studs and runners, 32 mm wide x depth as indicated on Contract Drawings. Formed from galvanized steel sheet, thicknesses as follows:
- .1 Studs less than 3000 mm: Minimum 0.53 mm (25 ga.).
- .2 Studs greater than 3000 mm and non-standard assemblies: Minimum 0.91 mm (20 ga.), unless stud thickness of greater thickness is required to accommodate intended loading, spans, or conditions.
- .3 Track runners and ancillary components to match stud thickness.

.4 Fire retardant treatment: In accordance with Section 06 05 73.13.

.5 Wood studs, plywood sheathing and blocking: In accordance with Section 06 10 00.

.6 Resilient channel: ASTM C645; 0.5 mm thick galvanized metal, 57 mm wide x 12 mm deep for walls and ceiling to reduce sound transmission.

.7 Furring channels: ASTM C645; Formed from galvanized steel sheet, 22 mm winged flange type, cold rolled.

.8 Furring channels (hat type): ASTM C645; 0.5 mm base steel thickness, galvanized. 70 mm wide x 22 mm deep hat shaped channel.

.9 Heavy duty furring channels: ASTM C645; 0.9 mm steel thickness, galvanized hat shaped channel with a wider and deeper size as required by manufacturers.

.10 Corner bead, casing bead, and special shapes: Formed from 0.6 mm thick minimum, galvanized steel sheet, designed to be concealed by joint compound.

.11 Deflection track: ASTM C 645 top runner with 50.8-mm- deep flanges, in thickness indicated for studs and in width to accommodate depth of studs.

.12 Deflection track (fire rated): Provide 25 mm deep leg deflection track where indicated on rated walls. ‘Fire Trak Shadowline’ by Fire Trak Corporation or approved equal.

.13 Ceiling clips: Hot dip galvanized partition attachment clips, in square and reveal edge; ‘PAC 15 Series’ to match grid system by CGC Inc. or approved equal.

.14 Gaskets (acoustic partitions): Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 3.2 mm thick, in width to suit steel stud size.

.15 Control joint strip: Roll formed from galvanized steel sheet, with a tape protected recess, 6 mm wide x 11 mm deep.

.16 Screw fasteners: ASTM C1002 Type S; Corrosion resistant.

.17 Concrete anchors: tie wire sleeve anchors, ‘Redi-Drive Anchors' by ITW Red Head or approved equal.

.18 Batt insulation: In accordance with Section 07 21 00.

.19 Standard sealants:
- .1 Acoustic sealant (non-rated): Non-hardening acoustic sealant for use at non-rated assemblies, ASTM C834; Lightweight, acrylic, mould resistant sealant, paintable. 'Lightweight Smoke and Acoustic Sealant CS-S SA Light' by Hilti or approved equal.
- .2 Standard sealants: In accordance with Section 07 92 00.

.20 Fire rated seal: Provide one of the following for use at fire rated assemblies:
- .1 Fire-rated sealant: Non-hardening sealant for use at fire-rated assemblies: CAN/ULC-S102; Acrylic based firestop sealant, colour: red or white as selected by Consultant. 'Flexible Firestop Sealant CP606' by Hilti or approved equal.
- .2 Fire-rated seal: Non-hardening seal for use at fire-rated assemblies: CAN/ULC-S102; Flexible seal for installation between top track and substrate. 'Firestop Top Track Seal CFS-TTS' by Hilti or approved equal.

.21 Gypsum board: ASTM C1396; gypsum board 12.7 mm and 15.9 mm thicknesses as indicated, of maximum practical lengths to minimize end joints, unless indicated otherwise. Furnish Board by CGC Inc., Certainteed Gypsum Canada or Georgia-Pacific Canada LP.

.22 Fire rated gypsum board: ASTM C1396; gypsum board 15.9 mm thick of maximum practical lengths to minimize end joints, unless indicated otherwise. Furnish Type X Board by CGC Inc., Certainteed Gypsum Canada or Georgia-Pacific Canada LP.

.23 Abuse resistant panels: ASTM C1396; 12.7 mm thick unless indicated otherwise on drawings; 'Abuse Resistant' by Certainteed Gypsum Canada, 'Sheetrock AR' by CGC Inc. or 'ToughRock' by Georgia-Pacific Canada LP.

.24 Moisture and mould resistant board: 12.7 mm thick, unless otherwise indicated, of maximum practical lengths to minimize end joints; 'M2Tech Moisture and Mould Resistant' by Certainteed Gypsum Canada, 'Sheetrock Mold Tough' by CGC Inc. or 'DensArmor Plus High Performance Interior Panel' by Georgia-Pacific Canada LP.

.25 Tile backer: Water resistant tile backer board meeting ASTM C1178 or ASTM C1278, thickness as indicated. 'Diamondback Tile Backer' by Certainteed Gypsum Canada, 'Fiberock Aqua-Tough Underlayment' by CGC Inc. or 'Dens Shield' by Georgia-Pacific Canada LP.

.26 Shaftwall gypsum system:
- .1 Steel J-Runner: ASTM C645; Rolled formed sheet steel, 25 gauge, by CGC, Gypsum Corporation or approved equal.
- .2 C-H stud: hot-dipped galvanized by CGC, Gypsum Corporation or approved equal.
- .3 Liner Panel: ASTM C1396; Gypsum wallboard panel, Thickness: 25.4 mm, Width: 610 mm. 'M2Tech Shaftliner Type X' by Certainteed Gypsum Canada, or approved equal by CGC or Gypsum Corporation.

.4 Face Panel: ASTM C1396; Gypsum wallboard panel, 1 layer, Thickness: 15.9 mm, Width: 1219 mm. 'GlasRoc Shaftliner Type X' by Certainteed Gypsum Canada, or approved equal by CGC or Gypsum Corporation.

.27 Primer: Where indicated by board manufacturer, provide primer as required to achieve finishes as defined in ASTM C840.

.28 Joint reinforcing tape:
.1 Standard gypsum board: ASTM C475; 50 mm wide x 0.25 mm thick, perforated paper, with chamfered edges.
.2 Moisture resistant and tile backer boards: ASTM C475; fibreglass mat joint tape as recommended by board manufacturer to suit location.

.29 Bonding adhesive: Type for purpose intended and as recommended and approved by manufacturer.

.30 Joint and patching compound: ASTM C475; Asbestos-free, supplied by manufacturer of gypsum board used.

.31 Fast setting patching compound: ASTM C475; Asbestos-free, Sheetrock or Durabond by CGC Inc., 'Moisture and Mold Resistant Setting Compound with M2Tech' by Certainteed Gypsum Canada or approved equal.

.32 Access doors: Supplied by other Sections for installation as part of the work of this Section.

3 Execution

3.1 EXAMINATION

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 INSTALLATION, GENERAL

.1 Install gypsum board systems in accordance with reviewed shop drawings, manufacturer's written instructions and to meet requirements of authorities having jurisdiction.

.2 Conform to Section 01 57 16 for pest control requirements for gypsum board work.

.3 Coordinate with Sections 06 05 73.13 and 06 10 00 as required for fire treatment, wood studs, plywood sheathing and blocking required for work of this Section.

3.3 STEEL STUDS AND FURRING

.1 Install steel studs and furring in accordance with reviewed Shop Drawings and manufacturer's written instructions.

.2 Install steel stud partitions to underside of structure unless indicated otherwise.

.3 Install track runners at floors, ceilings, and underside of structure; align track runners accurately and secure to structure at 600 mm centres maximum.

.4 Install double top track runner assembly to prevent the transmission of structural loads to steel studs.

.5 Install steel studs vertically at 400 mm o.c., unless otherwise indicated, and not more than 50 mm from abutting walls, at openings, and at each side of corners. Install studs securely to track runners.

.6 Schedule and coordinate steel framing installation with mechanical and electrical services installation.

.7 Install full height, double studs at door and service openings, fastened together and stiffened back to the structure to prevent vibration when doors close.

.8 Provide double studs boxed together at all openings, sill, head and jambs and at door jambs, fastened together and stiffened back to the structure to prevent vibration. At each opening exceeding 900 mm in width, double studs shall be 20 ga. extending to structure above, and adequately anchored at each end. Provide steel studs above and below openings spaced at 400 mm oc maximum. All metal stud partitions above doors and screens over 1220 mm wide shall be secured to structure over and reinforced with sway bracing to stabilize walls to prevent lateral movement.

.9 Erect three studs at corner and intermediate intersections of partitions. Space 50 mm apart and brace together with wired 19 mm channels.

.10 Stiffen partitions over 2440 mm high or 3000 mm long, or both, with horizontal bracing extended for full length of partitions. Provide one line of bracing in partitions. Space lines to provide equal unbraced panels. Provide bracing for portions of partitions over door openings in partitions over 3000 mm high, and bracing both above and below openings in partitions located no greater than 150 mm from top and bottom of opening, and extending two stud spaces beyond each edge of opening for both doors and windows. Wire tie or weld bracing to studs.

.11 Frame control joints using back to back double studs at abutting structural elements, at dissimilar backup interface, at dissimilar walls and ceilings, at structural expansion and control joints, at door and other openings, and at 9000 mm maximum spacing in continuous runs. Install control joint strips and secure in place.

.12 Install additional support framing at openings and cutouts for built-in equipment, upper cabinet support, access panels and similar items.

.13 Attach to framing adequate steel reinforcing members or an 1.2 mm (18 ga.) steel stud mounted horizontally and notched around furring members to support the load of, and to withstand the withdrawal and shear forces imposed by, items installed upon the work of this Section. Such items include, but are not restricted to, miscellaneous metals, coat hooks, washroom accessories, handrail anchors, rub rails, grab bars, guards, wall-hung cabinets and fitments, shelving, curtain and drape tracks, miscellaneous specialties; Owner supplied equipment; and minor mechanical and electrical work. Heavy mechanical and electrical equipment shall be self-supporting in Divisions 21, 22, 23 and 26.

.14 Provide for support and incorporation of flush-mounted and recessed mechanical and electrical equipment and fixtures only after consultation and verification of methods with those performing the work of Divisions 21, 22, 23 and 26.

.15 Install cross bracing in accordance with the steel stud manufacturer's recommendations.

3.4 FIRE RATED ASSEMBLIES

.1 Install Products in fire rated assemblies in strict accordance with reviewed Shop Drawings and applicable tested and approved designs required by Authorities Having Jurisdiction.

.2 Install firestop fill material behind fire rated acoustical sealant and provide firestop identification tag.

.3 Stiffen fire rated walls over 3.66 m high, where linear length of wall is greater than 2.44 m between perpendicular wall supports, with diagonal bracing above the ceiling extending perpendicular to wall at a 45° angle to structure above. Locate diagonal bracing at maximum 2.44 m o.c.

.4 Where double layers of gypsum board are shown, and required for fire rating, screw first layer to studs and furring and laminate the second layer to the first using joint filler as an adhesive. Stagger joints between first and second layers.

3.5 BATT INSULATION

.1 Install non-rated, fire-rated/acoustic insulation as required for Work of this Project in accordance with Section 07 21 00.

3.6 ACOUSTICAL SEALANT

.1 Install acoustical sealant to acoustically insulated partitions in accordance with the manufacturer's instructions and Contract Drawings.

.2 Install acoustical sealant under floor runner track, at partition perimeter both sides and at openings, cut-outs, and penetrations, concealed from view in the final installation.

.3 Smooth acoustical sealant with trowel prior to skin forming.

3.7 **GYPSUM BOARD**

.1 Comply with ASTM C840. Install gypsum board in accordance with reviewed Shop Drawings and manufacturer's written instructions.

.2 Prior to patching gypsum wallboard and installing wall base, provide diatomaceous earth in bottom of each wall cavity.

.3 Install gypsum board vertically or horizontally, whichever results in fewer end joints. Locate end joints over supporting members.

.4 Install gypsum board in lightly butted contact at edges and ends and with 1.6 mm maximum open space between boards; do not force gypsum board into place. Do not install imperfect, damaged or damp boards.

.5 Install gypsum board butting paired tapered edge joints, and mill-cut or field-cut end joints; do not place tapered edges against cut edges or ends.

.6 Install vertical joints minimum 300 mm from the jamb lines of openings and stagger vertical joints over different studs on opposite sides of partitions.

.7 Do not locate joints within 200 mm of corners or openings, except where control joints occur at jamb lines or where openings occur adjacent to corners. Where necessary, place a single vertical joint over the centre of wide openings.

.8 Install gypsum board over concrete and concrete masonry units with adhesive as recommended by gypsum board manufacturer where indicated on Drawings.

.9 Cut, drill and patch gypsum board as may be necessary to accommodate the work of other trades.

10. Fire separations:
    .1 Construct gypsum board assemblies, where located, in accordance with tested assemblies to obtain required or indicated fire rated assemblies. As a minimum fire separations shall consist of metal framing covered on both sides by fire-rated gypsum board.
    .2 Install assemblies tightly to enclosing constructions to maintain integrity of the separations. Install casing beads at all perimeter edges.
    .3 Provide fire sealant at all fire separations at wall base.

3.8 **SHAFTWALL LINER**

.1 Plan and lay out metal framing components to ensure that all wall sections are plumb and properly aligned.

.2 Install J-track along the ceiling line and vertically at columns and abutting partitions, positioning the long legs closest to the shaft, using powder actuated fasteners or other approved method. Secure each piece with the appropriate fasteners spaced a maximum 610 mm O.C.

.3 Attach J-track to the floor with fasteners spaced at 610 mm O.C.

.4 Install Shaftliner panels vertically. The leading edge of the first panel must be attached to the long leg of the vertical J-track with 41 mm Type S screws spaced 610 mm O.C. Secure the top and bottom edges using the same fasteners and spacing.

.5 Friction-fit C-H stud into the top and bottom tracks and slide it snugly against the Shaftliner panel. Make sure the edge of the board is in full contact with the centre web of the stud and covered by all the tabs.

.6 Place the next Shaftliner panel between the tabs and flange on the opposite side of the C-H stud and secure it to the top and bottom track with 41 mm Type S screws spaced 610 mm O.C.

.7 Install subsequent Shaftliner panels and C-H studs in the same manner. Check periodically to ensure they are plumb.

.8 At the end of a partition run, cut the last Shaftliner panel slightly narrower and shorter than the opening to facilitate installation.

.9 For walls exceeding 3.7 m in height, Shaftliner panel end joints shall fall alternately in the upper and lower 1/3 of the partition. Use a C-H stud placed horizontally between panels to secure each joint.

.10 Frame all cut openings in the shaft side with J-track, providing adequate structural support for openings over 1219 mm.

3.9 **CORNER, CASING BEADS AND TRIM**

.1 Corner reinforcing bead: Install along all external angles, erect plumb, level and with a minimum of joints. Secure with screws at 225 mm o.c. apply filler over flanges flush with nose of the bead and extending at least 75 mm onto surface of board each side of corner. When filler dries, apply a thin coat of topping cement and blend onto adjoining surfaces.

.2 Casing bead: Install where wallboard butts against a surface having no trim concealing the juncture and where shown on drawings. Erect casing beads plumb or level, with minimum joints, and secure with screws at 300 mm o.c. apply filler over flange flush with bead and extending at least 75 mm onto surface of board. When dry, apply a thin coat of topping cement and blend onto adjoining surfaces.

.3 Recess channels and trim: Install recess channels and special metal trim where shown. Secure to substrate. Provide casing beads full height on wallboard edges at recess channels and metal trim.

3.10 **JOINT TAPING AND FINISHING**

.1 Install reinforcing tape and a minimum of 3 coats of joint compound over gypsum board joints, metal trim and accessories, and screw fasteners in accordance with the gypsum board manufacturer's instructions.

.2 Fill gaps between ,and any imperfections in, gypsum boards with joint compound, allow to dry, and sand smooth ready for painting.

.3 Install finished gypsum board work smooth, seamless, plumb, true, flush, and with square, plumb, and neat corners.

.4 Finish gypsum board in accordance with ASTM C840 to the following grades:

.1 Level 0: No taping, finishing, or accessories required. Use above suspended ceilings and within other concealed spaces, unless the assembly is fire rated, sound rated, sound or smoke controlled, or unless the space serves as an air plenum.

.2 Level 1: At joints and interior angles embed tape in joint compound. Leave surface free of excess joint compound. Tool marks and ridges are acceptable. Use above suspended ceilings and within other concealed spaces if the gypsum board assembly is fire rated, sound rated, sound or smoke controlled, or the space serves as an air plenum.

.3 Level 2: At joints and interior angles embed tape in joint compound with one separate coat of joint compound applied over joints, angles, fastener heads, and accessories. Use for water resistant gypsum board indicated for use as a substrate for ceramic tile.

.4 Level 3: At joints and interior angles embed tape in joint compound with two separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply joint compound smooth and free of tool marks and ridges. Use where heavy grade wall coverings are the final decoration.

.5 Level 4: At joints and interior angles embed tape in joint compound with three separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply joint compound smooth and free of tool marks and ridges. Use for all locations except those indicated for other finish levels.

.6 Level 5: At joints and interior angles embed tape in joint compound with three separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply a thin skim coat of joint compound, or a material manufactured especially for this purpose, to the entire surface. Leave surface smooth and free of tool marks and ridges. Use where semi-gloss or gloss finish coatings are the final decoration.

3.11 ACCESS DOORS

.1 Install access doors, supplied as part of other parts of the work, in accordance with manufacturer's written instructions.

3.12 SITE TOLERANCES

.1 Install metal support systems to ensure that, within a tolerance of +3 mm and -1.5 mm for plaster thickness, finish surfaces will be flat within 3 mm under a 3 m straightedge, and with no variation greater than 1.5 mm in any running 300 mm, and that surface planes shall be within 3 mm of dimensioned location.

3.13 WORK IN EXISTING AREAS

.1 In existing areas, where existing gypsum board work has been demolished and/or damaged and repair work is required, provide new gypsum board finish.

.2 Thoroughly prepare areas to be repaired. Provide neat, clean and straight cuts.

.3 Finish all repair work as specified for new work.

.4 In existing areas where existing openings are to be filled in with gypsum board, provide new gypsum board wall and ceiling construction. Ensure new board faces are flush with faces of abutting existing walls and ceilings.

3.14 REPAIR

.1 Make good cut-outs for services and other work, fill in defective joints, holes and other depressions with joint compound.

.2 Make good defective work, and ensure that surfaces are smooth, evenly textured and within specified tolerances to receive finish treatments.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for tile work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ANSI A108/A118/A136.1, Installation of Ceramic Tile.

.2 ANSI A137.1, Specifications for Ceramic Tile.

.3 ASTM C144, Specification for Aggregate for Masonry Mortar.

.4 CAN/CSA A3000, Cementitious Materials Compendium.

.5 TTMAC Specification Guide 09 30 00 Tile Installation Manual.

.6 TTMAC, Maintenance Guide.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations and warranties.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 33 00 indicating:
  - .1 Tile layout, patterns, and colour arrangement.
  - .2 Perimeter conditions, junctions with dissimilar materials.
  - .3 Setting details.

.3 Samples:
- .1 Submit following sample panels in accordance with Section 01 33 00.
  - .1 Each colour, texture, size, and pattern of tile.
  - .2 Adhere tile samples to 400 x 400 x 12.5 mm thick cement board complete with selected grout colour in joints.

.4 Certificates: Submit manufacturer's certificates stating that materials supplied are in accordance with this specification.

.5 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.

.6 Closeout submittals: Submit recommended maintenance instructions and listing of recommended maintenance Products for incorporation into Operations and Maintenance Manuals in accordance with Section 01 78 00.

1.4 QUALITY ASSURANCE

.1 Perform work of this Section by a company that is a member in good standing of the Terrazzo Tile and Marble Association of Canada with proven, acceptable experience on installations of similar complexity and scope.

.2 Tile waterproofing system:
- .1 All work related to the shower waterproofing system is to be carried out by a single Contractor who is to be responsible for the complete installation of the system from the concrete surface to the completed finished installation.
- .2 This work is not to be divided to multiple contractors.

.3 Mock-up:
- .1 Construct tile mock-ups, in location acceptable to Consultant of the following:
  - .1 Full shower waterproofing mock-up.
  - .2 2 m^2 mock-up of bathroom tile floor.
  - .3 2 m^2 mock-up of bathroom wall tile.
- .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with work.
- .3 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
- .4 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in adequate crates or containers with manufacturer’s name and product description clearly marked.

.2 Handle and store tiles in a manner to avoid chipping, breakage or the instruction of foreign matter. Take precautions to protect the mortar and grout admixtures from freezing or from excessive heat.

1.6 **SITE CONDITIONS**

.1 Do not install work of this Section outside of the following environmental ranges without the Consultant's and Product manufacturer's written acceptance:

.1 Ambient air and surface temperature: 15^0C to 45^0C.

.2 Precipitation: None.

.2 Install temporary protection and facilities to maintain the Product manufacturer's, and specified, environmental requirements for 7 Days before, during, and 7 Days after installation.

1.7 **MAINTENANCE**

.1 Submit extra tile amounting to 3% of gross area covered, allowing proportionately for each pattern and type specified and which are part of the same Production run as installed Products. Store maintenance Products as directed by the Consultant.

1.8 **EXTENDED WARRANTY**

.1 Submit an extended written warranty for shower waterproofing system in accordance with the General Conditions, except that warranty period is extended to 10 years from date of Ready-for-Takeover.

.1 Warrant work against water leakage and failure to perform.

.2 Coverage: Complete replacement including effected adjacent work.

2 Products

2.1 **MATERIALS**

.1 General: All materials under work of this Section, including but not limited to, sealants, adhesives, and sealers are to have low VOC content limits.

.2 Tile:

.1 To ANSI A137.1.

.2 Supply coves, caps, inside and outside corners and bullnose tile as required.

.3 Where unfinished tile edge is exposed, supply cap to Consultant’s selection.

.4 Tile types as follows:

.1 Porcelain tile, Type 1 (PRT-1): 305 mm x 305 mm, porcelain tile, ‘Spectra Series’ by Olympia Tile or approved equal. Colour: ‘Antracite (Charcoal)’.

.2 Porcelain tile, Type 2 (PRT-2): 48 mm x 48 mm porcelain mosaic tile, unglazed, 'Quebec Mosaic' by Olympia Tile or approved equal. Colour: 'Gold Granite'.

.3 Porcelain tile, Type 3 (PRT-3): 48 mm x 48 mm porcelain mosaic tile 'Quebec Mosaic' by Olympia Tile or approved equal. Colour: To be selected by the Consultant from manufacturer's full range.

.4 Porcelain tile, Type 4 (PRT-4): 92 mm x 368 mm porcelain wall tile 'Stromboli' by Equipe Ceramicas or approved equal. Colour: 'Viridian Green'.

.5 Ceramic tile, Type 1 (CRT-1): 100 mm x 400 mm ceramic wall tile, 'Colour and Dimension Collection' by Olympia Tile or approved equal. Colour: 'Warm White Bright'.

.6 Ceramic tile, Type 2 (CRT-2): Ceramic tile to match existing tile in kitchen.

.3 Tile base: Tile base to match floor tile. Height as shown.

.4 Floor transition strip and tile cap: Stainless steel edge, continuous at all exposed tile edges, depth as required to suit tile thickness. 'Schiene-E' by Schluter Systems or approved equal.

.5 Wall tile edges: Stainless steel edge with squared reveal surface, continuous at all exposed tile edges, depth as required to suit tile thickness. 'Quadec' by Schluter Systems or approved equal.

.6 Curbless barrier-free showers: Two-part profiles that form a splashguard at curbless showers, anodized aluminum edge with end cap trim with matte finish, continuous at all exposed tile edges, depth as required to suit tile thickness. 'Showerprofile WSK-EK' by Schluter Systems or approved equal.

2.2 ACCESSORIES

.1 Cement: CAN/CSA A3000, Type GU.

.2 Sand: ASTM C144.

.3 Water: Potable and free of minerals and other contaminants which are detrimental to mortar and grout mixes.

.4 Polymer additive: 'Mortar Admix' by Custom Building Products, 'Keralastic' by Mapei Inc or approved equal by Flextile Ltd. or Laticrete International.

.5 Thin-set mortar: 2 component to ANSI A108/A118/A136.1:

.1 'Prolite Premium LFT Mortar' by Custom Building Products, '56SR/51 w/44' by Flextile Ltd., '254/255' by Laticrete International or 'Kerabond with Keralastic Latex Additive' by Mapei Inc.

.2 White coloured mortar shall be provided at appropriate tile types including, but not limited to; glass tile, light coloured marble, green marble and light coloured granite.

.6 Primer: To meet specified requirements of adhesive manufacturer.

.7 Cleaner: In accordance with TTMAC's requirements and as recommended by tile manufacturer.

.8 Sheet applied waterproofing membrane (SWP-1): 0.2 mm thick, bonded waterproofing and vapour-retardant membrane fabricated from polyethylene, with fleece webbing laminated on both sides to anchor membrane in thin-set mortar, 'Kerdi' by Schluter Systems or approved equal.

.9 Waterproofing transition membrane (TRM-1): Waterproofing strip seals to seal waterproofing membranes, 'Kerdi-Band' by Schluter Systems or approved equal.

.10 Sheet applied uncoupling (crack isolation)/waterproofing membrane (SUM-1):

.1 7 mm thick, orange, high-density polyethylene membrane with a grid structure of square cavities, each cut back in a dovetail configuration, and a polypropylene anchoring fleece laminated to its underside.

.2 Uncoupling/waterproofing membrane, 'Ditra XL Uncoupling Membrane' by Schluter Systems or approved equal.

.11 Prefabricated waterproof shower accessories:

.1 Shower niche: 305 x 305 mm, prefabricated shower niche, 'Kerdi-Board-SN' by Schluter Systems or approved equal.

.2 Waterproof prefabricated shower curb: Lightweight, waterproof, prefabricated shower curb, 'Kerdi-Board-SC' by Schluter Systems or approved equal. Size and length as per Contract Drawings.

.12 Prefabricated waterproof seals:

.1 Seals for pipe protrusions: Prefabricated waterpoofing seals with over-molded rubber gaskets, 'Kerdi-Seal-PS/MV/KM' by Schluter Systems or approved equal. Sizes as per Contract Drawing or as required.

.2 Prefabricated corner seals: Preformed waterproofing corners, 'Kerdi-Kereck-F' by Schluter Systems or approved equal. Size and length as per Contract Drawings.

.13 Epoxy grout:

.1 ANSI A108/A118/A136.1, Non-sag additive for work on vertical surfaces, Epoxy grout material shall be non-toxic, low odour, water cleanable and stain resistant. 'CEG-Lite' by Custom Building Products, '110 flex' by Flextile Ltd., 'Spectralock' by Laticrete International, or 'Kerapoxy CQ' by Mapei Inc.

.2 Grout colour:

.1 To be selected by the Consultant from the manufacturer's full colour range.

.2 A different grout colour will be selected for at least each different tile, assume up to 8 colours.

.14 Tile sealant: In accordance with Section 07 92 00.

2.3 MIXES

.1 Levelling bed mix:

.1 1 part Portland cement.

.2 4 parts sand.

.3 1 part water (including polymer additive), adjusted for water content of sand.

.4 1/10 part polymer additive.

3 Execution

3.1 EXAMINATION

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 SURFACE PREPARATION

.1 Clean and dry surfaces thoroughly. Remove oil, wax, grease, dust, dirt, paint, tar, primers, form release agents, curing compound, and other foreign material from substrate surfaces which may prevent or reduce adhesion.

.2 Neutralize any trace of strong acids or alkali from the substrate.

3.3 CONTROL JOINTS

.1 Provide control, expansion and isolation joints in accordance with TTMAC specification 301MJ and as indicated on drawings. Install in locations indicated on drawings and specified herein.

.2 Continue control, construction, and cold joints in the structural substrate up through the tile finish, and align with mortar joints where possible. Review joint locations on Site with the Consultant.

.3 Install joint widths to match grout joint widths, except where a minimum width is indicated.

.4 Install control joints in the following typical locations:

- .1 Aligned over changes in type of substrate.
- .2 At the restraining perimeters such as walls and columns.
- .3 Interior areas (not subject to sunlight): 6 mm minimum width, at 7320 mm o.c. maximum.
- .4 Interior areas (subject to sunlight): 6 mm minimum width, at 3660 mm o.c maximum.
- .5 As indicated on the Contract Drawings.

.5 Seal control joints in accordance with Section 07 92 00.

3.4 LEVELLING BED

.1 Install a levelling bed on uneven substrate surfaces, level and plumb substrates in accordance with the following tolerances:

- .1 Vertical surfaces: 3 mm in 2.4 m maximum.
- .2 Horizontal surfaces: 6 mm in 3 m from finished levels of the surface, or better.

.2 Clean structural substrate control joints and blow-clean with compressed air. Grout fill control joints flush to slab with levelling bed.

3.5 **UNCOUPLING (CRACK ISOLATION)/WATERPROOFING MEMBRANES AND WATERPROOFING MEMBRANES AND ACCESSORIES**

.1 Install uncoupling (crack isolation)/waterproofing, waterproofing and transition membranes and accessories in accordance with manufacturer's written instructions and to provide a watertight assembly.

.2 Apply mortar setting bed to subfloor, wall and ceiling substrates in accordance with manufacturer's written instructions. Roll out membrane and press into mortar, overlapping sheets to details as recommended by membrane manufacturer.

.3 Apply and install waterproofing strips, preformed corners and gaskets as required to complete the system and in accordance with manufacturer’s written instructions.

.4 Seal pipe extrusions and penetrations with sealing compound.

.5 Waterproofing system to be integrated with shower area drains as specified in Division 22. Ensuring installation drain weirs above waterproofing membrane are not rendered inoperable by mortar setting materials.

.6 Perform water test on application per waterproofing manufacturer’s instructions prior to proceeding with tile finish. Obtain manufacturer’s approval of waterproofing system installation prior to proceeding with tile installation.

3.6 **GENERAL INSTALLATION REQUIREMENTS**

.1 Install tiles in accordance with manufacturer's instructions and TTMAC Specification Guide 09 30 00 Tile Installation Manual. Manufacturer's installation instructions govern over TTMAC Installation Manual.

.2 Lay out work to produce a symmetrical pattern with minimum amount of cutting. Ensure cut tile at room perimeter and at joints is not less than ½ full size.

.3 Install trim to be placed under tile in locations indicated on Drawings.

.4 Set tiles in place and rap or beat with a beating block as necessary to ensure a proper bond and to level surface. Align tile for uniform joints and allow to set until firm. Clean excess mortar from surface of tile with a wet cloth or sponge while mortar is fresh.

.5 Ensure following minimum mortar contact coverage to back of tiles. Contact must be evenly distributed to give full support of the tile.

.1 98% for large format (305 mm x 305 mm or greater) interior applications.

.2 90% for non-large format interior applications.

.3 100% for shower applications.

.6 Adjust joints between units uniform, plumb, straight, even, and true, with adjacent tile flush. Align grout joints in both directions unless indicated otherwise.

.7 Align floor, base and wall grout joints.

.8 Install tile accessory fittings for a complete and fully coordinated tile assembly.

.9 Install wall tile full height unless indicated otherwise.

.10 Do not place tile, trim, and accessories over control, expansion, or isolation joints. Stop materials in either side on joints and provide control, expansion and isolation joints as specified.

.11 Cut and fit tile neatly around piping, fittings, joints, projections and around recesses items e.g. washroom accessories. Where surface mounted equipment and accessories are installed on tile surfaces, extend tile over surfaces. Cut edges smooth, even, and free from chipping; chipped and broken edges are not acceptable.

.12 Do not proceed with grouting until minimum 48 hours after tile has set, to prevent displacement of tiles.

.13 Apply grout in accordance with grout manufacturer's directions to produce watertight, filled joints without voids, cracks and excess grout. Thoroughly compact and tool floor grout. Finish grout flush to edge thickness of tile and remove excess grout with soft burlap or sponge moistened with clean water.

3.7 CLEANING

.1 Clean off excess grout with soft burlap or sponge moistened with clean water.

.2 Polish floor and wall tile after grout has cured in accordance with TTMAC recommendations in the Maintenance Guide; do not use acid for cleaning.

3.8 **JOINT BACKING AND TILE SEALANT**

.1 Install joint backing and sealant in accordance with Section 07 92 00.

3.9 **PROTECTION**

.1 Prevent traffic over tiled areas, and protect tiled assemblies from weather, freezing, and water immersion, for 72 hours minimum, after final installation.

.2 Prevent direct impact, vibration and heavy hammering on adjacent and opposite walls for 24 hours minimum, after final installation.

.3 Cover work temporarily with building paper properly lapped and taped at joints until work has been approved by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for detectable/tactile tile and indicator work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 CAN/ULC S102.2, Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.

.2 ISO 23599, Assistive Products for Blind and Vision-Impaired Persons - Tactile Walking Surface Indicators.

1.3 **DESIGN REQUIREMENTS**

.1 Design detectable warning surface system conforming to ISO 23599.

1.4 **SUBMITTALS**

.1 Product data:
.1 Submit copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
.1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations and warranties.
.2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings:
.1 Submit shop drawings in accordance with Section 01 33 00 indicating:
.1 Perimeter conditions, junctions with dissimilar materials.
.2 Setting details.

.3 Samples: Submit two 300 x 300 mm samples of each type of detectable/tactile warning surfaces in accordance with Section 01 33 00.

.4 Closeout submittals: Submit recommended maintenance instructions and listing of recommended maintenance Products for incorporation into Operations and Maintenance Manuals in accordance with Section 01 78 00.

1.5 **DELIVERY, STORAGE AND HANDLING**

.1 Deliver materials in adequate crates or containers with manufacturer’s name and product description clearly marked.

.2 Handle and store tiles in a manner to avoid chipping or breakage. Take precautions to protect the adhesives from freezing or from excessive heat.

1.6 **SITE CONDITIONS**

.1 Do not install work of this Section outside of the following environmental ranges without the Consultant's and Product manufacturer's written acceptance:
.1 Ambient air and surface temperature: Minimum 40^0F.
.2 Precipitation: None.

.2 Install temporary protection and facilities to maintain the Product manufacturer's, and specified, environmental requirements for 7 Days before, during, and 7 Days after installation.

1.7 **MAINTENANCE**

.1 Submit extra tiles and indicators amounting to 3% of gross area covered, allowing proportionately for each pattern and type specified and which are part of the same Production run as installed Products. Store maintenance Products as directed by the Consultant.

2 Products

2.1 **MATERIALS**

.1 All materials under work of this Section, including but not limited to, sealants and adhesives are to have low VOC content limits.

.2 Resilient tactile indicator tile:
.1 Fire rated composite material conforming to ULC S102.2, tiles shall incorporate an in-line pattern of truncated domes measuring nominal 5 mm high x 23 mm base diameter x 13 mm top diameter, spaced 61 mm o.c. apart.
.2 Tactile tile, ‘Access Tile FR’ as manufactured by Kinesik or approved equal in colour and size to be selected by the Consultant.

.3 Stainless steel tactile dome indicators:
.1 5 mm high, ADA compliant, tactile dome indicators, Type 316L, marine grade, stainless steel with non-slip concentric rings.
.2 Individual domes, ‘Tactile Indicator - 316 Grade Stainless Steel (D1TWSISTUD)’ by Stinson or approved equal by Advantage Tactile Systems.

.4 Adhesive: Bonding adhesive as approved by tactile tile and dome manufacturer.

.5 Fasteners: Colour matched, corrosion resistant, flat head drive anchor as recommended by tile manufacturer.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **PREPARATION**

.1 Prepare substrate using steel aggregate blast method and vacuum substrate free of debris and dust.

.2 Fill minor cracks and voids and prime surfaces in accordance with manufacturer's recommendations.

.3 Project adjacent surfaces from damage resulting from this work. Mask and/or cover adjacent surfaces, fixtures, and equipment as necessary.

.4 Clean, prime and seal surfaces as recommended by dome manufacturer.

3.3 **SURFACE APPLIED TACTILE TILE INSTALLATION**

.1 Install tactile tiles and adhesive in accordance with reviewed shop drawings and manufacturer’s written instructions.

.2 Apply adhesive to backside of tile, following perimeter and internal cross pattern established by tile manufacturer. Ensure sufficient adhesive has been placed on prescribed areas to have full coverage across width of adhesive locator and shall be applied to within 6 mm continuously around perimeter edge of tile.

.3 Set tile true and square to areas as detailed on drawings.

.4 Working from centre of tile outwards, proceed to drill and install all fasteners in tile’s moulded recesses.

.5 Drill hole while standing with both feet applying pressure around moulded recess in tile, drill through tile without hammer option until tile has been penetrated, then with hammer option to drill into concrete. Maintain foot pressure on both sides of hole while drilling to prevent concrete dust from accumulating between tile and concrete.

.6 Immediately after drilling each hole, mechanically fasten tile to concrete substrate while still applying foot pressure. Ensure fastener has been placed to full depth in dome, straight, and flush to the top of dome and drive pin of fastener with mallet.

.7 Apply perimeter caulking sealant in accordance with sealant manufacturer’s recommendations and Section 07 92 00.

3.4 TACTILE DOME INDICATOR INSTALLATION

.1 Install tactile indicator domes in intended locations in accordance with reviewed shop drawings and manufacturers written instructions using adhesive.

.2 Set indicators true and square to areas as detailed on drawings.

.3 Lay template material out over stair tread surface to receive indicators and secure in place.

.4 Drill a hole true and straight to required depth using appropriate size drill to match shaft of tactile indicator being installed.

.5 Move and situate template as required to create repeatable patterns or for installation in multiple locations.

.6 Vacuum or sweep dust following drilling of each hole.

.7 Apply adhesive to fill a quarter (¼) of the drilled hole in accordance with adhesive manufacturer's written instructions.

.8 Insert indicator firmly into hole.

.9 Remove excess adhesive around indicator's perimeter.

3.5 CLEANING AND PROTECTION

.1 Clean tactile warning surfaces in accordance with manufacturer's written instructions.

.2 Prevent traffic over new installed detectable/tactile warning surfaces, and protect from weather, freezing, and water immersion, for 24 hours minimum, after final installation.

.3 Cover work temporarily with plywood until work has been approved by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for resilient sheet flooring work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM F1482, Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring.

.2 ASTM F1516, Standard Practice for Sealing Seams of Resilient Floor Products by the Heat Weld Method.

.3 ASTM F2034, Standard Specification for Sheet Linoleum Floor Covering.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings: Submit shop drawings indicating seam layout and welding procedures in accordance with Section 01 33 00.

.3 Samples:
- .1 Submit samples in accordance with Section 01 33 00:
  - .1 Two 250 x 200 mm samples of each type of sheet material and colour.
  - .2 Two 250 mm long samples of each accessory and colour.
  - .3 Two 150 mm long samples of prefabricated integral cove base. Flash cove base samples must be representative of riser height and toe lengths specified, and shall represent one completed inside corner and one completed outside corner, with seams sealed and finished. Produce flash cove base samples in specified flooring materials and selected colours.

.4 Extended warranties: Submit extended warranties signed and registered by the manufacturer providing the warranties in the name of the Owner for the timeframe and coverage specified in this Section.

.5 Closeout submittals: Submit maintenance and cleaning data for incorporating into Operations and Maintenance Manuals in accordance with Section 01 78 00.

1.4 QUALITY ASSURANCE

.1 Installers qualifications (prefabricated flash cove bases): Perform work of this Section by a company that has a minimum of five years proven experience in the installation of prefabricated flash cove bases of a similar size and nature and that is approved by manufacturer. Submit to Consultant, installer's current certificate of approval by the material manufacturer as proof of compliance.

1.5 SITE CONDITIONS

.1 Maintain air temperature and structural base temperature at flooring installation area above 20°C for 48 hr before, during and 48 hr after installation.

.2 Store materials for 2 days prior to installation in area of Work to achieve temperature stability.

.3 Do not lay flooring in conditions of high humidity or where exposed to cold drafts. In hot weather, protect from direct sunlight.

.4 Provide adequate ventilation during installation.

1.6 EXTENDED WARRANTY

.1 Manufacturer's warranty:

.1 Resilient flooring; provide flooring manufacturer's warranty naming Owner as beneficiary, covering excessive wear for a period of 5 years from the date of Ready-for-Takeover.

.2 Prefabricated flash cove base: Warrant prefabricated flash cove base for lifetime against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to punctures through aluminum backing at cove radius provided prefabricated flash cove base was installed professionally in accordance with manufacturer's written specifications.

1.7 MAINTENANCE

.1 Submit extra 5% or to nearest full roll of each colour, pattern and type of flooring and base material required for maintenance use. Identify each roll. Store where directed. Submit maintenance material in one piece and of same production run as installed materials.

2 Products

2.1 **MATERIALS**

.1 All materials under work of this Section, including but not limited to, primers and adhesives are to have low VOC content limits.

.2 Linoleum sheet flooring (LINS-1, 2 & 3):
- .1 Conforming to ASTM F2034, 2.0 mm thick, homogeneous resilient flooring, made from natural ingredients, mixed and calendared onto a natural jute backing, complete with prefabricated base as specified herein.
- .2 Colours:
  - .1 Colour (LINS-1): ‘Sunny Day (3411)’.
  - .2 Colour (LINS-2): ‘Natural Corn (3846)’.
  - .3 Colour (LINS-3): ‘Sahara (3174)’.
- .3 Acceptable products and manufacturers: 'Marmoleum MCS Sheet' by Forbo Flooring or approved equal by Gerfloor Canada.

.3 Welding rod: type recommended by flooring manufacturer to complement flooring.

.4 Prefabricated reinforced cove base:
- .1 Prefabricated cove bases:
  - .1 Fabricated from same material and dye lots as resilient sheet flooring types as specified and scheduled, in maximum practical lengths, with aluminum reinforcing bonded to back of base material and forming a J-shape end cap.
  - .2 Height: 150 mm high.
  - .3 ‘ArmorCove by Forbo Flooring Systems or approved equal by FlashCove Prefabricated Bases Inc.
- .2 Colour: To match intended resilient sheet flooring (LINS-1 & LINS-2) product.

.5 Primers and adhesives: Low VOC, waterproof, of types recommended by flooring and base manufacturer for specific material on applicable substrate, above, on or below grade.

.6 Reducing edge strips, transition strips, thresholds, etc.: Nitrile rubber plasticized vinyl, 80-95 Shore A Durometer, adhesive recommended by flooring manufacturer.
- .1 ‘Finishing Accessories’ by Tarkett or approved equal.

.7 Skim coat compound: High-performance, rapid-setting cement based skim coating compound. 'Planiprep SC' by Mapei or approved equal for filling minor voids and leveling existing substrate.

.8 Stain sealer and polish: Type recommended by flooring manufacturer.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

.2 Ensure that sub-floors have been provided as specified without holes, protrusions, cracks, depressions or other major defects.

.3 Ensure that control joints have been filled and levelled.

.4 Defective work resulting from application to unsatisfactory surfaces will be considered the responsibility of those performing the work of this Section.

3.2 **WOOD SUBFLOOR TREATMENT**

.1 Prepare wood subfloors in accordance with manufacturer’s written instructions and as specified herein.

.2 Flooring shall be installed over subfloors conforming to ASTM F1482 for wood substrates.

.3 Substrates to receive flooring must be structurally sound, rigid, smooth, flat, clean, and permanently dry. Substrates must be free of all foreign materials including, but not limited to, dust, solvent, paint, wax, oils, grease, residual adhesive, adhesive removers, film-forming curing compounds, silicate penetrating curing compounds, sealing, hardening or parting compounds, alkaline salts, excessive carbonation or laitance, mold, mildew, and other foreign materials that might affect the rate of moisture dissipation from the concrete, the adhesion of flooring to the concrete or cause a discolouration of the flooring from below.

.4 Ensure wood substrates have double construction with a minimum total thickness of 25 mm as recommended by flooring manufacturer.

.5 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

.6 Apply sub-floor filler to low spots to achieve level floor. Allow to cure.

.7 Clean and remove all deleterious materials from surfaces to receive this work in accordance with the adhesive manufacturer's recommendations.

3.3 RESILIENT SHEET FLOORING APPLICATION

.1 Install resilient sheet flooring in accordance with manufacturer's written instructions.

.2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturers instructions. Do not spread more adhesive that can be covered by flooring before initial set takes place.

.3 Run sheets in direction of traffic. Double cut sheet joints and continuously seal according to manufacturer's printed instructions. Remove adhesive seepage of seams or surface while adhesive is still wet.

.4 Heat weld seams in accordance with ASTM F1516 and manufacturer's printed instructions.

.5 As installation progresses and after installation, roll flooring with minimum 45 kg roller to ensure full adhesion.

.6 Cut flooring neatly around fixed objects.

.7 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.

.8 Install reducing edge strips at unprotected or exposed edges where flooring terminates or where there are two finishes of different thicknesses.

3.4 PREFABRICATED FLASH COVE BASE APPLICATION

.1 Install prefabricated flash cove base in accordance with manufacturer's written instructions.

.2 Provide integral coved base at room perimeter and at built-in fitment locations complete with accessories as required for complete and secure installation.

.3 Dry-fit prefabricated flash cove base; cut and fit material to required lengths. Mitre-cut inside and outside corners.

.4 Dry-fit and cut cove cap prior to prefabricated flash cove base installation.

.5 Scribe glue line on walls and floor at edge of prefabricated flash cove base material.

.6 Apply adhesive in full spread (100% coverage on 2 surfaces) for full length of prefabricated flash cove base material. Apply prefabricated flash cove base to wall surface straight and level.

.7 Slide base cap behind prefabricated flash cove base material.

.8 Hand roll prefabricated flash cove base material onto wall and floor surface removing bumps, ripples and fishmouths. Remove excess adhesive.

.9 Heat weld seams (vertical and horizontal) in prefabricated flash cove base material.

3.5 **CLEANING AND SEALING**

.1 Forty-eight hours after installation, clean sheet flooring surfaces with a mild soap solution approved by finish manufacturer. Rinse clean and allow to dry.

.2 Apply stain sealer and allow to dry. Apply number of coats of sealer as recommended by flooring manufacturer and polish thoroughly.

3.6 **PROTECTION OF FINISHED WORK**

.1 Protect floors and bases from time of final set of adhesive until accepted by Consultant.

.2 Protect prefabricated flash cove bases from scratches, gouges, scuff marks and other damage from time initial surface protection application until final inspection.

.3 Prohibit traffic on floor for 48 hours after installation.

.4 Cover cleaned surfaces with fibre reinforced, clean, non-staining clean, kraft paper. Secure in position with gummed tape to prevent drifting. Remove covering when directed by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for resilient tile flooring work and accessories in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM F1066, Specification for Vinyl Composition Floor Tile.

.2 ASTM F1482, Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring.

.3 ASTM F1861, Specification for Resilient Wall Base.

.4 ASTM F2195, Standard Specification for Linoleum Tile Flooring.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 33 00:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Samples:
- .1 Submit following samples in accordance with Section 01 33 00:
  - .1 Two 250 x 200 mm samples of each type of tile material and colour.
  - .2 Two 250 mm long samples of each base, accessory and colour.

.3 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.

.4 Closeout submittals: Submit maintenance and cleaning data for incorporation into Operations and Maintenance Manuals in accordance with Section 01 78 00.

1.4 **SITE CONDITIONS**

.1 Maintain air temperature and structural base temperature at flooring installation area above 20°C for 48 hr before, during and 48 hr after installation.

.2 Store materials for 2 days prior to installation in area of Work to achieve temperature stability.

.3 Do not lay flooring in conditions of high humidity or where exposed to cold drafts. In hot weather, protect from direct sunlight.

.4 Provide adequate ventilation during installation.

1.5 **MAINTENANCE**

.1 Submit extra 5% or to nearest full carton of each colour, pattern and type of flooring material and base required for maintenance use. Identify each carton. Store where directed.

2 Products

2.1 **MATERIALS**

.1 All materials under work of this Section, including but not limited to, primers, adhesives, sealers, and waxes are to have low VOC content limits.

.2 Linoleum composition tile (LINT1):
- .1 ASTM F2195, Type 1; minimum 330 x 330 x 2.0 mm thick with polyester backing.
- .2 Colour: To be selected by Consultant from manufacturer's full colour range.
- .3 Linoleum composition tile, 'Marmoleum Composition Tile (MCT)' by Forbo Flooring or approved equal.

.3 Vinyl composite tile (VCT-1): ASTM F1066, to match existing vinyl composite tile.

.4 Rubber base (RBR1):
- .1 ASTM F1861, Type TP, Group 1, rubber wall base, approximately 100 mm high x 3 mm thick, toeless profile, in lengths as long as possible including premoulded end stops and inner and outer corners.
- .2 Colour: To be selected by Consultant from manufacturer's full colour range.
- .3 Rubber base, 'Traditional Wall Base' by Tarkett or approved equal.

.5 Rubber stair stringers:
- .1 Rubber stair stringers, manufacturer by Tarkett or approved equal.
- .2 Colour: Colour to later selection of Consultant from manufacturer's full colour range.

.6 Rubber stair treads and risers:
- .1 Integral rubber treads and risers with a raised round profile and a tapered thickness of 5.33 mm to 3.89 mm. Tread depth to be 330 mm and height of 178 mm. Nose depth to 50 mm with underside hinge to accommodate various stair pan angles.
- .2 Colour: Colour to later selection of Consultant from manufacturer's full colour range.
- .3 Rubber stair treads/risers, 'Roundel Rubber Stair Tread RTR' by Tarkett or approved equal.

.7 Reducing edge strips, transition strips, thresholds, etc.: Nitrile rubber plasticized vinyl, 80-95 Shore A Durometer, adhesive recommended by flooring manufacturer.
.1 'Finishing Accessories' by Tarkett or approved equal.

.8 Primers and adhesives: Low VOC, waterproof, recommended by flooring manufacturer for specific material on applicable substrate, above, at or below grade.

.9 Skim coat compound: High-performance, rapid-setting cement based skim coating compound. 'Planiprep SC' by Mapei or approved equal for filling minor voids and leveling existing substrate.

.10 Sealer and wax: Type recommended by flooring manufacturer.

3 Execution

3.1 EXAMINATION

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

.2 Ensure that sub-floors have been provided as specified without holes, protrusions, cracks, depressions or other major defects.

.3 Ensure that control joints have been filled and levelled.

.4 Defective work resulting from application to unsatisfactory surfaces will be considered the responsibility of those performing the work of this Section.

3.2 WOOD SUBFLOOR TREATMENT

.1 Prepare wood subfloors in accordance with manufacturer's written instructions and as specified herein.

.2 Flooring shall be installed over subfloors conforming to ASTM F1482 for wood substrates.

.3 Substrates to receive flooring must be structurally sound, rigid, smooth, flat, clean, and permanently dry. Substrates must be free of all foreign materials including, but not limited to, dust, solvent, paint, wax, oils, grease, residual adhesive, adhesive removers, film-forming curing compounds, silicate penetrating curing compounds, sealing, hardening or parting compounds, alkaline salts, excessive carbonation or laitance, mold, mildew, and other foreign materials that might affect the rate of moisture dissipation from the concrete, the adhesion of flooring to the concrete or cause a discolouration of the flooring from below.

.4 Ensure wood substrates have double construction with a minimum total thickness of 25 mm as recommended by flooring manufacturer.

.5 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

.6 Apply sub-floor filler to low spots to achieve level floor. Allow to cure.

.7 Clean and remove all deleterious materials from surfaces to receive this work in accordance with the adhesive manufacturer's recommendations.

3.3 **RESILIENT TILE FLOORING APPLICATION**

.1 Install resilient tile flooring in accordance with manufacturer’s written instructions.

.2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive that can be covered by flooring before initial set takes place.

.3 Lay flooring with joints straight and parallel to building lines to produce symmetrical tile pattern. Install equal size perimeter tile on each side.

.4 Install flooring to square grid pattern with all joints aligned.

.5 As installation progresses, and after installation, roll flooring in 2 directions with minimum 45 kg minimum roller to ensure full adhesion.

.6 Remove adhesive seepage at seams or surface while adhesive is still wet, in accordance with manufacturer's recommendation.

.7 Cut tile and fit neatly around fixed objects.

.8 Install feature strips and floor markings where indicated. Fit joints tightly.

.9 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.

.10 Install reducing edge strips at unprotected or exposed edges where flooring terminates and at edges where there are two finishes of different thicknesses.

3.4 **RUBBER STAIR TREADS/RISERS AND STAIR STRINGERS**

.1 Prepare adhesive and install materials in accordance with manufacturer’s written instructions.

.2 Stairs/treads: Pre-cut and fit treads prior to spreading adhesive. Fill back side of tread nose with a caulking bead; brush on adhesive on understeps and back of treads, as well as back of risers, and on receiving substrate. Allow to become tacky to touch before installing. Treads shall be fully bonded to substrate, with tread nosing butted tight against stair tread nosing. Roll with hand roller after installation.

.3 Stair stringers: Trowel adhesive evenly on substrate and apply stringer with tight joints. Allow to become tacky to touch before installing. Stringers shall be fully bonded to substrate. Roll with hand roller after installation.

.4 Remove adhesive seepage at seams or surface while adhesive is still wet, in accordance with manufacturer's recommendations.

3.5 RESILIENT BASE APPLICATION

.1 Install resilient base in accordance with manufacturer's written instructions and to comply with Section 01 57 16.

.2 Seal top and bottom of bases to ensure no gaps occur for pests to migrate behind base.

.3 Lay out base to keep number of joints at minimum.

.4 Prior to installing base, fill cracks and irregularities with a filler recommended by base manufacturer.

.5 Set base in adhesive using a 3 kg hand roller, against wall and floor surfaces.

.6 Install straight and level to variation of 1:1000.

.7 Scribe and fit to door frames and other obstructions.

.8 Cope internal corners.

3.6 CLEANING AND WAXING

.1 Forty-eight hours after installation, clean vinyl tile surfaces with a mild soap solution approved by finish manufacturer. Rinse clean, dry and apply 2 coats of wax. Polish thoroughly.

3.7 PROTECTION OF FINISHED WORK

.1 Protect floors from time of final set of adhesive until final waxing.

.2 Prohibit traffic on floor for 48 hours after installation.

.3 Cover waxed and polished surfaces with fibre reinforced, clean, non-staining kraft paper. Secure in position with gummed tape to prevent drifting. Remove covering when directed by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, Labour, Products, equipment and services necessary for acoustical panels work in accordance with the Contract Documents.

1.2 **SUBMITTALS**

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, limitations, and trouble-shooting protocol.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop Drawings:
- .1 Submit Shop Drawings in accordance with Section 01 33 00 indicating:
  - .1 Elevations, sections, details, materials, dimensions, and finishes.

.3 Samples:
- .1 Submit following samples in accordance with Section 01 33 00.
  - .1 Two 300 x 300 mm samples of each acoustical panel unit required, showing full range of exposed texture to be expected in completed work and one 300 x 300 mm sample for each finish and/or colour.

.4 Closeout submittals:
- .1 Submit following for panels incorporation into Operations and Maintenance Manuals in accordance with Section 01 78 00:
  - .1 Performance criteria and maintenance data.

1.3 **QUALITY ASSURANCE**

.1 Installers qualifications: Perform work of this Section by a company that has a minimum of five years proven experience in the installation of acoustical panel units of a similar size and nature and that is approved by manufacturer. Submit to Consultant, installer's current certificate of approval by the material manufacturer as proof of compliance.

.2 Mock-up:
- .1 Construct one 2 m^2 mock-up of acoustical panels in location acceptable to Consultant.
- .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with work.
- .3 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.

.4 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

1.4 **DELIVERY, STORAGE, AND HANDLING**

.1 Prevent soiling, physical damage or wetting.

.2 Store cartons open at each end to stabilize moisture content and temperature.

1.5 **SITE CONDITIONS**

.1 Do not install work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
.1 Ambient air and surface temperature: 13^0C to 21^0C.
.2 Precipitation: None.
.3 Relative Humidity: 65 to 75%

.2 Do not install acoustical panels until building is closed in and HVAC system is operational.

.3 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 24 hours before, during, and 24 hours after installation.

2 Products

2.1 **MATERIALS**

.1 General: All materials under work of this Section, including but not limited to, adhesives and touch-up paints are to have low VOC content limits.

.2 Acoustical wall and ceiling panels (AIP-1):
.1 Core: Aspen wood fibre bonded with inorganic cement binder.
.2 Panels with bevelled edges on four sides.
.3 Finish and colour: Manufacturer’s standard, factory-applied, abuse-resistance silicate surface coating with natural finish.
.4 Panel size: +/- 915 mm wide x 2439 mm long x 25 mm thick to suit Contract Drawings.
.5 Attachment method: Furring strips.
.6 Panels are to be complete with acoustic batt insulation to obtain an NRC rating of 0.80.
.7 Acceptable Product: ‘Tectum Direct-Attach’ by Armstrong Ceilings or approved equal.

.3 Furring strips: Manufacturer’s standard furring strips.

.4 Batt insulation: In accordance with Section 07 21 00.

.5 Moulding: Plastic, in colour to match panels.

.6 Fasteners: Concealed, stainless steel Type 304.

2.2 **FABRICATION**

.1 Verify dimensions of existing work before commencing fabrications and report discrepancies to Consultant.

.2 Fabricate work in accordance with Contract Drawings and reviewed shop drawings. Fabricate, fit and assemble work in shop where possible. Where shop fabrication is not possible, make trial assembly in shop.

.3 Fabricate work free from defects impairing function, appearance, strength and durability.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Install acoustic panels, support and anchoring system, insulation, fasteners, trim and related items to lines and elevations indicated and in strict accordance with reviewed shop/erection drawings and manufacturer's printed instructions. Carefully co-ordinate work with other Sections.

.2 Install support system true and plumb in order to provide proper support for acoustical panels, at specified intervals.

.3 Damaged panels, waviness, warp or distortion of finished work will not be accepted.

.4 Cover field cut edges by means of trim or other moldings.

3.3 **CLEANING**

.1 Clean exposed surfaces of acoustical panel, trim, moldings and suspension members to comply with manufacturer's instructions for cleaning.

.2 Touch up any minor finish damage.

.3 Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.4 **PROTECTION**

.1 Protect installed work from damage due to subsequent construction activity, including temperature and humidity limitations and dust control, so that the work will be without damage and deterioration at the time of acceptance by the Owner.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for painting work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 Master Painters Institute (MPI), Painting Specification Manual.

.2 SSPC Steel Structures Painting Council, Standards.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations.
  - .2 Product transportation, storage, handling and installation requirements.
- .2 Submit listing of manufacturer's Product types, Product codes, and Product names, number of coats, and dry film thicknesses, corresponding to each Painting Schedule code; submit listing minimum of 8 weeks before materials are required.

.2 Samples:
- .1 Submit following samples in accordance with Section 01 33 00.
  - .1 Three 300 x 150 mm draw downs of each colour minimum 4 weeks before paints are required.
  - .2 Identify each sample with Contract number and title, colour reference, sheen, date, and name of applicator.

.3 Certificates:
- .1 Submit certification from paint manufacturer, on company letterhead, indicating each product proposed for use is Manufacture's premium grade, first line Product.
- .2 Submit certified documentation to confirm each airless spray painter has minimum of 5 years experience on applications of similar complexity and scope.
- .3 Submit certified documentation to confirm each worker has Provincial Tradesman Qualification certificate of proficiency.

.4 Reports:
- .1 Submit written field inspection and test report results after each inspection.
- .2 Submit Field Quality Control test result reports for alkali content, substrate moisture, and dry film thickness.
- .3 Submit electronic moisture meter manufacturer's specifications including tolerances. Submit record of latest meter calibration to meet manufacturer's recommendations.

1.4 QUALITY ASSURANCE

.1 Finishing work: Perform work to MPI requirements for premium grade.

.2 Supervision: Have work supervised by a full-time qualified foreperson who has 10 years minimum experience on Contracts of similar complexity and scope.

.3 Mock-up:
- .1 Construct three 3 m^2 mock-ups of different Paint Schedule code systems, selected by Consultant, in locations acceptable to Consultant to demonstrate installation workmanship, colour, and hiding power of Products.
- .2 Obtain Consultant's acceptance in writing before proceeding with the work of this Section.
- .3 Mock-ups may remain as part of the Work if acceptable to Consultant and will serve as a standard for similar code systems.
- .4 Repaint over mock-ups which do not form part of the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Install correct, safe temporary storage for paint, thinner, solvents, and other volatile, corrosive, hazardous, and explosive materials in accordance with requirements of authorities having jurisdiction.

.2 Post hazard warning signage in areas of storage and mixing. Install and maintain sufficient CO_2 fire extinguishers of minimum 9 kg capacity, accessible in each storage mixing and storage areas.

.3 Maintain storage enclosures at minimum 10°C ambient temperature and to manufacturer's instructions.

1.6 SITE CONDITIONS

.1 Apply coatings under the following conditions:
- .1 Exterior coatings (except Latex): 5° C minimum.
- .2 Exterior latex coatings: 10°C minimum.
- .3 24 hours minimum after rain, frost, condensation, or dew.
- .4 When no condensation is possible (unless specifically formulated against condensation).
- .5 Interior coatings: 7°C minimum.
- .6 Relative humidity: 85% maximum.
- .7 Not in direct exposure to sun light.

.2 Maintain temperature conditions indicated above for 24 hours before, during and 24 hours after painting.

.3 Install clean plywood sheets to protect floors and walls in storage and mixing areas, from paint drips, spatters, and spills.

.4 Apply sufficient masking, clean drop cloths, and protective coverings for full protection of work not being painted including, but not limited to, the following:
- .1 Light fixtures, fire and smoke detectors.
- .2 Data cabling and data infrastructure.
- .3 Sprinkler heads.
- .4 Prepainted diffusers and registers.
- .5 Prepainted equipment.
- .6 Fire rating labels and equipment specification plates.
- .7 Finished surfaces.

1.7 ENVIRONMENTAL PERFORMANCE REQUIREMENTS

1. Provide paint products meeting MPI "Green Performance Standard GPS-1-12".

1.8 MAINTENANCE

1. Deliver to Owner's place of storage on completion of work, sealed containers of each finish painting material applied, and in each colour. Label each container as for original, including mixing formula. Provide the following:
   - .1 1 L of extra materials when less than 50 L are used for Project;
   - .2 3.78 L of extra stock when 50 to 200 L are used;
   - .3 7.57 L of extra stock when over 200 L are used.

2 Products

2.1 MATERIALS

.1 Paint:
- .1 All materials under work of this Section, including but not limited to, primers, stains, and paints are to have low VOC content limits.
- .2 Products in accordance with the MPI Painting Specification Manual, Exterior and Interior Systems;
  - .1 For each MPI paint code, manufacture's premium grade, first line Products is to be use.
  - .2 Uniform dispersion of pigment in a homogeneous mixture.
  - .3 Ready-mixed and tinted whenever possible.
- .3 Products within each MPI paint system code: From single manufacturer.
- .4 Acceptable manufacturers:
  - .1 AkzoNobel.
  - .2 Benjamin Moore.
  - .3 PPG Industries Inc.
  - .4 Sherwin Williams.

2.2 COLOUR SCHEDULE

.1 Paint types (PNT):
- .1 Consultant will select full choice of colours and gloss when compiling a Colour Schedule after award of Contract.
- .2 Allow for colour selection by the Consultant from paint manufacturer's full colour range.
- .3 Paint types as follows:
  - .1 PNT-1: General wall and ceiling paint.
  - .2 PNT-2: Concrete floor paint.
  - .3 PNT-3: Accent paint 1.
  - .4 PNT-4: Accent paint 2.
  - .5 PNT-5: Accent paint 3.
  - .6 PNT-6: Accent paint 4.
  - .7 PNT-7: Accent paint 5.

.2 Conform to gloss reflectance definitions listed in MPI Specification Manual.

2.3 PAINTING AND FINISHING SCHEDULE

.1 Refer to Table 1, MPI Painting and Finishing Schedule coded systems, comply with MPI Painting Specification Manual.

Table 1: Painting and Finishing Schedule

EXTERIOR SUBSTRATES	Typical substrates (Including but not limited to)	MPI Manual Ref.	MPI Finish System Code	Topcoat
Galvanized steel	Metal doors & frames, metal soffit access panels, bollards	EXT 5.3	EXT 5.3L	Pigmented polyurethane
INTERIOR SUBSTRATES	Typical substrates (Including but not limited to)	MPI Manual Ref.	MPI Finish System Code	Topcoat
Concrete floors		INT 3.2	INT 3.2C	Epoxy
Concrete block masonry		INT 4.2	INT 4.2A	Latex
Structural steel (Factory primed)		INT 5.1	INT 5.1R	High performance latex

Table 1: Painting and Finishing Schedule				
Metal Fabrications (Factory primed)		INT 5.1	INT 5.1R	High performance latex
Galvanized steel	Ducts, pipes	INT 5.3	INT 5.3A	Latex
Galvanized metal	HM doors & door frames	INT 5.3	INT 5.3M	High performance latex
Gypsum board,	Drywall, walls, ceilings	INT 9.2	INT 9.2B	High performance latex
Gypsum board,	Wet areas	INT 9.2	INT 9.2F	Epoxy-modified latex

3 Execution

3.1 **EXAMINATION**

.1 Verify condition of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **PREPARATION**

.1 General:
- .1 Clean substrate surfaces free from, dust, grease, soiling, or extraneous matter, which are detrimental to finish.
- .2 Patch, repair, and smoothen minor substrate defects and deficiencies e.g. machine, tool and sand paper marks, shallow gouges, marks, and nibs.
- .3 Clean, sweep, and vacuum floors and surfaces to be painted, debris and dust-free prior to painting.
- .4 Refer to MPI Painting Specification Manual for surface preparation requirements of substrates not listed here.
- .5 Existing surfaces, general:
  - .1 Remove all loose paint and other deleterious matters from surface of existing surfaces which require re-painting.
  - .2 Thoroughly clean and prepare such surfaces to accept positive and permanent bond of new paint finish. If such preparation exposes bare surface, provide touch up primer.

.2 Where finish hardware has been installed remove, store, re-install finish hardware, to accommodate painting. Do not clean hardware with solvent that will remove permanent lacquer finishes.

.3 Alkali content tests and neutralization:
- .1 Test for ph level using litmus paper on dampened substrate.
- .2 Neutralize surfaces over 8.5 ph with 4% solution of Zinc Sulphate for solvent based systems and tetrapotassium pyrophosphate for latex based systems, to below 8.0 ph, and allow to dry.
- .3 Brush-off any residual Zinc Sulphate crystals.
- .4 Coordinate paint system primer / sealer to be alkali-resistant.

.4 Substrate moisture tests:
- .1 Test for moisture content over entire surface to be painted, minimum one test/ 2 m^2 in field areas and one test/600 mm along inside corners including at ceiling to wall juncture.
- .2 If any test registers above 10% allow entire substrate surfaces, within the plane, to dry further before paint system application. Install temporary drying fans if necessary.
- .3 Re-test employing same criteria.

.5 Mildew removal: Scrub with solution of trisodium phosphate and sodium hypochlorite (Javex) bleach, rinse with water, and allow to dry completely.

.6 Masonry (existing): Clean existing surfaces by pressure washing where indicated on drawings with a TSP solution and pressure range of 1500 - 4000 PSI at 6 - 12". Rinse areas with clean water and allow to throughly dry. Provide for collection and disposal of water.

.7 Masonry (new):
- .1 Allow 28 days cure before painting.
- .2 Coordinate repair of protrusion-chipping and grinding, and honeycomb filling with responsible trades.
- .3 Remove dirt, loose mortar, scale, powder, efflorescence, and other foreign matter.
- .4 Remove form oil and grease with trisodium phosphate, rinse, and allow to dry thoroughly.
- .5 Remove rust stains with solution of sodium metasilicate after thorough wetting; allow to dry thoroughly.

.8 Concrete floors (existing): Clean existing surfaces by pressure washing where indicated on drawings with a TSP solution and pressure range of 1500 - 4000 PSI at 6 - 12". Rinse areas with clean water and allow to throughly dry. Provide for collection and disposal of water.

.9 Metal Fabrications (existing): Scrape and either hand or power wire brush surfaces to remove mill and scale.

.10 Galvanized steel sheet:
- .1 Z275 (Satin & Spangled Sheet): SSPC SP7 brush blast.
- .2 ZF075 (Wiped Coat): Remove contamination, wash with Xylene solvent.
- .3 Touch-up damaged galvanized areas with organic zinc rich primer.

.11 Galvanized iron and steel: Prepare galvanized and ungalvanized metal surfaces as follows:
- .1 Unpassivated, unweathered and weathered: Remove contamination, wash with Xylene or Toluol solvent, allow to dry thoroughly. Make paint system primer/sealer an etching type primer.
- .2 Manufacturer pre-treated (including passivated): SSPC SP7.
- .3 Touch-up damaged galvanized areas with organic zinc rich primer.

.12 Structural steel and miscellaneous metal fabrications:
- .1 Coordinate the following with the responsible trades:
  - .1 Rust, mars, mill scale, and weld-burn touch-ups.
  - .2 Oil, grease, weld flux and other residue removal.
- .2 Prime paint items, not otherwise indicated to be primed as part of another Section.
- .3 Touch-up damaged galvanized areas with organic zinc rich primer.

.13 Wood and millwork:
- .1 Wood surfaces to be clean and dry with a moisture content of less than 15%.
- .2 Remove foreign matter prior to prime coat; spot coat knots, pitch streaks and sappy sections with sealer.
- .3 Fill nail holes and fine cracks after primer has dried.
- .4 Backprime interior and exterior woodwork.

.14 Factory primed surfaces:
- .1 Touch up damaged areas.
- .2 Clean as required for top coat.

.15 Gypsum board (existing):
- .1 Remove dust, dirt, oil, grease, glue and all foreign material. Clean with stiff fibre brush prior to applying primer coat.
- .2 Coordinate repairs and touch-ups with the responsible trade.
- .3 Lightly sand surface to smooth out ridges and provide neat smooth surface.

.16 Gypsum board:
- .1 Apply primer/sealer paint to reveal defects and deficiencies and to equalize absorption areas.
- .2 Coordinate repairs and touch-ups with the responsible trade.
- .3 Re-prime repairs.

.17 Coordinate with other trades to prevent:
- .1 Damage, and inadvertent activation of fire and smoke detectors.
- .2 Odour and dust distribution by permanent HVAC systems including fouling of ducts and filters.

.18 Field-mix Products in accordance with manufacturer's written instructions.

3.3 **APPLICATION**

.1 Apply painting systems in accordance with the MPI Painting Specification Manual. Apply each Product to manufacturer's recommended dry film thickness.

.2 Painting systems listed are required minimal, apply additional coats if necessary to obtain substrate hiding acceptable to the Consultant.

.3 Tint intermediate coats lighter than final top coats for identification of each succeeding coat and to facilitate inspections. Include only manufacturer's recommended reducing and tinting accessories. Do not add adulterants.

.4 Primer to be specialized primer coating system as required by manufacturer for selected colour. Standard primer being tinted shall be tinted to a maximum of 1.5% by volume.

.5 Sand lightly between coats to achieve a tooth or anchor for subsequent coats.

.6 Apply paint uniformly in thickness, colour, texture, and gloss, as determined by the Consultant under adequate illumination and viewed at a distance of 1500 mm. Apply finishes free of defects in materials and application which, in the opinion of the Consultant, affect appearance and performance. Defects include, but are not limited to:
- .1 Improper cleaning and preparation of surfaces.
- .2 Entrapped dust, dirt, rust.
- .3 Alligatoring, blisters, peeling.
- .4 Scratches, blemishes.
- .5 Uneven coverage, misses, drips, runs, and poor cutting in.

.7 Do not apply coatings on substrates which are not sufficiently dry. Unless indicated otherwise, allow each painting system coat to cure dry and hard before following coats are applied.

.8 Repaint entire areas of damaged or incompletely covered surfaces, to the nearest inside or outside corner; patching will not be permitted.

.9 Miscellaneous painting requirements:
- .1 Paint projecting ledges, and tops, bottoms and sides of doors both above and below sight lines to match adjacent surfaces.
- .2 Paint door frames, access doors and frames, door grilles, prime coated butts, and prime coated door closers to match surface in which they occur.
- .3 Paint interior columns to match walls of room.
- .4 Unless otherwise indicated, allow for:
  - .1 2 wall colours per room, one ceiling colour per room.
  - .2 Different door colours in each functionally different area.
  - .3 Different colours on both sides of same door.

.10 Mechanical, electrical and other painting coordination:
- .1 Paint following items unless specified or indicated on drawings not to be painted.
- .2 Paint mechanical services in accordance with Mechanical Identification Division 21, 22 and 23.
- .3 Coordinate painting of pipes, ducts, and coverings with the work of Division 21, 22 and 23 to precede pipe colour banding, flow arrows, and other pipe identification labeling installation.
- .4 Paint exposed conduit, pipes, hangers, ductwork, grilles, gratings, louvres, access panels, fire hose cabinets, registers, covers, enclosures, and other mechanical and electrical equipment including services concealed inside cupboard and cabinet work; apply colour and sheen to match adjacent surfaces, except as noted otherwise.
- .5 Paint portions of surfaces such as duct interiors, piping, ductwork, hangers, insulation, walls, and similar items, visible through grilles, louvres, convector covers etc., matte black in colour.
- .6 Remove the following to accommodate painting, carefully store, clean, then re-install on completion of each area and when dry:
  - .1 Switch and receptacle plates, fittings and fastenings, grilles, gratings, louvres, access panels, convector covers, and enclosures .

3.4 FIELD QUALITY CONTROL

.1 Dry film thickness tests:
- .1 Test for film thickness over entire surface to be painted, minimum one test/2 m^2 in field areas and one test/600 mm along inside corners including at ceiling to wall juncture.
- .2 If any test registers below specified thickness, re-apply paint to entire surface to nearest inside and outside corners.
- .3 If test registers more than 50% above specified thickness, consult with paint manufacturer, determine if problem exists, offer solutions to Consultant, and repair as directed.
- .4 Re-test employing same criteria after repair.

3.5 CLEANING

.1 Remove spilled, splashed, and spattered paint promptly as work proceeds and on completion of work. Clean surfaces soiled by paint spillage and paint spatters. Repair or replace damaged work, as directed by Consultant.

3.6 PROTECTION

.1 Post Wet Paint signs during drying and restrict or prevent traffic where necessary.

.2 Post sign, after Consultant's inspection and acceptance of each room, reading: PAINTING COMPLETE - NO ADMITTANCE WITHOUT CONTRACTOR'S PERMISSION.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services for washroom accessories work as listed below in accordance with the Contract Documents.
- .1 Shower curtain rods.
- .2 Paper towel dispenser and waste receptacle.
- .3 Toilet tissue dispenser.
- .4 Grab bars.
- .5 Sanitary napkin/tampon dispensers.
- .6 Sanitary napkin disposals.
- .7 Hand sanitizer dispensers.
- .8 Mirrors.
- .9 Soap dispensers.
- .10 Waste receptacles.
- .11 Coat hooks.
- .12 Folding shower seats.
- .13 Sharps disposals.
- .14 Shelves.
- .15 Adult changing stations (future adult change table blocking only).

1.2 **REFERENCES**

.1 ASTM A167, Specification for Stainless Steel and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.2 ASTM A312, Specification for Seamless and Welded Austenitic Stainless Steel Pipes.

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

.4 CAN/CSA B651-M, Accessible Design for the Built Environment.

1.3 **SUBMITTALS**

.1 Product data: Submit Product data to requirements of Section 01 33 00 indicating each washroom accessory describing size, finish, details of function, attachment methods, hardware and locks, description of rough-in frame, and building-in details of anchors for grab bars.

.2 Closeout submittals:
- .1 Submit for each Product operation and maintenance instructions for incorporating into the Operations and Maintenance Manuals in accordance with Section 01 78 00.
  - .1 Supply 2 keys for each lockable washroom accessory to Consultant.
  - .2 Master key washroom accessories which are keyed.

.3 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.

1.4 **DELIVERY, STORAGE AND HANDLING**

.1 Deliver materials in sealed cartons and containers with manufacturer's name and product description clearly marked.

1.5 **EXTENDED WARRANTY**

.1 Submit an extended warranty for washroom accessories work in accordance with the General Conditions, except that the warranty period is extended to 2 years from date of Ready-for-Takeover.
- .1 Against cracked or scratched mirrors, spoiling or deterioration or backing, loosening of fastenings or adhesive
- .2 Coverage: complete replacement including effected adjacent work.

1.6 **MAINTENANCE**

1. Maintenance Tools: Provide special tools necessary for accessing, assembly/disassembly or removal of toilet, bath and cleaning accessories in accordance with Section 01 78 00.

2 Products

2.1 **MATERIALS**

.1 Stainless steel:
- .1 Sheet metal: ASTM A167, Type 304.
- .2 Tubing: ASTM A312, Type 304.

.2 Sheet steel: ASTM A653M, Z275; Cold rolled, commercial quality, surface preparation and pretreatment as required for applied finish.

.3 Fasteners, screws and bolts: ASTM A167, Type 304 stainless steel, tamper-proof.

2.2 **ACCESSORIES**

.1 Refer to drawings for quantity and location of washroom accessories.

.2 Shower curtain rod (SB1):
- .1 32 mm diameter, 1.2 mm (18 ga.) thick stainless steel shower rod tube, 1524 mm long, complete with 1.5 mm (16 ga.) thick flanges
- .2 Finish: Type 304 stainless steel with brushed finish.
- .3 Shower curtain rod, 'Model 1145-S' by Frost Products Ltd. or approved equal.

.3 Shower curtain rod (SB2):

.1 32 mm diameter, 1.2 mm (18 ga.) thick stainless steel shower rod tube, 914 mm long, complete with 1.5 mm (16 ga.) thick flanges
.2 Finish: Type 304 stainless steel with brushed finish.
.3 Shower curtain rod, 'Model 1145-36S' by Frost Products Ltd. or approved equal.

.4 Shower curtain rod (SB3):
.1 32 mm diameter, 1.2 mm (18 ga.) thick stainless steel shower rod tube, 2440 mm long, complete with 1.5 mm (16 ga.) thick flanges
.2 Finish: Type 304 stainless steel with brushed finish.
.3 Shower curtain rod, 'Model 1145-S, Custom Size' by Frost Products Ltd. or approved equal.

.5 Paper towel dispenser and waste receptacle (PTW1):
.1 Provide recessed, universal paper towel dispenser adjustable to dispense c-fold and multifold paper towels, full length stainless steel piano hinge, stainless steel waste receptacle, complete with rounded towel tray with hemmed opening and tumbler lock. Waste receptacle capacity: 7.6 L (2 gal).
.2 Finish: Type 304 stainless steel with satin finish.
.3 Combination paper towel dispenser and waste receptacle, 'Classic Series, Recessed Paper Towel Dispenser and Waste Receptacle, Model B-369' by Bobrick Washroom Equipment or approved equal by ASI Group Canada.

.6 Toilet tissue dispenser (TPD1): Surface mounted, center-pull, twin roll, toilet paper dispenser with translucent cover fabricated from polycarbonate material, 'Model 56501' by Georgia-Pacific Consumer Products LP. or approved equal.

.7 Grab bar, straight (GB1):
.1 38 mm diameter, 1.2 mm (18 ga.) thick, 600 mm long, stainless steel grab bar, concealed mounting with snap flange, complete with escutcheons. Configurations as indicated on drawings.
.2 Finish: Type 304 stainless steel with a satin finish and peened grip.
.3 Straight grab bar, 'B-6806 x 24' by Bobrick Washroom Equipment or approved equal by ASI Group Canada.

.8 Grab bar, L-shaped (GB2):
.1 38 mm diameter, 1.2 mm (18 ga.) thick, concealed mounting with snap flange, complete with escutcheons.
.2 Length and configuration: 762 x 762 mm, in L-shaped configuration as shown on Contract Drawings.
.3 Finish: Type 304 stainless steel with a satin finish and peened grip.
.4 L-shaped grab bar, 'Series 6898-99 - L30x30' by Bobrick Washroom Equipment or approved equal by ASI Group Canada.

.9 Sanitary napkin/tampon dispenser (SND1):
- .1 Surface mounted, two flush tumbler locks, one lock for dedicated for coin box, multi-staked piano hinge, stainless steel cabinet.
- .2 Fabricate unit to combine 2 dispensing mechanisms available with 25 or 50 cents or “free” operation in one cabinet.
- .3 Finish: Type 304 stainless steel with satin finish.
- .4 Sanitary napkin/tampon dispenser, ‘Model 0864' by ASI Group Canada or ‘Model B-2706 by Bobrick Washroom Equipment.

.10 Sanitary napkin disposal (SNA1):
- .1 Surface mounted, 0.8 mm (22 ga.) thick, pivoting self-closing lid with full length piano hinge.
- .2 Capacity: 6 L (1.6 gal.).
- .3 Finish: Stainless steel with brushed finish.
- .4 Sanitary napkin disposal, ‘Model 622' by Frost Products Ltd. or approved equal.

.11 Hand sanitizer dispenser (HSD1):
- .1 Wall mounted, batter operated, automatic, stainless steel hand sanitizer dispenser with brushed finish, equipped with low battery LED indicator. Capacity: 700 ml.
- .2 Hand sanitizer dispenser, ‘Automatic Foam Soap/Sanitizer Dispenser, Model T9A641521' by Global Industrial or approved equal.

.12 Mirror (MR1):
- .1 Minimum 6 mm thick, acrylic mirror fabricated from 100% virgin acrylic material with one-piece integral frame, custom size of 450 x 900 mm.
- .2 Acrylic mirror, manufactured' by Cortech USA or approved equal.

.13 Mirror, tilted/angled (MR2):
- .1 Minimum 6 mm thick plastic acrylic mirror with tapering Type 304 stainless steel frame with satin finish, extending out 100 mm at top and tapering to 25 mm at bottom, complete with shock absorbing, water resistant, non-abrasive polyethylene padding, sized at 610 x 915 mm.
- .2 Acrylic mirror with tilted/angled frame, ‘U704 Series-PM, Fixed Tilt Angle Frame Mirror' by AJW Architectural Products or approved equal.

.14 Mirror (MR3):
- .1 Mirror with minimum 6 mm thick acrylic plastic mirror with one-piece channel frame, shock resistant foam filler material and wall bracket.
- .2 Dimension: 457 x 914 mm.
- .3 Locations as indicated on the Contract Drawings.
- .4 Frame finish: Type 304 stainless steel satin finish.
- .5 Acrylic mirror, ‘Model #0620-B1836' by ASI Group Canada or approved equivalent by Bobrick.

.15 Soap dispenser (SD1):
- .1 Wall mounted, stainless steel soap dispenser with Lucite soap level indicator window and black plastic nozzle. Capacity: 1.2 L (40 fl. oz).
- .2 Finish: Type 304 stainless steel with brushed finish.
- .3 Soap dispenser, 'Model 708-A' by Frost Products Ltd. or approved equal.

.16 Coat hook (CH1):
- .1 Collapsible coat hook, secured from front with tamper resistant screws, complete with back plate, 'Vandal-Resistant Clothes Hook, #B-983' by Bobrick or approved equal by ASI Group Canada.
- .2 Auto-release hook tested to hold a minimum of 20 lbs. and release at 40 lbs.
- .3 Finish: Type 304 stainless steel with satin finish.

.17 Folding shower seat (SS1):
- .1 Wall mounted, folding shower seat fabricated from 8 mm thick, one piece, white coloured phenolic seat.
- .2 Dimensions: 457 mm wide x 615 mm long.
- .3 Finish: Type 304 stainless steel frame with brushed finish.
- .4 Folding shower seat, 'Model 972' by Frost Products Ltd. or approved equal.

.18 Sharps disposal (SHD1):
- .1 Surface mounted, heavy duty, front loading, stainless steel biomedical sharps disposal with brushed finish, equipped with recessed tube inlet to prevent unauthorized access, disposal plastic sharps container and tumbler lock. Sharps container capacity: 4 L (4.23 qt).
- .2 Sharps disposal, 'Model 878' by Frost Products Ltd. or approved equal.

.19 Stainless steel shelf, straight (US1):
- .1 Shelf fabricated from 1.2 mm thick stainless steel with 13 mm return edge and front edge hemmed for safety.
- .2 Shelf complete with brackets fabricated from 1.2 mm thick stainless steel.
- .3 Size: 100 mm wide x 455 mm length.
- .4 Finish: Type 304 stainless steel, satin finish.
- .5 Stainless steel shelf, 'B-295 x 18, Stainless Steel Shelf" by Bobrick or approved equal by ASI Group Canada.

.20 Corner shelf (SHS1):
- .1 Corner shelf fabricated from 0.8 mm (22 ga.) thick stainless steel, with 200 mm long corner wings.
- .2 Finish: Type 304 stainless steel, No. 4 brushed finish.
- .3 Stainless steel corner shelf, 'Model '950-8x8' by Frost Products Ltd. or approved equal.

.21 Hand dryer (HD1): In accordance with Division 22 - Plumbing.

.22 Emergency call buttons: In accordance with Section 08 70 00.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Verify and coordinate templates, inserts, and rough-in frames and verify exact location of washroom accessories for installation.

.2 Verify there is adequate supports and/or blocking in gypsum wall assemblies prior to installation of washroom accessories.

.3 Verify adequate blocking has been installed in gypsum wall assembly for future adult change table.

.4 Provide fastening and mounting kits for washroom accessories.

.5 Locate washroom accessories where indicated on Drawings and where directed by Consultant.

.6 Install washroom accessory fixtures, accessories, and items in accordance with manufacturer's instructions and CAN/CSA B651-M. Provide exposed tamper-proof screws of stainless steel to match units.

.7 Install washroom accessories plumb, level, and securely and rigidly anchored to substrate surfaces and framing. Adjust accessories for proper operation and verify mechanisms function smoothly.

.8 Install grab bars to withstand minimum load of 1.3 kN applied vertically or horizontally. Provide necessary reinforcements as required.

.9 Clean and polish exposed surfaces and fill accessories with necessary supplies prior to acceptance by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for miscellaneous specialties work as listed below in accordance with the Contract Documents.
- .1 Janitor's shelf.
- .2 Corner guards.
- .3 Bulletin boards.
- .4 Privacy curtain and track.
- .5 Coat hooks:
- .6 Fire safety plan box.

1.2 **REFERENCES**

.1 CAN/ULC-S109, Flame Tests of Flame-resistant Fabrics and Films.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data for each Product specified in accordance with Section 01 33 00 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, and limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings: Submit shop drawings in accordance with Section 01 33 00 indicating elevations, sections, details, dimensions, materials, gauges, and finishes.

.3 Samples:
- .1 Submit samples in accordance with Section 01 33 00 of the following:
  - .1 Duplicate 300 x 300 mm tackable linoleum surface demonstrating colour and finish.

.4 Closeout submittals: Submit cleaning and maintenance instructions for miscellaneous specialties for incorporation into Operations and Maintenance Manuals in accordance with Section 01 78 00.

1.4 **DELIVERY, STORAGE, AND HANDLING**

.1 Package or crate, and brace products to prevent distortion in shipment and handling. Label packages and crates, and protect finish surfaces by sturdy wrappings.

2 Products

2.1 **MANUFACTURED UNITS**

.1 Janitor's shelf with mop and broom holders and hooks:
- .1 #B-239 x 34 by Bobrick Washroom Equipment of Canada or approved equal.
- .2 330 mm H by 205 mm deep. Shelf constructed of minimum 1.2 mm stainless steel, mop and broom holders to have spring loaded rubber cam to grip handles up to 30 mm in diameter, and stainless steel hooks positioned below shelf.
- .3 Finish: Type 304 stainless steel with satin finish.

.2 Stainless steel corner guard (CG): 51 mm x 51 mm x 90°, stainless steel corner guard. Surface mounted with adhesive (without fastenings), 'CO-8' by C/S Group or approved equal by McGill Architectural Products.

.3 Bulletin boards (BB1 & BB2):
- .1 Tackable bulletin board material:
  - .1 Provide tackable material to plywood substrate supplied under Section 06 10 00, for mounting where indicated on Contract Drawings, complete with stainless steel trims.
  - .2 Minimum 6 mm thick, uni-colour linoleum resilient homogeneous tackable surface consisting of linseed oil, granulated cork, rosin binders and dry pigments calendared onto a natural burlap backing. Colour shall extend through thickness of material.
  - .3 Colour: As selected by Consultant from manufacturer's full colour range.
  - .4 Bulletin board material, 'Bulletin Board Pinboard Linoleum' by Forbo or approved equal.
- .2 Adhesive: Low VOC, type as recommended by bulletin board manufacturer.
- .3 Stainless steel trims: Coordinate with Section 05 50 00 as required for sizing and installation of extruded trims.

.4 Privacy curtain and track (CMT1):
- .1 Curtain track (heavy duty):
  - .1 Ceiling mounted, extruded aluminum track with satin anodized finish, 'Curtain System Track, Model KNCR10196 with Aluminum Track CR-101' by Richelieu or approved equal by Commercial Draperies Ltd., Inpro Corporation or Silent Gliss Canada.
  - .2 Track is complete with nylon curtain carriers , rolling nylon wheel units, stainless steel chain, hooks, end sleeves and stops. Form curved sections as indicated on Drawings.
- .2 Privacy curtains:
  - .1 Curtain material shall pass CAN/ULC-S109, small and large scale. Provide 500 mm wide flame resistant nylon mesh at top of curtain and 100% polyester flame resistant curtain fabric in colour as selected by Consultant.
  - .2 Hem all edges, interlock all seams, double stitched, with 50 mm wide matching top hem, triple thickness stitched to body of mesh, and 50 mm bottom hem.

.3 Provide metal grommets every 150 mm and not further than 12 mm from ends. Grommets shall have brushed aluminum finish.

.4 Acceptable manufacturers: Imperial Fastener Company, Inpro Corporation, or Commercial Draperies Ltd.

.5 Coat hook (CH1):

.1 Collapsible coat hook, secured from front with tamper resistant screws, complete with back plate, 'Vandal-Resistant Clothes Hook, #B-983' by Bobrick or approved equal by ASI Group Canada.

.2 Auto-release hook tested to hold a minimum of 20 lbs. and release at 40 lbs.

.3 Finish: Type 304 stainless steel with satin finish.

.6 Fire safety plan box:

.1 Fully recessed stainless steel cabinet with 1.2 mm thick frame and 2.6 mm thick door, 380 mm H x 342 mm W x 125 mm D.

.2 Lettering: 'Fire Safety Plan' in red colour.

.3 Lock: Cam lock/deadbolt lock complete with lock core to suit application and installation.

.4 Acceptable manufacturers: Mikor Metal Products or approved equal by Safety Media Inc.

3 Execution

3.1 EXAMINATION

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 PREPARATION

.1 Verify substrate surfaces are solid, free from surface water, dust, oil, grease, projections and other foreign matter detrimental to performance.

.2 Items to be built-in: Provide information and templates required for installation of work of this Section, and assist or supervise, or both, the setting of anchorage devices, and construction of other work incorporated with products specified in this Section in order that they function as intended.

.3 Verify there is adequate supports and/or blocking in gypsum wall assemblies prior to installation of miscellaneous specialty items as required.

3.3 INSTALLATION

.1 Install miscellaneous specialties level and securely and rigidly anchored to substrate in accordance with authorities having jurisdiction, reviewed shop drawings, and manufacturer's written instructions.

.2 Adjust operable components for smooth and efficient operation.

.3 After installation, adjust miscellaneous specialties in accordance with manufacturer’s written instructions.

3.4 CLEANING

.1 Clean and polish exposed surfaces prior to acceptance by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for appliance and equipment work in accordance with the Contract Documents.

1.2 **SUBMITTALS**

.1 Product data:
  .1 Submit copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
    .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations and warranties.
    .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings: Submit shop drawings in accordance with Section 01 33 00 indicating elevations, sections, details, dimensions, materials, gauges, and finishes.

.3 Closeout submittals: Submit recommended maintenance instructions and listing of recommended maintenance Products for incorporation into Operations and Maintenance Manuals in accordance with Section 01 78 00.

1.3 **QUALITY ASSURANCE**

1. All electrical equipment shall have attached labels attesting to CSA or Electrical Safety Authority approval, and shall have magnetic starters for motors, transformers, and overload protection.

1.4 **DELIVERY, STORAGE AND HANDLING**

1. Package equipment to prevent damage or distortion during shipment and handling. Label packages and protect finish surfaces by sturdy wrappings, strippable plastic or equivalent protection.

2. Do not deliver equipment to site until conditions are such that no damage will occur to them while in storage. Store equipment on site in a manner to prevent damage.

1.5 **SCHEDULING**

1. Provide equipment or its parts ready for installation in accordance with construction schedule. Verify required delivery date sufficiently before delivery to ensure that construction is not delayed.

2 Products

2.1 APPLIANCES AND EQUIPMENT

1. Appliances and equipment, general:
   - .1 Salvaged appliances and equipment: Salvaged commercial kitchen appliances/equipment, washers and dryers in accordance with Section 02 40 00, reviewed and approved by the Consultant for reuse/reinstallation under Work of this Project.
   - .2 Appliances and equipment include the following:
     - .1 Dryer (DR1), quantity of one (1).
     - .2 Washing machine (WD1), quantity of one (1).
     - .3 Stacked washer/dryer (WM1), quantity of three (3).
     - .4 Reach-in freezer (R1), quantity of two (2).
     - .5 Reach-in refrigerator (R2), quantity of two (2).
   - .3 Location of appliances as shown on Contract Drawings.
   - .4 Equipment shall include all components required by jurisdictional authorities, and to protect the equipment from damage during operation.
   - .5 Equipment shall include all components, connections, devices and controls required to make it fully and safely operable.
   - .6 Provide reinforcing and anchorage for built-in products.
   - .7 Insulate between dissimilar metals, and metal and masonry, to prevent electrolysis.

2.2 FABRICATION

1. Fit joints and junctions between components tightly, in true planes, and to prevent entry of water to collect in component voids. Cap open ends of sections exposed to view.

2. Fabricate work with materials and component sizes, metal gauges, reinforcing anchors, and fastenings of adequate strength to ensure that it will remain free of warping, buckling, opening of joints and seams, and distortion within limits of intended and specified use. Conceal and weld connections wherever possible.

3. Cleanly and smoothly finish exposed edges of materials including holes and cutouts.

4. Provide reinforcing and attached anchorage for built-in products.

5. Provide holes and connections for work installed under other Sections.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

2. Before installation commences, ensure that mounting devices, members and surfaces are satisfactory for fitting, and adequate for securing of Work.

3. Take site measurements of construction to which work of this Section must conform, and through which access must be made, before work is delivered to site, to ensure that adaptation is not required which would result in construction delay.

3.2 **INSTALLATION**

1. Obtain and pay for all permits and connection fees as per authorities having jurisdiction.

2. Perform mechanical and electrical work in accordance with applicable codes and standards. Coordinate with applicable Sections as required for work of this Section.

3. Obtain from manufacturer or supplier, anchorage information, roughing-in dimensions, templates and service requirements for installation of Work of this Section. Also obtain assistance from manufacturer or supplier, for the setting of anchorage devices, and construction of other work incorporated with equipment specified in this Section in order that they function as intended.

4. Install work to meet manufacturer's recommended specifications, true, tightly fitted, and level or flush to adjacent surfaces, as suitable for installation.

5. Work shall include rough hardware, fastenings and other items necessary for secure installation.

6. Use only fastenings suitable for materials. Do not use through fastening at floors or walls.

7. Install work straight, plumb, level, and secured to prevent distortion or displacement, or both. Shim as necessary with concealed shims. Where required, use grout on which iron oxide deposits will not form.

8. Secure fixed equipment to building structure or construction as required to maintain it permanently in place, and so that it functions properly with no damaging vibration to the building or itself.

9. Install equipment with connections provided and as required for plumbing and electrical services.

10. Mechanical work:
    .1 Obtain and pay for all permits and connection fees as per authorities having jurisdiction.
    .2 Provision of mechanical services and connection of equipment to mechanical work is specified in Divisions 22 and 23.

11. Electrical:
    .1 Obtain electrical permit and connection fees as required by authorities having jurisdiction.
    .2 Provision of electrical service and connections of equipment to the services is specified in Division 26.

3.3 REPAIR

1. Refinish damaged or defective work so that no variation in surface appearance is discernible. Refinish work at site only if approved by Consultant.

3.4 ADJUSTING

1. Verify under work of this Section that installed products function properly, and adjust them accordingly to ensure satisfactory operation.

2. Lubricate equipment as specified by equipment manufacturer.

3.5 CLEANING

1. Clean and polish all surfaces that are exposed to view from any location on completion of installation.

2. Remove packaging materials and debris from installation from the site.

3.6 DEMONSTRATION

1. After start-up, adjusting and cleaning, demonstrate operation of equipment to Owner and Consultant, prior to Ready-for-Takeover. Demonstrations shall be made:
    .1 When the Work is certified complete by the Consultant.
    .2 When the Work is turned over to the Owner.

2. Knowledgeable representatives of the manufacturers and installers of the equipment being demonstrated shall be present at time of demonstrations.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for Owner supplied and Contractor installed item work in accordance with the Contract Documents.

1.2 **SUBMITTALS**

.1 Product data:
.1 Submit copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
.1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations and warranties.
.2 Product transportation, storage, handling and installation requirements.

.2 Certificates: Submit manufacturer's certificates stating that products are in accordance with this specification.

.3 Closeout submittals: Submit recommended maintenance instructions and listing of recommended maintenance Products for incorporation into Operations and Maintenance Manuals in accordance with Section 01 78 00.

1.3 **QUALITY ASSURANCE**

1. Regulatory requirements: All electrical equipment shall have attached labels attesting to CSA or Electrical Safety Authority approval, and shall have magnetic starters for motors, transformers, and overload protection.

1.4 **DELIVERY, STORAGE AND HANDLING**

1. Package or crate, and brace products to prevent damage or distortion of equipment in shipment and handling. Label packages and crates, and protect finish surfaces by sturdy wrappings or equivalent protection. Provide temporary skids under large or heavy units.

2. Do not deliver products to site until conditions are such that no damage will occur to them while in storage.

3. Store equipment at site in a manner to prevent damage to equipment.

4. Uncrate equipment only before installation.

1.5 **SCHEDULING**

1. Provide equipment or its parts ready for installation in accordance with construction schedule. Verify required delivery date sufficiently before delivery to ensure that construction is not delayed.

2 Products

2.1 **EQUIPMENT**

1. Provide reinforcing and anchorage for built-in products.

2. Insulate between dissimilar metals, and metal and masonry, to prevent electrolysis.

3. Equipment shall include all electrical components required by jurisdictional authorities, and to protect the equipment from damage during operation.

4. Equipment shall include all components, connections, devices and controls required to make it fully and safely operable.

2.2 **FABRICATION**

1. Fit joints and junctions between components tightly, in true planes, and to prevent entry of water to collect in component voids. Cap open ends of sections exposed to view.

2. Fabricate work with materials and component sizes, metal gauges, reinforcing anchors, and fastenings of adequate strength to ensure that it will remain free of warping, buckling, opening of joints and seams, and distortion within limits of intended and specified use. Conceal and weld connections wherever possible.

3. Cleanly and smoothly finish exposed edges of materials including holes and cutouts.

4. Provide reinforcing and attached anchorage for built-in products.

5. Provide holes and connections for work installed under other Sections.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

2. Before installation commences, ensure that mounting devices, members and surfaces are satisfactory for fitting, and adequate for securing of work.

3. Take site measurements of construction to which work of this Section must conform, and through which access must be made, before work is delivered to site, to ensure that adaptation is not required which would result in construction delay.

3.2 INSTALLATION

1. Obtain from manufacturer or supplier, anchorage information, roughing-in dimensions, templates and service requirements for installation of work of this Section. Also obtain assistance from manufacturer or supplier, for the setting of anchorage devices, and construction of other work incorporated with equipment specified in this Section in order that they function as intended.

2. Install work to meet manufacturer's recommended specifications, true, tightly fitted, and level or flush to adjacent surfaces, as suitable for installation.

3. Work shall include rough hardware, fastenings and other items necessary for secure installation.

4. Use only fastenings suitable for materials. Do not use through fastening at floors or walls.

5. Install work straight, plumb, level, and secured to prevent distortion or displacement, or both. Shim as necessary with concealed shims. Where required, use grout on which iron oxide deposits will not form.

6. Secure fixed equipment to building structure or construction as required to maintain it permanently in place, and so that it functions properly with no damaging vibration to the building or itself.

7. Install equipment with connections provided as required for plumbing and electrical services.

3.3 REPAIR

1. Refinish damaged or defective work so that no variation in surface appearance is discernible. Refinish work at site only if approved by Consultant.

3.4 ADJUSTING

1. Verify under work of this Section that installed products function properly, and adjust them accordingly to ensure satisfactory operation.

2. Lubricate equipment as specified by equipment manufacturer.

3.5 CLEANING

1. Clean and polish all surfaces that are exposed to view from any location on completion of installation.

2. Remove packaging materials and debris from installation from the site.

3.6 DEMONSTRATION

1. After start-up, adjusting and cleaning, demonstrate operation of equipment to Owner and Consultant, prior to Ready-for-Takeover. Demonstrations shall be made:
   .1 When the Work is certified complete by the Consultant.
   .2 When the Work is turned over to the Owner.

2. Knowledgeable representatives of the manufacturers and installers of the equipment being demonstrated shall be present at time of demonstrations.

3.7 SCHEDULE OF EQUIPMENT

1. Owner supplied and Contractor installed items:
   .1 Existing salvaged items: Existing salvaged items in accordance with Section 02 40 00, scheduled for relocation and reinstallation under Work of this Project.
   .2 [...].
   .3 [...].
   .4 Additional items as indicated by the Consultant or Owner.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for manually operated window covering work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 Canada Consumer Product Safety Act, Regulation SOR/2019-97.

.2 CAN/ULC-S109, Flame Tests of Flame-resistant Fabrics and Films.

.3 CWCR, Corded Window Covering Regulations.

1.3 **DESIGN REQUIREMENTS**

.1 Design manually operated window shade system in accordance with Canada Consumer Product Safety Act, Regulation SOR/2019-97, for CWCR regulations to prevent risk of strangulation.

1.4 **SUBMITTALS**

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, limitations, and finishes.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings: Submit shop drawings in accordance with Section 01 33 00 indicating elevations, sections and details of opening size, clearances, handling of operating components, anchorage, dimensions, gauges, materials, and finishes.

.3 Samples: Submit following samples in accordance with Section 01 33 00; Two 300 x 300 mm samples of fabric type.

.4 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.

.5 Closeout submittals:
- .1 Submit following for each Product for incorporation into Operations and Maintenance Manuals in accordance with Section 01 78 00:
  - .1 Functional description detailing operation and control of components.
  - .2 Performance criteria and maintenance data.
  - .3 Operating instructions and precautions.
  - .4 Safety precautions.

1.5 **EXTENDED WARRANTY**

.1 Manufacturer shall provide warranty that all components are free of manufacturing defects for two years from date of installation. This warranty is void if the product has been improperly installed or subjected to improper care.

2 Products

2.1 **ACCEPTABLE PRODUCTS AND MANUFACTURERS**

.1 Manual roller shade: Factory assembled, manual chain operated, roller type fabric shades with “snap-in” mounting, end brackets, shade tube, aluminum fascias, soffit, hembar and fabric as indicated on drawings and as specified herein. ‘Teleshade’ by Solarfective (Legrand North America) or approved equal by Elite Pro Shading Systems or SunProject Inc.

2.2 **SHADING FABRIC**

.1 Solar shading fabric:
- .1 Shading fabric with 3% openness factor, type and colour to be selected by the Consultant from manufacturer’s full range.
- .2 Flame retardance: Fabric shall be certified by an independent laboratory to pass CAN/ULC-S109.
- .3 Fabric colour: Selected by Consultant from full colour range of any of the specified manufacturers. Shade fabric on any one floor shall be from the same dye lot.
- .4 Fabric shall be sealed under heat and pressure to retain weave pattern, with additional heat seal at sides, to prevent fraying and to eliminate rough edges.

2.3 **MANUAL SHADE FABRICATION**

.1 Extruded aluminum shade tube: Manufacturer’s standard shade tube, minimum 1.5 mm thick, with internal fins for strength and drive capabilities.

.2 Fascias and soffit: Minimum 1.7 mm thick, extruded aluminum cover, complete with continuous screw flutes which accept end brackets to form unitized unit (totally assembled). To cover front and rear of shade and soffit return at underside to conceal roller and hardware, notched for chain clearance.

.3 Drive assemblies:
- .1 Factory set, spring clutch type drive assembly to suit size and travel of fabric shades, complete with built-in shock absorber system to prevent chain breakage under normal conditions, and balancing spring or lift assist mechanism.
- .2 Capable of being field adjusted from exterior of shade without having to disassemble shades.

.4 Exterior hembar: Extruded aluminum in clear anodized finish with plastic end finials.

.5 Drive chain:
- .1 No. 10 “bright” finished series 300 stainless steel bead type chain forming continuous loops and capable of withstanding 400 N pull test.
- .2 Provide drive chains with upper and lower stops to prevent overwinding or underwinding.

.6 Tension safety/hold-down device: Provide manufacturer's standard pull chain tension/hold-down device for fastening to adjacent wall or as applicable to suit intended application, complete with fasteners and anchors as required for complete installation.

.7 Dynamic hembar: At sill locations, in lieu of bottom channel, provide aluminum Dynamic Hembar with same finish as side channels. Upon contact with sill, it shall provide a light seal even if the sill is slightly out of level.

.8 End bracket: Two piece moulded ABS construction with a nylon drive sprocket. Incorporate snap-in clip on each end bracket to engage snap-in mounting hardware. Bracket colour shall coordinate with the fascia colour.

.9 Colour: Exposed surfaces (excluding fabric) shall be colour selected by Consultant, and not necessarily from manufacturer's full colour range. Metal components shall be pretreated and finished with an acceptable baked enamel finish.

.10 Fasteners: Non-corrosive metal screws for attachment to windows or curtain wall framing, concealed in completed installation.

.11 Mounting System: Snap-in brackets which allow the shade to be removed without disassembling the shade unit.

.12 Shade and mounting system to be designed to allow air between shade and glass.

.13 Fabric shall hang flat, without buckling or distortion. Trimmed edges shall hang straight without curling or raveling.

.14 Unguided vertical shades shall not drift sideways more than 3 mm in total run.

.15 Provide stops at highest and lowest shade positions to prevent over winding and unrolling.

.16 Design and fabricate shades so that there is a maximum 12 mm gap both sides of fabric.

.17 Shades shall be fully factory assembled units of unitized construction consisting of end brackets, shade tube, extruded aluminum fascias, soffit return, hembar and specified fabric.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Install shades in accordance with accepted shop drawings and manufacturer's written instructions.

.2 Install shades in locations shown using specified fasteners, plumb, true, square, straight, and level in proper planes, complete with all fascias/soffits, trims and accessories.

3.3 **ADJUSTMENT AND CLEANING**

.1 The shade cloth fabric shall hang flat, without buckling or distortion. The edge, when trimmed, shall hang straight without ravelling. An unguided roller shade cloth shall roll true and straight, without shifting sideways more than 3 mm in either direction due to warp distortion, or weave design.

.2 Adjust, correct and lubricate fabric shade as required, to provide smooth and efficient operation without binding.

.3 Clean shade surfaces and remove all finger marks and smudges from fascias, soffits, and trim surfaces. Remove all protective films.

.4 Leave fabric shade in raised position and in first-class condition upon completion of the work of this Section.

END OF SECTION

HIDI

DIVISION 25 – INTEGRATED AUTOMATION

SPECIFICATIONS

FOR THE

SSHA YOUTH SHELTER

25 CANTERBURY PLACE

TORONTO, ON

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DISCIPLINES
MECHANICAL
ELECTRICAL
PLUMBING
LIGHTING DESIGN
COMMUNICATIONS & AV
SECURITY & RISK
COMMISSIONING
ENERGY SERVICES

Our Project No. 2023-0233

Issued for Construction

April 22, 2024

SEAL:

Project Name: *SSHA YOUTH SHELTER*
Project No.: *2023-0233*
Section Name: ***Table of Contents***
Section No.: ***Division 25 - Integrated Automation***
Date: *April 22, 2024*

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Project Name: *SSHA YOUTH SHELTER*
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1 **GENERAL**

1.1 GENERAL

1.1.1 Section 20 00 00 – General Requirements shall apply to and govern this Section.

1.2 SCOPE OF WORK

1.2.1 Provide a Building Automation System (BAS) utilizing Distributed Digital Control (DDC) to serve new mechanical and associated systems as described on the drawings and in this specification.

1.2.2 Provide all labour, materials, Products, equipment, and services to supply, install, and commission the electronic control and monitoring system with electronic actuation as specified in Specification Division 25 – Integrated Automation.

1.2.3 Provide all computer hardware and software, operator input/output communication devices, communication units, a communication interface to digital system controllers, field sensors, and controls as required to meet the specified performance.

1.2.4 Provide all labour, including calibration, commissioning, software programming and data base generation, generation of colour graphics and additional work necessary to provide a complete and fully operating system.

1.2.5 Provide all necessary wiring for fully complete and functional control system as specified in the Contract Documents.

1.2.6 Building Automation System shall meet the City of Toronto Standard Building Automation System (BAS) Owner requirements outlined in Appendix A. Appendix A shall supersede other requirements outlined in Division 25 where applicable.

1.3 GENERAL SYSTEM REQUIREMENTS

1.3.1 Provide a single architecture common data base microprocessor based electronic control and monitoring BAS system for air handling equipment, heating and cooling and other specified systems employing distributed processing and direct digital control (DDC) with electronic sensing and electronic actuation to conform with the specification requirements. The BAS shall consist of the following:

1.3.1.1 Stand-Alone DDC Controllers

1.3.1.2 Application Specific Controllers

1.3.1.3 Personal computer operator workstation

1.3.2 The system shall be modular in nature and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, DDC Controllers, Application Specific Controllers, and operator devices.

1.3.3 The BAS shall be designed and implemented entirely for use and operation on the Internet and the Owner's Intranet. This functionality for operational access shall extend down to the field panel and field point level.

1.3.4 The primary Controls Application Nodes (AN) shall be fully IT compatible nodes operating over the industry standard IT infrastructure provided for the Project. The Subcontractor responsible for the work of Division 25 (BAS Contractor) shall coordinate with the IT infrastructure support staff or Subcontractors to ensure compatibility and performance of the operation of the BAS over the LAN/WAN made available for its shared use. If the Owner's LAN/WAN is not made available at time of commissioning, this Division shall supply an independent network cabling system for this Division's communication.

1.3.5 The Controls Systems Tier 1 network shall be configured on IT industry standard off-the-shelf technologies compatible with other building systems and Project network arrangements.

1.3.6 All aspects of the Controls Systems Operator Interface shall be provided to operate through an IT industry standard Web Browsers such as Internet Explorer, Firefox, Chrome or Opera.

1.3.7 The Web Browser based Operator Interface provided shall incorporate complete tool sets, operational information displays, multi-Window displays and other interactive aids to assist interpretation and ease of use. Simple HTML based web page displays are not acceptable.

1.3.8 The Web Browser based Operator Interface provided shall not require the procurement or licensing of any special or proprietary software from the BAS Contractor or its suppliers for the Controls Systems OWS.

1.3.9 As required for the functional operation of the Controls Systems, the BAS Contractor shall provide all necessary digital processor

programmable Server(s). These Server(s) shall be utilized for Controls Systems Application configuration, for archiving, reporting and trending of data, for Operator transaction archiving and reporting, for network information management, for alarm annunciation, for Operator Interface tasks, for Controls Application management and the like. These Server(s) shall utilize IT industry standard data base platforms such as Microsoft SQL Server and Microsoft Data Engine (MSDE) or approved equal.

1.3.10 Provide a fully distributed processing, on-line, real-time, direct digital control Controls Systems Application in compliance with all applicable codes and as approved by the Authorities Having Jurisdiction (AHJ) at the Site. All communication between Controls Application Nodes shall be digital only.

1.3.11 All Controls Systems Application facilities and features shall be accessible via Enterprise Intranet and Internet Browser with user ID or Password access control for user access.

1.3.12 The Controls Systems Application shall support auto-dial/auto-answer communications to allow Controls Systems Nodes to communicate with other remote Controls Systems Nodes via standard telephone lines. The lines shall be provided by the Owner at the Owner's cost.

1.3.13 The Controls Systems Application network shall utilize an open architecture capable of each and all of the following:

1.3.13.1 Utilizing standard Ethernet communications and operate at a minimum speed of 100 Mb/sec.

1.3.13.2 Connecting via BACnet at the Tier 1 level in accordance with ANSI/ASHRAE Standard 135-2001.

1.3.13.3 Connecting via LonMark as per ANSI/EIA 709 (LonWorks) to LonMark FTT-10 transceivers at the Tier 2 level.

1.3.13.4 Connecting via manufacturer specific Protocol at the Tier 2 level. (i.e. Johnson Controls N2).

1.3.14 Downloading and Uploading

1.3.14.1 Provide the capability to generate and modify the Controls Systems Application software-based sequences, database elements, associated operational definition information, and user-required revisions to same at any designated Workstation together

with the means to download same to the associated Controls Systems Application Node.

1.3.14.2 The Controls Systems Application software tool provided for the generation of custom and database definitions shall be resident in both the Controls Systems Application Node and Controls Systems Application Server(s).

1.3.14.3 Provide the capability to upload Controls Systems Application operating software information, database items, sequences, and alarms to designated Server(s).

1.3.14.4 The functions of this Part shall be governed by the codes, approvals, and regulations applying to this Controls Systems Application as provided.

1.3.15 System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. Each DDC Controller shall operate independently by performing its own specified control, alarm management, operator I/O and data collection. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

1.3.16 DDC Controllers shall be able to access any data from, or send control commands and alarm reports directly to, any other DDC Controller or combination of controllers on the network without dependence upon a central processing device. DDC Controllers shall also be able to send alarm reports to multiple operator workstations without dependence upon a central processing device.

1.3.17 Provide English language operator interface using readily understood English language abbreviations and mnemonics.

1.3.18 Future buildings must have the ability to communicate to this building using the BACNet Protocol. The successful Controls Contractor shall provide a PICS (Protocol Implementation Conformance Statement) for the BACNet Gateway. (Minimum conformance of Class 4). The intent is to ensure that existing and future buildings using alternate manufacturers will be able to integrate to this building.

1.4 SYSTEM PERFORMANCE

1.4.1 The system shall conform to the following:

1.4.1.1 Graphic Display. The system shall be dashboard based, and also capable of displaying a graphic with 20 dynamic points/objects with all current data within 10 seconds.

1.4.1.2 Graphic Refresh. The system shall update a graphic with 20 dynamic points/objects with all current data within 8 seconds.

1.4.1.3 Object Command. The maximum time between the command of a binary object by the operator and the reaction by the device shall be less than 2 seconds. Analog objects should start to adjust within 2 seconds.

1.4.1.4 Object Scan. All changes of state and change of analog values will be transmitted over the high-speed Ethernet network such that any data used or displayed at a controller or workstation will have been current within the previous 2 seconds.

1.4.1.5 Alarm Response Time. The maximum time from when an object goes into alarm to when it is annunciated at the workstation shall not exceed 45 seconds.

1.4.1.6 Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 1 second. The Contractor shall be responsible for selecting execution times consistent with the mechanical process under control.

1.4.1.7 Performance. Programmable controllers shall be able to execute DDC PID control loops at a frequency of at least once per second. The controller shall scan and update the process value and output generated by this calculation at this same frequency.

1.4.1.8 Multiple Alarm Annunciation. All workstations on the network must receive alarms within 5 seconds of each other.

1.4.1.9 Reporting Accuracy. The system shall report all values with an end-to-end accuracy as listed or better than those listed in the below table.

Measured Variable	**Reported Accuracy**
Space Temperature	±0.5ºC [±1ºF]
Ducted Air	±0.5ºC [±1ºF
Outside Air	±1.0ºC [±2ºF]
Dewpoint	±1.5ºC [±3ºF]
Water Temperature	±0.5ºC [±1ºF]
Delta-T	±0.15ºC[±0.25ºF]

Measured Variable	**Reported Accuracy**
Relative Humidity	±5% RH
Water Flow	±5% of full scale
Airflow (terminal)	±10% of full scale *(see Note*
Airflow (measuring stations)	±5% of full scale
Air Pressure (ducts)	±25 Pa [±0.1 "W.G.]
Air Pressure (space)	±3 Pa [±0.01 "W.G.]
Water Pressure	±2% of full scale *(see Note*
Electrical (A, V, W, Power factor)	5% of reading *(see Note 3)*
Carbon Monoxide (CO)	±5% of reading
Carbon Dioxide (CO_2)	±50 ppm
Note 1: 10%-100% of scale	
Note 2: For both absolute and differential	
Note 3: Not including utility-supplied meters	

1.4.1.10 Energy Reporting. The operating software shall have as standard, dashboard widgets which can be selected by the operator to create individual interface points as well as multi-trend graphics as standard.

1.4.1.11 Stability of Control. Control loops shall maintain measured variable at setpoint within the tolerances listed in the below table.

Controlled Variable	**Control Accuracy**	**Range of Medium**
Air Pressure	±50 Pa [±0.2" w.g.] ±3 Pa [±0.01" w.g.]	0-1.5 kPa [0-6" w.g.] -25 to 25 Pa [-0.1 to 0.1" w.g.]
Airflow	±10% of full scale	
Temperature	±0.5ºC [±1.0ºF]	
Humidity	±5% RH	
Fluid Pressure	±10 kPa [±1.5 psi]	0-1 kPa [1-150 psi]
Pressure Differential	±250 Pa [±1.0" w.g.]	0-12.5 kPa [0-50"w.g.]

1.5 COMMUNICATION

1.5.1 All control products provided for this project shall comprise a BACnet internetwork. Communication involving control components (i.e., all types of controllers and Operator Workstations) shall conform to ANSI/ASHRAE Standard 135-2004, BACnet.

1.5.2 Each BACnet device shall operate on the BACnet Data Link/Physical layer protocol specified for that device as defined in this Section.

1.5.3 The Contractor shall provide all communication media, connectors, repeaters, bridges, hubs, switches, and routers necessary for the internetwork.

1.5.4 All controllers shall have a communication port for connections with the Operator Workstations using the BACnet Data Link/ Physical layer protocol.

1.5.5 Communication services over the internetwork shall result in operator interface and value passing that is transparent to the internetwork architecture as follows:

1.5.6 Connection of an Operator Workstation device to any one controller on the internetwork will allow the operator to interface with all other controllers as if that interface were directly connected to the other controllers. Data, status information, reports, system software, custom programs, etc., for all controllers shall be available for viewing and editing from any one controller on the internetwork.

1.5.7 All database values (e.g., objects, software variables, custom program variables) of any one controller shall be readable by any other controller on the internetwork. This value passing shall be automatically performed by a controller when a reference to an object name not located in that controller is entered into the controller's database. An operator/installer shall not be required to set up any communication services to perform internetwork value passing.

1.5.8 The time clocks in all applicable controllers shall be automatically synchronized daily. An operator change to the time clock in any controller shall be automatically broadcast to all controllers on the network.

1.5.9 The network shall have the following minimum capacity for future expansion:

1.5.9.1 Each Building Controller shall have routing capacity for 99 controllers.

1.5.9.2 The Building Controller network shall have capacity for 1000 Building Controllers.

1.5.9.3 The system shall have an overall capacity for 12,500 Building Controller, Advanced Application Controller, and Application Specific Controller input/output objects.

1.6 QUALITY ASSURANCE

1.6.1 All labour, material, equipment and software not specifically referred to herein or on the plans, but are required to meet the functional intent, shall be provided without additional cost to the Owner.

1.6.2 Materials and equipment shall be the catalogue products of a single manufacturer regularly engaged in production and installation of automatic temperature control systems and shall be manufacturer's latest standard design that complies with the specification requirements. Products referenced under this Section establish the minimum acceptable standards of the Product features, quality, and performance.

1.6.3 The BAS Contractors shall be manufacturers or licensed factory representatives and installers of the manufacturers, specified for the local area in which the Site is located.

1.6.4 The installing Subcontractor shall have an established working relationship with the Control System Manufacturer.

1.6.5 The installing Subcontractor shall have successfully completed Control System Manufacturer's classes on the control system. The installing Subcontractor shall present for review the certification of completed training, including the hours of instruction and course outlines upon request.

1.6.6 All products used in this installation shall be new, currently under manufacture, and shall be applied in standard off the shelf products. This installation shall not be used as a test site for any new products unless explicitly approved by the Owner or Consultant in writing. Spare parts shall be available for at least 5 years after completion of this Contract.

1.6.7 The BAS Contractor shall have single source responsibility for the

complete installation and proper operation of the DDC control system and BAS, including debugging and proper calibration of each component in the entire system.

1.6.8 During the initial design the Owner will supply the BAS Contractor a range of BACnet addresses the BAS will run on. The BAS network will run either BACnet over IP or BACnet over MSTP. All BAS points will be network visible so that other BACnet systems can auto discover them. The Contractor shall consult with the Owner during the development of addresses.

1.6.9 The BAS shall be compatible with future control Products for 10 years or more.

1.6.10 Include all software, associated licensing, upgrades, and labour/materials for two (2) years from the date of the Total Performance of the Work.

1.7 REFERENCE STANDARDS

1.7.1 All work, materials, and equipment shall comply with the rules and regulations of all codes and ordinances of the local, provincial, and federal authorities. Such codes, when more restrictive, shall take precedence over these plans and Specifications.

1.7.2 Provide electrical and electronic equipment which is CSA approved where such approval is required by the regulatory authorities.

1.7.3 Provide ASCII American Standard for Communication and Information Interchange code input/output devices with standard EIA Electronic Industry Association interface.

1.8 SUBMITTALS

1.8.1 The Contractor shall provide shop drawings or other submittals on all hardware, software, and installation to be provided. No work may begin on any segment of this project until submittals have been reviewed and approved for conformity with the design intent. All drawings shall be done in DXF or pdf format and provided on magnetic/optical disk and as full-size drawings. When manufacturer's cut sheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Each submitted piece of literature and drawings shall clearly reference the specification and/or drawing that the submittal is to cover. General catalogs shall not be accepted as cut sheets to fulfill submittal

requirements. Submittals shall include:

1.8.1.1 A complete bill of materials of equipment to be used shall be listed indicating quantity, manufacturer, model number, and other relevant technical data.

1.8.1.2 Manufacturer's description and technical data, such as performance curves, product specification sheets, and installation/maintenance instructions for each system component.

1.8.1.3 Wiring diagrams and layouts for each control panel. Show all termination numbers.

1.8.1.4 A schematic diagram for all control wiring, communication wiring and power wiring shall be provided. Provide a schematic drawing of the central system installation. Label all cables and ports with computer manufacturers' model numbers, function and data link protocol(s). Show all interface wiring to the control system.

1.8.1.5 Schematic diagrams for all field sensors and controllers. Provide floor plans of all sensor locations and control hardware on the BAS graphics as it relates to the equipment being controlled.

1.8.1.6 Provide detailed riser diagrams of wiring between central control unit, operator workstation(s), routers, gateways and all control panels.

1.8.1.7 Examples of the color graphic dashboard screens shall be provided. Provide 3 screen shots from 5 existing projects representing various systems. For each screen, provide a conceptual layout of pictures and data, and show or explain which other screens can be directly accessed.

1.8.1.8 A schematic diagram of each controlled system. The schematics shall have all control points/objects labeled and with point/object names shown or listed. The schematics shall graphically show the location of all control elements in the system.

1.8.1.9 A complete control points list.

1.8.1.10 An instrumentation list for each controlled system. Each element of the controlled system shall be listed in table format. The table shall show element name, type of device, manufacturer, model number, and product data sheet number.

1.8.1.11 A complete description of the operation of the control system,

including sequences of operation. The description shall include and reference a schematic diagram of the controlled system.

1.8.1.12 A point/object list for each system controller including inputs and outputs (I/O), point/object number, the controlled device associated with the I/O point/object, and the location of the I/O device. Software flag points/objects, alarm points/objects, etc.

1.8.1.13 A BACnet Protocol Implementation Conformance Statement (PICS) for each type of controller and Operator Workstation included in the submittal. PICS shall include for each Product, as a minimum, a list of BACnet functional groups supported, BACnet services supported, BACnet data link options available and BACnet objects provided.

1.8.1.14 Point-to-point verification check sheets once completed.

1.8.2 Upon completion of the Work, provide a complete set of 'as-built' drawings, application software and layout colour graphics on compact disc. Drawings shall be provided as AutoCAD™ compatible files. Two complete sets of hard copies are also to be provided to the Owner.

1.9 OWNERSHIP OF PROPRIETARY MATERIAL

1.9.1 All project-developed software and documentation shall become the property of the Owner. These include, but are not limited to:

1.9.1.1 Project graphic images

1.9.1.2 Record drawings

1.9.1.3 Project database

1.9.1.4 Project-specific application programming code

1.9.1.5 All documentation

2 **PRODUCTS**

Not used.

3 **EXECUTION**

3.1 BAS DEMONSTRATION

3.1.1 All BAS Demonstration shall take place on the main Control

Systems Server and WAN. Schedule to add system to main Control Systems Server and WAN with Owner at least two (2) weeks in advance to the demonstration. At the time of request, provide all documentation that the following criterions are met:

3.1.1.1 Updated BAS submittals in electronic and hard copy to the Owner including the updated riser diagram for the system.

3.1.1.2 Reports on verification of Network Layout Verification including but not limited to Building Controller locations, cable routes with length of cable between controllers and any trunk extenders or trunk isolators.

3.1.1.3 Reports on verification of electrical characteristics of BAS network, communications and electrical integrity of Building Controllers.

3.1.1.4 Reports on verification of traffic on BAS Network including but not limited to COVs between Building Controllers, point commands by the operator, point commands by program across the network, alarm reporting on the network, any unresolved points in the system, integrity of the ports on any Building Controller isolator/extender and results of Building Controller tests running at selected baud rate.

3.1.1.5 Demonstrate to the Owner the updates of databases without errors or faults between the temporary Control Systems Server and Building Controllers. If there is no temporary server, demonstrate to Owner after system is added to main Control Systems Server.

3.1.1.6 Reports on verification of system log files, interruption of log files of system traffic and overall acceptable operation of the system where a temporary Control Systems Server is utilized.

3.1.2 Demonstrate the operation of the BAS hardware, software, and all related components and systems to the satisfaction of the Owner. Schedule the demonstration with the Owner seven (7) calendar days in advance. Demonstration shall not be scheduled until all hardware and software submittals, and the Start-Up Test Report are approved. If the Work fails to conform to the Contract Documents, and additional Site visits by the Owner are to be scheduled for re-demonstration, the Contractor shall reimburse the Owner for costs of subsequent Site visits.

3.1.3 The Contractor shall supply all personnel and equipment for the demonstration, including, but not limited to instruments, ladders, etc. The Contractor-supplied personnel must be competent with

and knowledgeable of all project-specific hardware, software, and the HVAC systems. All training documentation and submittals shall be at the Site.

3.1.4 Demonstration shall typically involve small representative samples of systems/equipment randomly selected by the Owner.

3.1.5 The system shall be demonstrated following the same procedures used in the Start-Up Test by using the approved checklists. Demonstration shall include, but not necessarily be limited to, the following:

3.1.5.1 Demonstrate that required software is installed on BAS workstations. Demonstrate that graphic screens, alarms, trends, and reports are installed as submitted and approved.

3.1.5.2 Demonstrate that points specified and shown can be interrogated and/or commanded (as applicable) from all workstations, as specified in the Contract Documents.

3.1.5.3 Demonstrate that remote dial-up communication abilities are in accordance with these Specifications.

3.1.5.4 Demonstrate correct calibration of input/output devices using the same methods specified for the Start-Up Tests. A maximum of 10 percent of I/O points shall be selected at random by the Owner for demonstration. Upon failure of any device to meet the specified end-to-end accuracy, an additional 10 percent of I/O points shall be selected at random by the Owner for demonstration. This process shall be repeated until 100 percent of randomly selected I/O points have been demonstrated to meet specified end-to-end accuracy.

3.1.5.5 Demonstrate that all DDC and other software programs exist at respective field panels. The Direct Digital Control (DDC) programming and point database shall be as submitted and approved.

3.1.5.6 Demonstrate that all DDC programs accomplish the specified sequence of operation.

3.1.5.7 Demonstrate that the panels and DDC network of panels automatically recover from power failures within five (5) minutes after power is restored.

3.1.5.8 Demonstrate that the stand-alone operation of panels meets the requirements of these Specifications. Demonstrate that the panels'

response to LAN communication failures meets the requirements of these Specifications.

3.1.5.9 Identify access to equipment selected by the Owner. Demonstrate that access is sufficient to perform required maintenance.

3.1.5.10 Demonstrate that required trend graphs and trend logs are set up per the requirements. Provide a sample of the data archive. Indicate the file names and locations.

3.1.6 BAS Demonstration shall be completed and approved prior to the Substantial Performance of the Work.

3.1.7 Any tests successfully completed during the demonstration will be recorded as passed for the functional performance testing and will not have to be retested.

3.2 BAS ACCEPTANCE PERIOD

3.2.1 After approval of the BAS Demonstration and prior to Total Performance of the Work, Acceptance Period shall commence. Acceptance Period shall not be scheduled until all HVAC systems are in operation and have been accepted, all required cleaning and lubrication has been completed (i.e., filters changed, piping flushed, strainers cleaned, and the like), and TAB report has been submitted and approved. Acceptance Period and its approval will be performed on a system-by-system basis if mutually agreed upon by the Contractor and the Owner.

3.2.2 Operational Test: At the beginning of the Acceptance Period, the system shall operate properly for set period as agreed with the Owner without malfunction, without alarm caused by control action or device failure, and with smooth and stable control of systems and equipment in conformance with these Specifications. At the end of this period, the Contractor shall forward the trend logs to the Owner for review. The Owner shall determine if the system is ready for functional performance testing and document any problems requiring the Contractor's attention.

3.2.2.1 If the systems are not ready for functional performance testing, the Contractor shall correct problems and provide notification to the Owner that all problems have been corrected. The Acceptance Period shall be restarted at a mutually scheduled time for an additional period.

3.2.2.2 This process shall be repeated until Owner issues notice that the

BAS is ready for functional performance testing.

3.2.3 During the Acceptance Period, the Contractor shall maintain a hard copy log of all alarms generated by the BAS. For each alarm received, the Contractor shall diagnose the cause of the alarm, and shall list on the log for each alarm, the diagnosed cause of the alarm, and the corrective action taken. If in the Contractor's opinion, the cause of the alarm is not the responsibility of the Contractor, the Contractor shall immediately notify the Owner.

3.2.4 Once 5 consecutive days of alarm-free operation are complete and documented, operator training may begin.

3.3 TRAINING

3.3.1 Upon completion of the work and prior to the Substantial Performance of the Work, the Owner's operating and maintenance personnel shall be given complete instructions on the operation and maintenance of the complete system. Include a description of the information flow from field sensors, contacts and devices to the ASCs. Give an overview of the system's communication network to provide a better understanding to the operator of the interplay between initiating devices, field hardware panels, system communications, and their importance within the operating BAS.

3.3.2 An Owner's manual prepared for this project by BAS Contractor shall be used in conjunction with the training. Two copies of the Owner's manual shall be provided.

3.3.3 During system commissioning and at such time as acceptable performance of the BAS hardware and software has been established, the BAS Contractor shall provide on-site operator instruction to the owner's operating personnel. Operator instruction shall take place during normal working hours and shall be performed by a competent representative of the BAS Contractor, familiar with the BAS software, hardware, and accessories.

3.3.4 The Subcontractor responsible for the work of Division 25 shall give XX hours of instruction to the Owner's designated personnel on the operation of all equipment within the central equipment center and describe its intended use with respect to the programmed functions specified. Operator orientation of the BAS shall include, but not be limited to, the overall operational program, equipment functions (both individually and as part of the total integrated system), commands, system generation, advisories, and appropriate operator intervention required in responding to the

system's operation.

3.4 WARRANTY

3.4.1 Labor and materials for the control system specified shall be warranted free from defects for a period of 12 months after final completion and acceptance. Control system failures during the warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to the Owner. The Contractor shall respond to the Owner's request for warranty service within 24 hours during normal business hours.

3.4.2 All work shall have a single warranty date, even when the Owner has received beneficial use due to an early system start-up. If the work specified is split into multiple contracts or a multi-phase contract, then each contract or phase shall have a separate warranty start date and period.

3.4.3 At the end of the final start-up, testing, and commissioning phase, if equipment and systems are operating satisfactorily to the Owner, the Owner will sign certificates certifying that the control system's operation has been tested and accepted in accordance with the terms of this specification. The date of acceptance shall be the start of warranty.

3.4.4 Operator workstation software, project-specific software, graphic software, database software, and firmware updates which resolve known software deficiencies as identified by the Contractor shall be provided at no charge during the warranty period. Any upgrades or functional enhancements associated with the above mentioned items also can be provided during the warranty period for an additional charge to the Owner by purchasing an in-warranty technical support agreement from the Contractor. Written authorization by the Owner must, however, be granted prior to the installation of any of the above-mentioned items.

3.4.5 The control contractor shall have in place the capability to monitor the operation of the system on a 24-hour basis.

3.4.6 Parts, which have a wear-out characteristic, such as printer ink cartridges, etc., shall not be counted as failures within the terms of this warranty, if they fail or become worn out beyond their stated life expectancy.

3.5 WARRANTY PHASE BAS OPPOSITE SEASON TRENDING AND TESTING

3.5.1 Throughout the warranty phase, trend logs shall be maintained. The Contractor shall forward archive trend logs to the Owner for review upon the Owner's request. The Owner will review these and notify the Contractor of any warranty work required.

3.5.2 Within twelve (12) months of the Substantial Performance of the Work, the Contractor shall schedule and conduct with the Owner an opposite season functional performance testing. The BAS Contractor shall participate in this testing and remedy any deficiencies identified.

3.6 BAS COMMISSIONING

3.6.1 Refer to Section 20 08 00 - Commissioning.

3.7 CONTROL STRATEGIES

3.7.1 Refer to Section 25 90 00 – Sequences of Operation for control sequences and to the associated control schematics on the Drawings for the required number of control loops. Provide all hardware and software necessary to achieve specified control. The sequence of events required for each control loop is described for each system in the control sequence.

END OF SECTION

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1 **GENERAL**

1.1 GENERAL

1.1.1 Sections 20 00 00 and 25 00 00 – General Requirements shall apply to and govern this Section.

1.1.2 Conform to the requirements of Section 26 00 00 - General Electrical Requirements.

1.2 SCOPE OF WORK

1.2.1 Provide all labour, materials, tools, equipment, training, commissioning and certification required to complete the work as shown on the Drawings and specified in this Section, including:

1.2.1.1 Wiring.

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1.2.1.9 Nameplates.

1.2.1.10 Testing Equipment.

1.2.2 Provide the following electrical work as part of the work of this Section, complying with requirements of Division 26 – Electrical and the requirements of this Section.

1.2.2.1 Control wiring between field-installed controls, indicating devices, and unit control panels in this Section, and as specified in other Sections of this Division and under Divisions 20, 21, 22 and 23.

1.2.2.2 Interlock wiring between electrically interlocked devices, sensors, and between a hand or auto position of motor starters as indicated

for all mechanical and controls.

1.2.2.3 Wiring associated with annunciator and alarm panels (remote alarm panels) and connections to their associated field devices.

1.2.2.4 Power wiring to field panels and other devices requiring a main supply from circuit breakers provided by Division 26 – Electrical in local emergency power and emergency lighting panels.

1.2.2.5 All other necessary wiring for fully complete and functional control system as specified in the Contract Documents.

1.3 ELECTRICAL WIRING

1.3.1 All wiring shall be in accordance with the latest edition of the Ontario Electrical Safety Code and Division 26 - Electrical. This includes wiring between control components and wiring from such components to electrical circuits of fans, pumps, and any other equipment.

1.3.2 Electrical interlock wiring of field devices (i.e., flow switches, thermostats) associated with equipment specified under other Sections of Division 25 and under Divisions 21, 22 and 23 is the responsibility of this Section, unless indicated otherwise in the Contract Documents.

1.4 CO-ORDINATION OF WORKS

1.4.1 The BAS Contractor shall design, provide, install, test, commission, and guarantee the system.

1.4.2 Provide all control devices, instrumentation, relays, auxiliary contacts, and transformers as specified in the Contract Documents and as required to meet the control and monitoring points and sequence of operation.

1.4.3 Extend control wiring requiring interfacing to systems by Division 26 – Electrical (i.e. fire alarm system, diesel generator control panel, etc.) to respective panel for termination by Division 26 - Electrical.

1.4.4 Dampers

1.4.4.1 Manual balancing dampers, fire dampers, combination fire/smoke dampers and back draft dampers are provided as part of the work of their respective Divisions.

1.4.5 Smoke dampers shall be supplied as part of the work of this Division and installed under Division 23 - HVAC. The BAS Contractor shall provide and connect all associated damper actuators and damper position sensor devices.

1.4.5.1 The BAS Contractor shall supply all remaining automatic control dampers not integral part of equipment specified elsewhere in Division 23. These dampers are to be installed as part of the work of Division 23 – HVAC under the direction of the BAS Contractor who will be fully responsible for the proper operation of the dampers. The BAS Contractor shall provide and connect all associated damper actuators.

1.4.5.2 The BAS Contractor shall provide and connect all damper actuators for dampers specified as an integral part of equipment specified elsewhere in the Contract Documents.

1.4.6 Automatic Control Valves

1.4.6.1 The BAS Contractor shall supply all automatic control valves required by the sequences of operation and not integral part of equipment specified elsewhere in Divisions 22 and 23. These valves are to be installed as part of the work of Division 22 – Plumbing and Division 23 – HVAC, under the direction of the BAS Contractor who will be fully responsible for the proper operation of the valves. The BAS Contractor shall provide and connect all associated valve actuators.

1.4.7 VAV and CAV Controls

1.4.7.1 Supply all actuators, flow transducers, and controllers to VAV/CAV terminal unit manufacturer for installation by the terminal unit manufacturer at the expense of the terminal unit manufacturer. Refer to Section 23 36 00 - Air Terminal Units.

1.4.8 Work by other sections

1.4.8.1 The following equipment is supplied by the BAS Contractor, installed under Division 22 and 23, and connected by the BAS Contractor.

1.4.8.1.1 Air flow measuring stations

1.4.8.1.2 Water pressure sensors

1.4.8.1.3 Water pressure taps, thermal wells, flow switches, flow meters, etc.

that will have wet surfaces, shall be installed under the applicable piping Section under the direction of the BAS Contractor who will be fully responsible for the proper installation and application.

1.4.8.2 Division 26 - Electrical shall provide:

1.4.8.2.1 120-volt AC 15 amp dedicated emergency power circuits for power to the Building Automation System, including all mechanical rooms and control panels.

1.4.8.2.2 Termination at fire alarm system, diesel generator control panel, etc.

1.4.8.3 All other installation work required for the complete installation of the Building Automation System shall be provided by the BAS Contractor.

1.4.8.4 The BAS Contractor shall co-ordinate the control work involving Divisions 20, 21, 22, 23 and 26 - Electrical.

1.5 SUBMITTALS

1.5.1 Provide shop drawings for:

1.5.1.1 Control Valves and Actuators.

1.5.1.2 Control Dampers and Actuators.

1.5.1.3 Control Panels.

1.5.1.4 Sensors.

1.5.1.5 Electric Control Components (Switches, EP Valves, Thermostats, Relays, etc.).

1.5.1.6 Transducers.

1.5.1.7 Current Switches.

1.5.1.8 Testing Equipment.

2 PRODUCTS

2.1 GENERAL

2.1.1 All materials shall meet or exceed all applicable referenced standards, and conform to codes and ordinances of authorities

having jurisdiction.

2.1.2 Provide electronic, pneumatic, and electric control products in sizes and capacities indicated, consisting of valves, dampers, controllers, sensors, and other components as required for complete installation. Except as otherwise indicated in the Contract Documents, provide manufacturer's standard materials and components as published in their product information; designed and constructed as recommended by manufacturer, and as required for application indicated.

2.2 INSTRUMENT PIPE AND TUBE

2.2.1 Hydronic and instruments:

2.2.1.1 Connection to main piping: Provide 15mm (½ inch) minimum size threadolet, 15mm x 50mm (½ inch x 2 inch) brass nipple, and 15mm (½ inch) ball valve for connection to welded steel piping. Provide tee fitting for other types of piping.

2.2.1.2 Remote instruments: Adapt from ball valve to specified tubing and extend to remote instruments. Provide a union or otherwise removable fitting at ball valve so that connection to main can be cleaned with straight rod. Where manifolds with test ports are not provided for instrument, provide tees with 6mm (¼ inch) FPT branch with plug for use as test port. Adapt from tubing size to instrument connection.

2.2.1.3 Line mounted instruments: Extend rigid piping from ball valve to instrument. Do not use close or running thread nipples. Adapt from ball valve outlet to instrument connection size. Provide a plugged tee if pipe makes 90 degree bend at outlet of valve to allow cleaning of connection to main with straight rod without removing instrument.

2.2.1.4 Instrument tubing: Seamless copper tubing, Type K or L, ASTM B 88; with cast-bronze solder joint fittings, ANSI B1.18; or wrought-copper solder-joint fittings, ANSI B16.22; or brass compression-type fittings. Solder shall be 95/5 tin antimony, or other suitable lead free composition solder. Tubing outside diameter size shall be not less than the larger of 6mm (¼ inch) or the instrument connection size.

2.2.1.5 Rigid piping for line mounted instruments: Schedule 40 threaded brass, with threaded brass fittings.

2.2.2 Low pressure air instrument sensing lines:

2.2.2.1 Connections: Use suitable bulkhead type fitting and static sensing tip for static pressure connections. Adapt tubing to instrument connection.

2.2.2.2 Tubing: Virgin polyethylene non-metallic tubing type FR, ASTM D 2737, with flame-retardant harness for multiple tubing. Use compression or push-on brass fittings.

2.3 WIRING

2.3.1 Communication Wiring:

2.3.1.1 Communication wiring shall be provided in a customized color jacketing material. Material color shall be as submitted and approved by the Owner. In addition, all wiring jackets shall be labeled "BAS" in three (3) foot or fewer intervals along the length of the jacket material. An example is provided below:

Purpose	Function	Color	Label
Building Level	Communication	Orange	BAS Building Level Communication
Floor level	Communication	Blue	BAS Floor Level Communication
Inputs/Outputs	Panel to device	White	BAS Input Output Device Cable
24VAC	Control power	White/Black tracer	BAS 24 VAC Control Power

2.3.1.2 The BAS Contractor shall supply all communication wiring between Building Controllers, Routers, Gateways, AAC's, ASC's and local and remote peripherals (e.g., operator workstations, printers, and modems).

2.3.1.3 Local Supervisory LAN: For any portions of this network required under this Section of the Specification, the BAS Contractor shall use multimode fiber (62.5 micron) or Category 5E cable per TIA/EIA 68 (10BaseT). Network shall be run with no splices and separate from any wiring over 30V.

2.3.1.4 Primary and Secondary Controller LANs: Communication wiring shall be individually 100% shielded pairs per manufacturer's recommendations for distances installed, with overall PVC cover, Class 2, plenum-rated run with no splices and separate from any wiring over 30V. Shield shall be terminated and wiring shall be grounded as recommended by building controller manufacturer.

2.3.2 Signal Wiring:

2.3.2.1 Signal wiring to all field devices, including, but not limited to, all sensors, transducers, transmitters, switches, etc. shall be twisted, 100% shielded pair, minimum 18-gage wire, with PVC cover. Signal wiring shall be run with no splices and separate from any wiring above 30V.

2.3.2.2 Signal wiring shield shall be grounded at controller end only unless otherwise recommended by the controller manufacturer.

2.3.3 Low Voltage Analog Output Wiring:

2.3.3.1 Low voltage control wiring shall be minimum 18-gage, twisted pair, 100% shielded, with PVC cover, Class 2 plenum-rated. Low voltage control wiring shall be run with no splices separate from any wiring above 30V.

2.3.4 Control Panels:

2.3.4.1 Provide control panels with suitable brackets for wall mounting, unless noted otherwise, for each control system. Locate panel adjacent to systems served. Mount center of control panels 1,524mm (60 inches) above finished floor or roof.

2.3.4.2 Interior mount: Fabricate panels of 0.0625mm (16-gauge) furniture-grade steel, totally enclosed on four sides, with removable perforated backplane, hinged door and keyed lock, with manufacturer's standard shop-painted finish and color.

2.3.4.3 Exterior mount: 0.0625mm (16-gauge) 304 or 316 stainless steel NEMA 4X enclosure. Panel shall have hinged door, keyed lock, and integral, thermostatically controlled heater. Provide hinged deadfront inside panel when flush-mounted control and/or indicating devices are included in panel. Fiberglass or aluminum, as applicable, to be used when gases that are being used in the panel area are corrosive to stainless steel.

2.3.4.4 Provide UL-listed cabinets for use with line voltage devices.

2.3.4.5 Control panel shall be completely factory wired and piped, and all electrical connections made to a terminal strip.

2.3.4.6 All gauges and control components shall be identified by means of nameplates.

2.3.4.7 All control tubing and wiring shall be run neatly and orderly in open slot wiring duct with cover.

2.3.4.8 Provide a 150mm x 150mm (6” x 6”) minimum wireway (metal wiring/tubing) trough across the entire width of the panel mounted to the top of the panel with close nipples of sufficient size for additional 50% wiring and tubing capacity. Wireways shall not be less than 610mm (24”) in length. Control panel wiring shall be installed and distributed in the wireway to minimize routing of wiring and tubing within the control panel. Wireway construction to be the same as the associated control panel.

2.3.4.9 Complete wiring and tubing termination drawings shall be mounted in, and a second set mounted adjacent to, each panel in a frame with Lexan cover of sufficient size to be easily readable.

2.4 AUTOMATIC CONTROL DAMPERS

2.4.1 Provide factory fabricated automatic control dampers of sizes, velocity and pressure classes as required for smooth, stable, and controllable airflow. For dampers located near fan outlets, provide dampers rated for fan outlet velocity and close-off pressure, and recommended by damper manufacturer for fan discharge damper service. Control dampers used for smoke dampers shall comply with UL 555S. Control dampers used for fire dampers shall comply with UL 555.

2.4.2 Supply control dampers with a leakage rate of less than 15 L/s / m^2 (3 cfm/sq. ft.) at 249 Pa (1" w.g.) static pressure difference.

2.4.3 Use opposed blade type dampers for modulating service. Dampers for two position service, face and bypass and mixing may be parallel blade type.

2.4.4 Construct aluminum airfoil blades of minimum 2.0mm (12-gauge) extruded aluminum. Blades to be 150mm (6") wide single air foil design.

2.4.5 Construct damper frames of extruded aluminum channel with grooved inserts for vinyl seals. Standard frames are 50mm x

100mm x 15mm (2" x 4" x 5/8") on linkage side, and 25mm x 100mm x 25mm (1" x 4" x 1") on the other sides.

2.4.6 Provide 22mm (7/8") hexagon extruded aluminum pivot rods that interlock into the blade section. Bearings to be double sealed type with a Celcon inner bearing on a rod within a Polycarbonate outer bearing inserted into frame so that the outer bearing cannot rotate.

2.4.7 Design the bearing to prevent metal-to-metal or metal-to-bearing riding surfaces. Interconnecting linkage shall have a separate Celcon bearing to eliminate friction in linkage.

2.4.8 Blade linkage hardware is to be installed in a frame out of the air stream. All hardware to be made of non-corrosive reinforced material or cadmium plated steel.

2.4.9 Supply overlapping damper seals that minimize air leakage.

2.4.10 Insulate all dampers in direct contact with outside air with 22mm (7/8") thick polyurethane foam. Blade construction must provide a 100% thermal break. Insulate frame with polystyrene.

2.4.11 Maximum allowable damper blade length is 1016mm (40") per section.

2.4.12 Provide dampers greater than two sections wide with a jackshaft.

2.4.13 Acceptable dampers are: T. A. MORRISON (TAMCO) 1000 / 9000 and RUSKIN CD-50 / CD-2000.

2.5 <u>STANDARD SERVICE CONTROL VALVES</u>

2.5.1 Control valve sizing and selection is the responsibility of the BAS Contractor. Provide a valve schedule that lists the requirements of the valves for Cv, close off, temperature, etc. This should be a result of analyzing the valves performance across the range of control.

2.5.2 Valves to be factory fabricated of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated in the Contract Documents.

2.5.3 Control valves shall be equipped with heavy-duty actuators, selected to proper close-off rating for each individual application.

2.5.4 Minimum close-off rating shall be considered at dead head rating

of the pump.

2.5.5 The control valve assembly shall be provided and delivered from a single manufacturer as a complete assembly.

2.5.6 Characterized Control Valves

2.5.6.1 50mm (2") and smaller: nickel-plated forged brass body rated at 2,758 kPa (400 psi), stainless steel ball and blowout proof stem, female NPT end fittings, with a dual EPDM O-ring packing design, fiberglass reinforced Teflon seats, and a TEFZEL flow characterizing disc. 20mm (¾") and smaller for terminal units: nickel plated forged brass body rated at 4,137 kPa (600 psi), chrome plated brass ball and blowout proof stem, female NPT end fittings, with a dual EPDM O-Ring packing design, fiberglass reinforced Teflon seats, and a TEFZEL flow characterizing disc.

2.5.6.2 65mm (2-1/2") through 80mm (3"): GG25 cast iron body according to ANSI Class 125, standard class B, stainless steel ball and blowout proof stem, flange to match ANSI 125 with a dual EPDM O-ring package design, PTFE seats, and a stainless steel flow characterizing disc.

2.5.7 Plug-Type Globe Pattern for Water Service:

2.5.7.1 Where not specifically indicated in the Contract Documents, modulating valves shall be sized for maximum full flow pressure drop between 50% and 100% of the branch circuit it is controlling unless scheduled otherwise. Two-position valves shall be same size as connecting piping or size using a pressure differential of 6.9 kPa (1 psi).

2.5.7.2 Single Seated (Two-way) Valves: Valves shall have equal-percentage characteristic for typical heat exchanger service and linear characteristic for building loop connections unless otherwise scheduled on the drawings. Valves shall have cage-type trim, providing seating and guiding surfaces for plug on 'top-and-bottom' guided plugs.

2.5.7.3 Double Seated (Three-way) Valves: Valves shall have linear characteristic. Valves shall be balanced-plug type, with cage-type trim providing seating and guiding surfaces on 'top-and-bottom' guided plugs.

2.5.7.4 Two- and Three-Way Modulating: twice the load pressure drop, but not more than 34.5 kPa (5 psig).

2.5.7.5 50mm (2”) and smaller: ANSI Class 250 bronze body, stainless steel stem, brass plug, bronze seat, and a TFE packing.

2.5.7.6 65mm (2-1/2”) and larger: ANSI Class 125 or 250 as applicable, cast iron body, stainless steel stem, bronze plug, bronze seat, and a TFE V-ring packing.

2.5.7.7 Two- and three-way globe valves shall be used only if characterized control valves do not fit the sizing criteria or application.

2.5.8 Plug-Type Globe Pattern for Steam Service:

2.5.8.1 Two-Position: line size or sized using 10% of inlet gauge pressure.

2.5.8.2 Modulating: 103 kPa (15 psig) or less: inlet steam pressure, the pressure drop shall be 80% of inlet gauge pressure. Higher than 103 kPa (15 psig) inlet steam pressure: the pressure drop shall be 42% of the inlet absolute pressure.

2.5.8.3 Characteristics: Modified equal-percentage characteristics. Cage-type trim, providing seating and guiding surfaces for plug on "top and bottom" guided plugs.

2.5.8.4 50mm (2”) and smaller: ANSI Class 250 bronze body; stainless steel seat, stem and plug; and a TFE packing.

2.5.8.5 65mm (2-1/2”) and larger: ANSI Class 125 or 250 as applicable, cast iron body, stainless steel seat, stem and plug, and a TFE V-ring packing.

2.5.9 Ball Type:

2.5.9.1 Brass or bronze body; one-, two-, or three-piece design; threaded ends; reinforced Teflon seat; stainless steel ball; standard or ‘V’ style port; stainless steel stem, blow-out proof design, extended to match thickness of insulation.

2.5.9.2 Rating: Cold service pressure 4,138 kPa (600 psi) WOG; Steam working pressure 1,034 kPa (150 psi).

2.5.10 Segmented or Characterized Ball Type:

2.5.10.1 Carbon steel (ASTM 216) body, one-piece design with wafer style ends; reinforced teflon (PTFE) seat; stainless steel ASTM A351 ball; segmented design port with equal-percentage characteristic; stainless steel stem.

2.5.10.2 Rating: Cold service pressure 1,380 kPa (200 psi) WOG

2.5.11 Pressure Independent Control Valves

2.5.11.1 50mm (2") dia and smaller: forged brass body rated at no less than 2,758 kPa (400 psi), chrome plated brass ball and stem, female NPT union ends, dual EPDM lubricated O-rings and a brass or TEFZEL characterizing disc.

2.5.11.2 65mm (2-1/2") through 150mm (6') dia: GG25 cast iron body according to ANSI Class 125, standard class B, stainless steel ball and blowout proof stem, flange to match ANSI 125 with a dual EPDM O-ring packing design, PTFE seats, and a stainless steel flow characterizing disc.

2.5.11.3 Accuracy: The control valves shall accurately control the flow from 0 to 100% full rated flow with an operating pressure differential range of 34.5 kPa (5 psi) to 345 kPa (50 psi) differential across the valve with a valve body accuracy of +/- 5% variance due to differential pressure fluctuation or +/- 10% total assembly error incorporating differential pressure fluctuation, manufacturing tolerances and valve hysteresis.

2.5.11.4 Flow Characteristics: Equal percentage characteristics.

2.5.11.5 All actuators shall be capable of being electronically programmed in the field by use of external computer software or a dedicated handheld tool for the adjustment of flow. Programming using actuator mounted switches or multi-turn actuators are not acceptable. Actuators for 3-wire floating (tri-state) and for two-position 15mm (½") to 25mm (1") pressure independent control valves shall fail in place and have a mechanical device inserted between the valve and the actuator for the adjustment of flow.

2.5.11.6 Coil optimization 65mm (2-1/2") through 150mm (6") shall be accomplished by utilizing a pressure independent control valve assembly; two temperature sensors providing feedback of coil inlet water temperature and coil outlet water temperature; and a flow meter to provide analog flow feedback. Software shall control the valve to avoid the coil differential temperature from falling below a programmed setpoint. Independent trend logs data shall be available by means of BACnet MS/TP trending data to include, but not be limited, to inlet and outlet coil water temperatures, valve position, absolute flow, absolute valve position, absolute power and heating/cooling energy in BTU/hr.

2.5.11.7 The BAS Contractor shall ensure that the manufacturer provides a published commissioning procedure following the guidelines of the National Environmental Balancing Bureau (NEBB) and the Testing Adjusting Balancing Bureau (TABB).

2.5.11.8 The control valve shall require no maintenance and shall not include replaceable cartridges.

2.5.12 Butterfly valves may be provided for two-position service. Where indicated on the Drawings, supply motorized butterfly valves complete with pipe tee of same rating as piping specification. Supply tight shut-off valves equipped with a limit switch for position indication.

2.5.12.1 50mm (2") to 300mm (12"): valve body shall be full lugged cast iron 1,379 kPa (200 psig) body with a 304 stainless steel disc, EPDM seat, extended neck and shall meet ANSI Class 125/150 flange standards. Disc-to-stem connection shall utilize an internal spline. The shaft shall be supported at four locations by RPTFE bushings.

2.5.12.2 350mm (14") and larger: valve body shall be full lugged cast iron 1,034 kPa (150 psig) body with a 304 stainless steel disc, EPDM seat, extended neck and shall meet ANSI Class 125/150 flange standards. Disc-to-stem connection shall utilize a dual-pin method to prevent the disc from settling onto the liner. The shaft shall be supported at four locations by RPTFE bushings.

2.5.12.3 Butterfly valves for medium pressure service: valve body shall be full lugged carbon steel ANSI Class 300 body with a 316 stainless steel disc without a nylon coating, RTFE seat, and be ANSI Class 300 flange standards. Blowout-proof shaft shall be 17-4ph stainless steel and shall be supported at four locations by glass-backed TFE bushings. Valve packing shall be Chevron TFE and shall include fully adjustable packing flange and separable packing gland. Valve body shall have long stem design to allow for 50mm (2") insulation (minimum). Valve face-to-face dimensions shall comply with API 609 and MSS-SP-68. Valve assembly shall be completely assembled and tested, ready for installation.

2.5.13 The BAS Contractor shall ensure that the manufacturer warrants all components for a period of 5 years from the date of production, with the first two years unconditional.

2.5.14 Cavitation Trim:

2.5.14.1 Provide cavitation trim where indicated and/or required, designed

to eliminate cavitation and noise while maintaining an equal percentage characteristic. Trim shall be a series of plates with orifices to break the pressure drop into multi-stages.

2.6 CRITICAL SERVICE CONTROL VALVES

2.6.1 Control valve sizing and selection is the responsibility of the BAS Contractor. Provide a valve schedule that lists the requirements of the valves for Cv, close off, temperature, etc. This should be a result of analyzing the valves performance across the range of control.

2.6.2 General:

2.6.2.1 Provide selection of valve type or body material as determined by installation requirements and pressure class, based on maximum pressure and temperature in piping system.

2.6.2.2 Provide valve size in accordance with scheduled or specified maximum pressure drop across control valve.

2.6.2.3 Control valves shall be equipped with heavy-duty actuators and pilot positioners with proper close-off rating and capability for each individual application.

2.6.2.4 Minimum close-off rating shall be as scheduled and adequate for each application, and shall generally be considered at dead head rating of the pump.

2.7 ENERGY VALVES

2.7.1 Pressure Independent Control Valves with flow and temperature measurements. Based on Belimo.

2.7.1.1 50mm (2”) dia and smaller: forged brass body rated at no less than 2,758 kPa (400 psi), chrome plated brass ball and stem, female NPT union ends, dual EPDM lubricated O-rings and a brass or TEFZEL characterizing disc.

2.7.1.2 65mm (2-1/2”) through 150mm (6’) dia: GG25 cast iron body according to ANSI Class 125, standard class B, stainless steel ball and blowout proof stem, flange to match ANSI 125 with a dual EPDM O-ring packing design, PTFE seats, and a stainless steel flow characterizing disc.

2.7.1.3 Accuracy: The control valves shall accurately control the flow from 0 to 100% full rated flow with an operating pressure differential

range of 34.5 kPa (5 psi) to 345 kPa (50 psi) differential across the valve with a valve body accuracy of +/- 5% variance due to differential pressure fluctuation or +/- 10% total assembly error incorporating differential pressure fluctuation, manufacturing tolerances and valve hysteresis.

2.7.1.4 Flow Characteristics: Equal percentage characteristics.

2.7.1.5 All actuators shall be capable of being electronically programmed in the field by use of external computer software or a dedicated handheld tool for the adjustment of flow. Programming using actuator mounted switches or multi-turn actuators are not acceptable. Actuators for 3-wire floating (tri-state) and for two-position 15mm (½") to 150mm (6") pressure independent control valves shall fail in place and have a mechanical device inserted between the valve and the actuator for the adjustment of flow.

2.7.1.6 Coil optimization 15mm (1/2") through 150mm (6") shall be accomplished by utilizing a pressure independent control valve assembly; two temperature sensors providing feedback of coil inlet water temperature and coil outlet water temperature; and a flow meter to provide analog flow feedback.

2.7.1.7 Software shall control the valve to avoid the coil differential temperature from falling below a programmed setpoint. Independent trend logs data shall be available by means of BACnet MS/TP trending data to include, but not be limited, to inlet and outlet coil water temperatures, valve position, absolute flow, absolute valve position, absolute power and heating/cooling energy in BTU/hr.

2.7.1.8 The BAS Contractor shall ensure that the manufacturer provides a published commissioning procedure following the guidelines of the National Environmental Balancing Bureau (NEBB) and the Testing Adjusting Balancing Bureau (TABB).

2.7.2 The control valve shall require no maintenance and shall not include replaceable cartridges.

2.8 VALVE AND DAMPER ACTUATORS

2.8.1 Size actuators and linkages to operate their appropriate dampers or valves with sufficient reserve torque or force to provide smooth modulating action or 2-position action as specified. Select spring-return actuators with manual override to provide positive shut-off of devices as they are applied.

2.8.2 Provide electric actuators of the enclosed reversible gear drive type that can accept modulating control signals as required. Actuators using balance relays or mechanical travel limiting switches are not acceptable.

2.8.3 Electric damper actuators shall be spring return on outdoor air service.

2.8.4 Valves installed for outdoor service applications must be provided with actuators that operate satisfactorily at -30°C (-22°F) through 50°C (122°F).

2.8.5 Coupling shall be V-bolt dual nut clamp with a V-shaped, toothed cradle.

2.8.6 Mounting: actuators shall be capable of being mechanically and electrically paralleled to increase torque if required.

2.8.7 Fail-Safe Operation: mechanical, spring-return mechanism

2.8.8 Actuators to be overload protected electronically throughout rotation and come with electronic fail safe actuator for pressure independent valves 50mm (2-1/2”) through 150mm (6”).

2.8.9 Proportional actuators shall be fully programmable through an EEPROM without the use of actuator mounted switches.

2.8.10 Housing: minimum requirement NEMA type 2 / IP54 mounted in any orientation.

2.9 POSITIONERS

2.9.1 Positive positioning relays shall be provided on damper motors and valves when required to provide sufficient power, sequencing, repeatability, or speed of response. Positioner shall allow field adjustment of both starting pressure and operating span. Positioner shall provide an antilock feature and shall provide accurate positioning without excessive air bleed.

2.10 SMOKE DAMPERS

2.10.1 Provide Ruskin SD-35, Class I smoke dampers where indicated on the Drawings.

2.10.2 Provide parallel blade type dampers, suitable for horizontal or vertical mounting. Provide multiple dampers where sizes exceed code limitations.

2.10.3 Select dampers with airflow resistance not exceeding 13 Pa (0.05" w.g.) at design flow rates.

2.11 SMOKE DAMPER MOTORS

2.11.1 Size for torque required for damper seal at load conditions with one actuator per damper section. Mechanically paralleled or 'piggybacked' actuators are not permitted.

2.11.2 Coupling shall be V-bolt dual nut clamp with a V-shaped toothed cradle. Aluminum clamps or set screws are not acceptable.

2.11.3 Overload protection: microprocessor or an electronic based motor controller providing burnout protection if stalled before full rotation is reached. The actuator shall be electronically cut off at full open to eliminate noise generation with the holding noise level to be inaudible.

2.11.4 Actuator timing shall be per OBC and NFPA requirements.

2.11.5 Temperature rating: actuator shall have a UL555S listing by the damper manufacturer for 177°C (350°F).

2.11.6 Proportional smoke and fire damper actuators shall meet all requirements specified above and shall modulate 0-100% open in response to a 2-10vdc or 4-20mA control signal. A 2-10vdc feedback output shall provide a 2-10vdc signal for position indication.

2.11.7 Balancing smoke and fire damper actuators shall meet all requirements specified above and shall include an integral adjustable maximum opening potentiometer for airflow adjustment.

2.11.8 A manual override winder and locking mechanism shall be provided for override operation of the actuator on a loss of power to the actuator.

2.11.9 Actuator to include auxiliary switches for signaling, fan control, or position indication.

2.11.10 Housing for combination fire/smoke damper actuator to be steel, aluminum is not acceptable.

2.12 GENERAL FIELD DEVICES

2.12.1 Provide field devices for input and output of digital (binary) and analog signals into controllers (BCs, AACs, ASCs). Provide signal

conditioning for all field devices as recommended by field device manufacturers and as required for proper operation in the system.

2.12.2 BAS Contractor shall assure that all field devices are compatible with controller hardware and software.

2.12.3 Field devices specified herein are generally 'two-wire' type transmitters, with power for the device to be supplied from the respective controller. If the controller provided is not equipped to provide this power, is not designed to work with 'two-wire' type transmitters, if field device is to serve as input to more than one controller, or where the length of wire to the controller will unacceptably affect the accuracy, the BAS Contractor shall provide 'four-wire' type equal transmitter and necessary regulated DC power supply or 120 VAC power supply, as required.

2.12.4 For field devices specified hereinafter that require signal conditioners, signal boosters, signal repeaters, or other devices for proper interface to controllers, the BAS Contractor shall provide proper devices, including 120V power as required. Such devices shall have accuracy and repeatability equal to, or better than, the accuracy and repeatability listed for respective field devices.

2.12.5 Accuracy: As stated in this Section, accuracy shall include combined effects of nonlinearity, non-repeatability and hysteresis.

2.13 ELECTRONIC TEMPERATURE SENSORS

2.13.1 Supply factory calibrated temperature sensors that utilize 1000-Ohm nickel wire or platinum (RTDs).

2.13.2 Temperature sensors utilized for measuring duct temperatures shall incorporate an averaging style temperature element (RTD) of sufficient length to ensure a proper average of the variation across the full cross section of the duct.

2.13.3 Temperature sensors utilized for measurement of fluid temperatures shall incorporate a separate well of a material suitable for the service.

2.13.3.1 Water service – brass

2.13.3.2 Steam service - 304 SS

2.13.3.3 Ethylene/propylene glycol service - 304 SS

2.13.4 Temperature sensors utilized for wall mounting in occupied spaces

and connected to ASCs used for terminal unit control must be complete with a momentary contact switch for override initiation, concealed temperature setpoint adjustment and telephone style jack for connection of a portable service terminal.

2.13.5 Supply sensors with the following accuracy:

2.13.5.1 Duct and water insertion sensors +/- 0.5% at 20°C (68°F)

2.13.5.2 Duct averaging sensors +/- 1.0% at 20°C (68°F)

2.13.5.3 Space sensors +/- 0.5% at 20°C (68°F)

2.14 ELECTRONIC HUMIDITY SENSORS

2.14.1 Provide humidity sensors with a solid state sensing element suitable for operating ranges of 10 to 100% RH and an accuracy of +/- 3% over a range of 5 to 95% RH.

2.14.2 Incorporate in the humidity sensors a transducing circuit for conversion of the sensed variable to a voltage level for digital conversion.

2.15 PRESSURE SENSORS

2.15.1 Provide pressure transmitters suitable for continuous contact with the material being measured (i.e., air, water, glycol, or steam as applicable).

2.15.2 Pressure transmitters shall have a linear output of 0-5V. Pressure transmitters shall have a span of not greater than twice the static pressure at maximum flow or differential pressure at shut-off as applicable.

2.16 AIRFLOW MONITORING STATIONS

2.16.1 Airflow measuring stations must be designed and built to comply with, and provide results in accordance with accepted practice as defined for system testing in the ASHRAE Handbook of Fundamentals, as well as the Industrial Ventilation Handbook.

2.16.2 Where required, incorporate air straightening to ensure an accurate flow profile.

2.16.3 Utilize total pressure and static pressure probes and incorporate averaging manifolds, internal piping, and connections for an external differential pressure/flow transmitter. Hot wire

anemometer technology is also acceptable

2.16.4 Airflow stations incorporated into the flow channels of silencers must be a series of probes inserted and tubed together according to design criteria, to provide an acceptable airflow profile.

2.16.5 Connect air flow monitoring devices supplied as part of equipment such as air terminal units to the BAS as required based on the Sequences of Operation set out in Section 25 90 00.

2.17 PRESSURE SWITCHES

2.17.1 Supply pressure-sensing elements of the bourdon tube, bellows, or diaphragm type, with adjustable setpoint and differential.

2.17.2 Pressure switches to be snap action type rated at 120 Volts, 15 Amps AC or 24 Volts DC.

2.18 TEMPERATURE SWITCHES

2.18.1 Temperature sensing element shall be liquid, vapour, or bimetallic type.

2.18.2 Supply adjustable setpoint and differential.

2.18.3 Snap action type rated at 120 volts, 15 Amps, or 24 volts DC as required.

2.18.4 Sensors shall operate automatically and reset automatically. Temperature switches shall be of the following types:

2.18.4.1 Room Type suitable for wall mounting on standard electrical box with or without protective guard.

2.18.4.2 General Purpose Duct Type suitable for insertion into air ducts, insertion length of 450mm (18 inches).

2.18.4.3 Thermowell Type complete with compression fitting for 20mm (¾") NPT well mounting of length of 100 mm (4 inches). Immersion wells shall be stainless steel.

2.18.4.4 Strap-on-Type complete with helical screw stainless steel clamps.

2.19 PRESSURE ELECTRIC SWITCHES

2.19.1 Provide pressure electric switches with diaphragm operated S.P.D.T. snap acting contacts with electrical rating suitable for

application.

2.19.2 Pressure electric switches must withstand up to 172 kPa (25 psig) and be provided with adjustable cut-in and cut-out settings between 21 and 138 kPa (3 and 20 psig).

2.20 CURRENT SENSING RELAYS

2.20.1 Supply current sensing relays in fan and pump motor starters to detect flow a required in the sequence of operation.

2.20.2 Supply current sensing relays complete with metering transformer ranged to match load being metered.

2.20.3 Provide adjustable latch level, a minimum differential of 10% of latch setting between latch level and release level, and an LED for local status indication.

2.20.4 Ensure relay contacts are compatible with control circuit voltage.

2.21 CARBON DIOXIDE SENSORS

2.21.1 Supply carbon dioxide sensors for air quality control purposes with the following characteristics:

2.21.1.1 Measurement Range – 0-2000 ppm CO_2

2.21.1.2 Accuracy +/- 100 ppm

2.21.1.3 Repeatability +/- 20 ppm

2.21.1.4 Drift +/- 100 ppm per year

2.21.1.5 Output Signal 0-10 VDC proportional over the 0-2000 ppm range

2.21.1.6 Response time 20 seconds maximum

2.21.1.7 Operating conditions 0-50°C (32-122°F), 10-100% RH non-condensing

2.21.2 Provide one single point calibration kit

2.22 LOW TEMPERATURE LIMIT THERMOSTATS

2.22.1 Where shown on the Drawings or described in the sequences of operation, install low temperature limit thermostats complete with 6.1m (20’-0”) of sensing capillary sensitive to 400mm (16”) and

manual reset. Provide one limit thermostat for approximately every 6 sq. m (65 sq. ft.) of duct area.

2.23 HIGH TEMPERATURE LIMIT THERMOSTATS

2.23.1 Where shown on the Drawings or described in the Sequences of Operation in this Section below for individual systems, provide high limit thermostats to shut down respective fan system(s).

2.23.2 Provide a single rod and tube type manual reset limit thermostat set at 57.5°C (135°F).

2.24 WATER FLOW SWITCHES

2.24.1 Supply paddle actuated water flow switches with snap acting S.P.D.T. contacts rated at 16 Amps 120/1/60 AC full load.

2.25 AIR PROVING SWITCHES

2.25.1 Air proving and motor status shall be performed by an adjustable latch level current switch. Upon motor current rise above setpoint, switch shall activate and status shall be proven.

2.26 DAMPER STATUS SWITCHES

2.26.1 Damper status switches shall be lever operated, activated by damper blade movement, and mounted securely on damper frame.

2.26.2 Damper switch shall have contact rating of 5 Amperes at 120V AC and be C.S.A. approved.

2.27 OCCUPANCY SENSORS

2.27.1 Provide passive infrared sensors, which shall operate on 24 VDC, with a current draw of 26 mA. Sensors shall be sealed and gasketed and be moisture and dust proof. The passive infrared sensor shall utilize a temperature compensated dual element sensor and a multi-element Fresnel lens.

2.27.2 Provide isolated relay with normally open, normally closed, and common outputs for use with HVAC control.

2.28 CONTROL RELAYS

2.28.1 Supply and install load relays capable of switching 10 Amps at 120/1/60.

2.29 CONTROL TRANSFORMERS

2.29.1 Furnish and install control transformers as required. Control transformers shall be machine tool type, and shall be ULC and CSA listed. Primary and secondary sides shall have replaceable fuses in accordance with the NEC. Transformer shall be properly sized for application, and mounted in minimum NEMA 1 enclosure.

2.30 TIME DELAY RELAYS (TDR)

2.30.1 TDRs shall be capable of on or off delayed functions, with adjustable timing periods, and cycle timing light. Contacts shall be rated for the application with a minimum of two (2) sets of Form C contacts, enclosed in a NEMA 1 enclosure.

2.30.2 TDRs shall have silver cadmium contacts with a minimum life span rating of one million operations. TDRs shall have solid state, plug-in type coils with transient suppression devices.

2.30.3 TDRs shall be ULC and CSA listed, Crouzet type.

2.31 ELECTRIC PUSH BUTTON SWITCH

2.31.1 Switch shall be momentary contact, oil tight, push button, with number of N.O. and/or N.C. contacts as required. Contacts shall be snap-action type, and rated for minimum 120 VAC operation.

2.32 PILOT LIGHT

2.32.1 Panel-mounted pilot light shall be NEMA ICS 2 oil tight, transformer type, with screw terminals, push-to-test unit, LED type, rated for 120 VAC.

2.33 ALARM HORN

2.33.1 Panel-mounted audible alarm horn shall be continuous tone, 120 VAC Sonalert solid-state electronic signal.

2.34 ELECTRIC SELECTOR SWITCH (ESS)

2.34.1 Switch shall be maintained contact, NEMA ICS 2, oil-tight selector switch with contact arrangement, as required. Contacts shall be rated for minimum 120 VAC operation.

2.35 NAMEPLATES

2.35.1 Duct and pipe mounted sensors and panels shall be provided with

minimum size 75mm x 25mm x 3.2mm (3” x 1” x 1/8”) lamacoid nameplates, clearly identifying the equipment and functions with letter and number designation. Nameplates shall be mechanically secured and listed in the Operating and Maintenance manual.

2.36 TESTING EQUIPMENT

2.36.1 The BAS Contractor shall test and calibrate all signaling circuits of all field devices to ascertain that required digital and accurate analog signals are transmitted, received, and displayed at system operator terminals, and make all repairs and recalibrations required to complete test. The BAS Contractor shall be responsible for test equipment required to perform these tests and calibrations. Test equipment used for testing and calibration of field devices shall be at least twice as accurate as respective field device (e.g., if field device is +/- 0.5% accurate, test equipment shall be +/- 0.25% accurate over same range).

3 EXECUTION

3.1 PREPARATION

3.1.1 Examine areas and conditions under which control systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to the BAS Contractor.

3.2 GENERAL REQUIREMENTS

3.2.1 Installation shall meet or exceed all applicable federal, provincial, and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

3.2.2 Install systems and materials in accordance with manufacturer's instructions, roughing-in Drawings and details shown on Drawings. Install electrical components and use electrical products complying with requirements of the Ontario Electrical Safety Code and all local codes.

3.2.3 Install all equipment, accessories, conduits, and interconnecting wiring in a neat manner by skilled and qualified workmen using the latest standard practices of the industry.

3.2.4 Notify the Consultant in writing of any conflict between these specifications and manufacturer's instructions.

3.2.5 Retain, at no additional cost to the owner, original equipment suppliers to provide contacts that are required on the point schedules and in the software and sequences specified. Provide the necessary relays and transformers required to interconnect equipment.

3.2.6 All equipment installed shall be mechanically stable and, as necessary, fixed to wall or floor. Anti-vibration mounts shall be provided, if required, for the proper isolation of equipment.

3.2.7 Install equipment to allow for easy maintenance access. Ensure equipment does not interfere in any way with access to adjacent equipment and personal traffic in the surrounding space.

3.2.8 Install equipment in locations providing ventilation and ambient conditions for its specified function.

3.2.9 Install all electrical wiring in conformance with the requirements of the local electrical authority, the Ontario Building Code and, unless otherwise indicated in the Contract Documents, the Specification Sections of Division 26 – Electrical.

3.2.10 Install low voltage wiring in accordance with the control manufacturer's recommendations. Run all wiring in a protective conduit in areas where exposed or where required to meet with applicable codes. Plenum rated (FT6) type cables may be used in accordance with applicable codes, in concealed, accessible locations such as ceiling spaces and wall cavities.

3.2.11 Shield and ground communication trunk wiring at a single end. Do not splice trunk cables.

3.3 INSTALLATION OF CONTROLLED DEVICES AND SENSORS

3.3.1 Supply equipment to be installed under the work of other Divisions in accordance with their work schedule.

3.3.2 Coordinate final location of all sensors with the Consultant's field representative prior to installation.

3.3.3 Sensor assemblies and elements must be readily accessible. Provide access doors as required to allow for easy replacement and servicing.

3.3.4 Support field mounted transmitters and sensors on pipe stands or channel brackets.

3.3.5 Locate all sensing elements to correctly sense measured variable. Isolate elements from vibrations and temperatures, which could affect measurement.

3.3.6 Install temperature sensing elements with thermal paste to ensure accurate reading.

3.3.7 Install averaging type RTDs in serpentine configuration with adequate provision for the mechanical protection of the sensor. Support along its entire length.

3.3.8 Modifications to plenum and ductwork must achieve the intent of the Contract Documents and adhere to the following:

3.3.9 Mount sensors with extension necks such that access to sensors is not restricted by insulation.

3.3.10 Keep cutting to a minimum and perform in a neat and workmanlike manner.

3.3.11 Provide patches and access covers of the same material and thickness as adjoining ductwork. Provide necessary reinforcing and fastening materials.

3.3.12 Repair insulation to maintain integrity of insulation and vapor barrier jacket. Use hydraulic insulating cement to fill voids and finish with material matching or compatible with adjacent jacket material.

3.3.13 Provide gaskets, seals, and insulation to restore to, or exceed as found conditions in areas where the BAS Contractor has made modifications.

3.3.14 All damper actuators shall be rigidly mounted and supplied with heavy-duty linkage consisting of a crank arm, pushrod, and swivel ball joint to connect to the damper shaft. Secure linkages in such a manner as to prevent slipping under normal operating torque.

3.3.15 Where the point schedules indicate that auxiliary contact provision, provide all instrumentation, wiring, conduit, power supplies, and services as required to integrate these points into the BAS.

3.3.16 Provide interposing and motor control relays at the local item of equipment or at the associated MCC as applicable. Provide all relays, wiring, conduit, power supplies, and services as required integrating these points into the BAS.

3.3.17 Control Air System:

3.3.17.1 All main air piping between the compressors and the control panels shall be copper, run per ASTM B88

3.3.17.2 Branch Control Air Piping: Accessible tubing is defined as that tubing run in mechanical equipment rooms; inside mechanical equipment enclosures, such as heating and cooling units, instrument panels; across roofs, in pipe chases, etc. Inaccessible tubing is defined as that tubing run in concrete slabs, furred walls, or ceilings with no access.

3.3.17.2.1 Provide copper tubing with maximum unsupported length of 0.91m (3 feet) for accessible tubing run exposed to view. Terminal single-line connections less than 457mm (18 inches) length may be copper tubing, or polyethylene tubing run. Tubing exposed to ambient conditions must be properly protected from sunlight and protected from damage.

3.3.17.2.2 Provide copper tubing for inaccessible tubing, other than in concrete pour. In a concrete pour polyethylene tubing may be used, install in rigid conduit or vinyl-jacketed polyethylene tubing. Install in galvanized rigid steel conduit at all exterior locations. Install in PVC Schedule 40 conduit if encased in concrete.

3.3.17.2.3 Polyethylene tubing may be used in control panels provided it is run in a neat and orderly fashion, bundled where applicable, properly supported and installed in a neat and workman like manner. Fasten flexible connections bridging cabinets and doors, neatly along hinge side, and protect against abrasion.

3.3.17.2.4 Pressure test control air piping at 207 kPa (30 psi) for 24 hours. Test fails if more than 13.8 kPa (2 psi) loss occurs.

3.3.17.2.5 Number-code or color-code tubing, except local individual room control tubing, for future identification and servicing of control system. Code shall be as indicated on approved installation drawings.

3.3.18 Control Wiring:

3.3.18.1 The term "control wiring" is defined to include providing of wire, conduit, and miscellaneous materials as required for mounting and connection of electric control devices.

3.3.18.2 Install complete wiring system for electric control systems.

Conceal wiring except in mechanical rooms and areas where other conduit and piping are exposed. Installation of wiring shall generally follow building lines. Install in accordance with the latest edition of the Ontario Electrical Safety Code and Division 26 - Electrical. Fasten flexible conductors bridging cabinets and doors, neatly along hinge side, and protect against abrasion. Tie and support conductors neatly.

3.3.18.3 Install control wiring conductors, without splices between terminal points, color-coded. Install in neat workmanlike manner, securely fastened.

3.3.18.4 Communication wiring, signal wiring and low voltage control wiring shall be installed separate from any wiring over 30V. Signal wiring shield shall be grounded at controller end only, unless otherwise recommended by the controller manufacturer.

3.3.18.5 All WAN and LAN communication wiring shield shall be terminated as recommended by controller manufacturer. All WAN and LAN communication wiring shall be labeled with a network number, device ID at each termination and shall correspond with the WAN and LAN system architecture and floor plan submittals.

3.3.18.6 Install all control wiring external to panels in electric metallic tubing or raceway. Installation of wiring shall generally follow building lines. Provide compression type connectors. Install wiring in galvanized rigid steel conduit at all exterior locations and where subjected to moisture. Install in PVC Schedule 40 conduit if encased in concrete. All conduits penetrating partitions, walls or floors shall be sealed with a submitted and approved fire/smoke sealant material to prevent migration of air through the conduit system.

3.3.18.6.1 The BAS Contractor shall be fully responsible for noise immunity and rewire in conduit if electrical or RF noise affects performance.

3.3.18.6.2 Accessible locations are defined as areas inside mechanical equipment enclosures, such as heating and cooling units, instrument panels etc.; in accessible pipe chases with easy access, or suspended ceilings with easy access. Installation of wiring shall generally follow building lines.

3.3.18.6.3 Run in a neat and orderly fashion, bundled where applicable, and completely suspended (strapped to rigid elements or routed through wiring rings) away from areas of normal access. Tie and support conductors neatly with suitable nylon ties and not to

exceed 1.52m (5 foot) intervals.

3.3.18.6.4 Conductors shall not be supported by the ceiling system or ceiling support system. Conductors shall be pulled tight and be installed as high as practically possible in ceiling cavities. Wiring shall not be laid on the ceiling or duct.

3.3.18.6.5 Conductors shall not be installed between the top cord of a joist or beam and the bottom of roof decking.

3.3.18.7 Communication cabling shall be provided in an Owner approved color dedicated to the BAS.

3.3.18.8 Number-code or color-code conductors appropriately for future identification and servicing of control system. Code shall be as indicated on approved installation drawings.

3.3.19 Install control valves so that actuators, wiring, and tubing connections are accessible for maintenance. Where possible, install with valve stem axis vertical, with operator side up. Where vertical stem position is not possible or would result in poor access, valves may be installed with stem horizontal. Do not install valves with stem below horizontal, or down.

3.3.20 Averaging temperature sensors shall cover no more than 0.61 sq.m per linear meter (2 sq.ft per linear foot) of sensor length except where indicated. Sensor shall be installed in location where flow is sufficiently homogeneous and adequately mixed. Install averaging sensors in a serpentine configuration with adequate provision for the mechanical protection of the sensor. Support along its entire length.

3.3.21 Install airflow measuring stations per manufacturer's recommendations in an unobstructed straight length of duct (except those installations specifically designed for installation in fan inlet). For installations in fan inlets, provide on both inlets of double inlet fans and provide inlet cone adapter as recommended by AFM station manufacturer.

3.3.22 Install fluid flow sensors per manufacturer's recommendations in an unobstructed straight length of pipe.

3.3.23 Provide element guard for relative humidity sensors as recommended by manufacturer for high velocity installations. For high limit sensors, position remote enough to allow full moisture absorption into the air stream before reaching the sensor.

3.3.24 Water differential pressure transmitters shall be installed in a valve bypass arrangement to protect against over pressure damaging the transmitter. Establish required locations and coordinate installation of valve bypass with the respective Subcontractors.

3.3.25 Install steam differential pressure transmitters as shown on the Drawings per manufacturer's instructions.

3.3.26 Install pipe surface mount temperature sensors with thermally conductive paste at pipe contact point. Where sensor is to be installed on an insulated pipe, the BAS Contractor shall neatly cut insulation, install sensor, repair or replace insulation and vapor barrier, and adequately seal vapor barrier.

3.3.27 Where possible, install flow switches in a straight run of pipe at least 15 diameters in length to minimize false indications.

3.3.28 Adjust current switches for motor status monitoring so that setpoint is below minimum operating current and above motor no load current.

3.3.29 Supply Duct Pressure Transmitters:

3.3.29.1 Install pressure tips with at least four (4) 'round equivalent' duct diameters of straight duct with no takeoffs upstream. Install static pressure tips securely fastened with tip facing upstream in accordance with manufacturer's installation instructions. Locate the transmitter at an accessible location to facilitate calibration.

3.3.29.2 On VAV Systems, locate down-duct transmitter pressure tips approximately 2/3 of the hydraulic distance to the most remote terminal in the air system.

3.4 IDENTIFICATION OF EQUIPMENT

3.4.1 Identify each piece of equipment, including sensors, controlled devices, and control panels, with a nameplate identifying the equipment and functions with a letter and number designation.

3.4.2 Nameplates shall be minimum size 75mm x 25mm (3" x 1") and 3.2mm (1/8") thick laminated plastic with black face and white center and 6.4mm (1/4") deep engraved lettering. Nameplates shall be securely attached to the equipment.

3.4.3 Printed nametags are acceptable for cabinet mounted components providing they are securely attached.

3.5 ACCEPTANCE AND TESTING PROCEDURES

3.5.1 The BAS Contractor shall request completion acceptance in writing and advise the Consultant of situations that would prevent a complete testing of overall system performance.

3.5.2 Work and/or systems installed under this Division and under Divisions 21, 22 and 23 shall be fully functioning prior to Demonstration and Acceptance Phase. The BAS Contractor shall start, test, adjust, and calibrate all work and/or systems under this Contract, as described below:

3.5.2.1 Inspect the installation of all devices. Review the manufacturer's installation instructions and validate that the device is installed in accordance with them.

3.5.2.2 Verify proper electrical voltages and amperages, and verify that all circuits are free from faults.

3.5.2.3 Verify integrity/safety of all electrical connections.

3.5.2.4 Coordinate with the Subcontractor responsible for the TAB work to obtain control settings that are determined from balancing procedures. Record the following control settings as obtained from the Subcontractor responsible for the TAB work, and note any TAB deficiencies in the BAS Start-Up Report:

3.5.2.4.1 Optimum duct static pressure setpoints for VAV air handling units.

3.5.2.4.2 Minimum outside air damper settings for air handling units.

3.5.2.4.3 Optimum differential pressure setpoints for variable speed pumping systems.

3.5.2.4.4 Calibration parameters for flow control devices such as VAV terminal units and flow measuring stations.

3.5.2.5 The BAS Contractor shall provide a hand-held device as a minimum to the Subcontractor responsible for the TAB work to facilitate calibration. Connection for any given device shall be local to it (i.e. at the VAV terminal unit or at the thermostat). Hand-held device or portable operator's terminal shall allow querying and editing of parameters required for proper calibration and start-up.

3.5.2.6 Test, calibrate, and set all digital and analog sensing and actuating devices. Calibrate each instrumentation device by making a comparison between the BAS display and the reading at the

device, using an instrument, which shall be at least twice as accurate as the device to be calibrated (e.g., if field device is +/-0.5 percent accurate, test equipment shall be +/-0.25 percent accurate over same range). Record the measured value and displayed value for each device in the BAS Start-up Report.

3.5.2.7 Check and set zero and span adjustments for all transducers and transmitters.

3.5.2.8 For dampers and valves:

3.5.2.8.1 Check for adequate installation including free travel throughout range and adequate seal.

3.5.2.8.2 Where loops are sequenced, check for proper control without overlap.

3.5.2.9 For actuators:

3.5.2.9.1 Check to insure that device seals tightly when the appropriate signal is applied to the operator.

3.5.2.9.2 Check for appropriate fail position, and that the stroke and range is as required.

3.5.2.9.3 For pneumatic operators, adjust the operator spring compression as required to achieve close-off. If positioner or volume booster is installed on the operator, calibrate per manufacturer's procedure to achieve spring range indicated. Check split-range positioners to verify proper operation. Record settings for each device in the BAS Pre-Commissioning Report.

3.5.2.9.4 For sequenced electronic actuators, calibrate per manufacturer's instructions to required ranges.

3.5.2.10 Check each digital control point by making a comparison between the control command at the CU and the status of the controlled device. Check each digital input point by making a comparison of the state of the sensing device and the Operator Interface display. Record the results for each device in the BAS Start-Up Report.

3.5.2.11 For outputs to reset other manufacturer's devices (for example, VSDs) and for feedback from them, calibrate ranges to establish proper parameters. Coordinate with representative of the respective manufacturer and obtain their approval of the installation.

3.5.3 Sensor Checkout and Calibration:

3.5.3.1 Verify that all sensor locations are appropriate and are away from causes of erratic operation. Verify that sensors with shielded cable are grounded only at one end. For sensor pairs that are used to determine a temperature or pressure difference, make sure they are reading within 0.1 degrees C (0.2 degrees F) of each other for temperature and within a tolerance equal to 2 percent of the reading of each other for pressure. Tolerances for critical applications may be tighter.

3.5.3.2 Calibrate all sensors using one of the following procedures:

3.5.3.2.1 Sensors without transmitters: Make a reading with a calibrated test instrument within 150mm (6 inches) of the site sensor at various points across the range. Verify that the sensor reading (via the permanent thermostat, gauge or BAS) is within the tolerances specified for the sensor. If not, adjust offset and range, or replace sensor. Where sensors are subject to wide variations in the sensed variable, calibrate sensor within the highest and lowest 20 percentage of the expected range.

3.5.3.2.2 Sensors with transmitters: Disconnect sensor. Connect a signal generator in place of sensor. Connect ammeter in series between transmitter and BAS control panel. Using manufacturer's resistance-temperature data, simulate minimum desired temperature. Adjust transmitter potentiometer zero until the ammeter reads 4 mA. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the OI. Record all values and recalibrate controller as necessary to conform to tolerances. Reconnect sensor. Make a reading with a calibrated test instrument within 150mm (6 inches) of the site sensor. Verify that the sensor reading (via the permanent thermostat, gauge or BAS) is within the tolerances specified. If not, replace sensor and repeat. For pressure sensors, perform a similar process with a suitable signal generator.

3.5.3.3 Sensors shall be within the tolerances specified for the device.

3.5.4 Coil Valve Leak Check:

3.5.4.1 Verify proper close-off of the valves. Ensure the valve seats properly seat by simulating the maximum anticipated pressure difference across the circuit. Demonstrate to the Owner the verification of zero flow by measuring the coil differential pressure. If there is pressure differential, close the isolation valves to the coil

to ensure the conditions change. If they do, this validates the valve is not closing. Remedy the condition by adjusting the stroke and range, increasing the actuator size/torque, replacing the seat, or replacing the valve as applicable.

3.5.5 Valve Stroke Setup and Check:

3.5.5.1 For all valve and actuator positions checked, verify the actual position against the Operator Interface readout.

3.5.5.2 Set pumps to normal operating mode. Command valve closed, verify that valve is closed, and adjust output zero signal as required. Command valve open, verify position is full open and adjust output signal as required. Command the valve to various few intermediate positions. If actual valve position doesn't reasonably correspond, replace actuator or add pilot positioner (for pneumatics).

3.5.6 After completion of installation and in cooperation with Subcontractors responsible for the related work of other Specification Sections, adjust each control device and component to ensure that the operations are in accordance with the Sequences of Operation specified in Section 20 95 00.

END OF SECTION

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3.1 Installation

1 **GENERAL**

1.1 GENERAL

1.1.1 Sections 20 00 00 and 25 00 00 – General Requirements shall apply to and govern this Section.

1.2 SCOPE OF WORK

1.2.1 Provide all labour, materials, tools, equipment, training, commissioning and certification required to complete the work as shown on the Drawings and specified in this Section, including:

1.2.1.1 Operator Workstations.

1.2.1.2 Control System Servers.

1.2.1.3 Portable Operator Terminal / Remote Workstation.

1.2.2 Furnish and install all Operator Interfaces and Control System Servers as required for the BAS functions specified in the Contract Documents. All computers shall be warranted by the manufacturer for a period of one year after final acceptance.

2 **PRODUCTS**

2.1 GENERAL

2.1.1 All materials shall meet or exceed all applicable referenced standards, and conform to codes and ordinances of authorities having jurisdiction.

2.1.2 The make and model of control system server computers, personal computers (PC), notebook PC's, monitors, and printers shall comply with Owner's current standards for desktop personal computers as of the date of the Substantial Performance of the Work. Contact the Owner for the current computer hardware standards.

2.1.3 Operating system for operator workstation shall comply with the Owner's current standards for desktop personal computers as of the date of the Substantial Performance of the Work. Contact the Owner for the current computer software standards.

2.2 CONTROL SYSTEMS APPLICATION SERVER (CSS)

2.2.1 Provide Controls Systems Application Server to archive historical

data including trends, alarm and event histories and transaction logs.

2.2.2 Server shall be an IBM compatible computer platform. Minimum 2 GB RAM, 19" LCD monitor, and 500 GB hard-drive. DVD Read / Write drive shall be provided for system backup use.

2.2.3 One printer shall be provided for information summaries, custom reports, and graphical printing. The printer shall be capable of six (6) pages per minute at a resolution of 600 dpi, and use inkjet technology.

2.2.4 Equip this Server with the same software tool set that is located in the Primary Controls Systems Application Nodes for system configuration, custom logic definition, and for colour graphic configuration.

2.2.5 Access to all information on the Controls Systems Server shall be through the same Operator Interface functionality used to access individual nodes. When logged onto a Server the Operator will be able to also interact with any of the primary Nodes on the Controls Systems Application.

2.3 OPERATOR WORKSTATION (OWS)

2.3.1 The Operator Interface provided shall include the functionality to selectively combine data and information from any system element or component in the Controls Systems Application on a single Browser window display panel at the Operator's option. This shall include both current information and historical data stored on the Server.

2.3.2 The Controls Systems Application Operator Workstation (OWS) shall operate on Microsoft® Windows 8 or other approved platform, with the same hardware as described under the CSS.

2.3.2.1 The BAS Contractor shall provide a modem for connection to the Owner's paging service.

2.3.3 Operator Workstations shall be placed as indicated on the Drawings or as directed by the Owner.

2.4 PORTABLE OPERATOR TERMINAL (POT) / REMOTE WORKSTATION

2.4.1 Portable Operator Terminal shall support system management by

connection to the controllers and by connection via the Internet while serving as the remote workstation.

2.4.2 Provide one notebook personal computer (PC) that meets or exceeds the minimum requirements of the BAS software and meets or exceeds Owner's minimum requirements. Notebook PC shall contain a DVD-RW Drive.

2.4.3 Provide carrying case and extra battery.

2.4.4 Operating system for operator workstation shall be Microsoft Windows 8 Professional.

2.4.5 Provide additional hardware, video drivers, serial ports, etc., to facilitate all control functions and software requirements specified for the building automation system.

2.4.6 Provide all controller configurations, interface software, and/or plug-ins for all devices applicable. All shall be loaded and functional. Provide all required interface cables required to connect to all networks, routers, controllers, SDs, etc.

2.4.7 Wherever a POT connection point is not accessible in the same room as the device controlled, Contractor shall provide a wireless system, to permit configuration, testing, and operation.

2.4.8 BAS licensing for this POT shall allow unlimited access to all aspects of the any manufacturer's system including system access, workstations, points, programming, database management, graphics etc.

2.4.9 No restrictions shall be placed on the license.

2.4.10 All operator interfaces, programming environment, networking, database management and any other software used by the Contractor to install the system or needed to operate the system to its full capabilities shall be licensed and provided to the Owner.

2.5 UNINTERRUPTABLE POWER SUPPLY

2.5.1 Provide an uninterruptible power supply system (UPS) providing battery backup for each operator workstation, server and peripheral devices.

2.5.1.1 UPS shall protect against blackouts, brownouts, surges, and noise.

2.5.1.2 UPS shall include LAN port and modem line surge protection.

2.5.1.3 UPS shall be sized for a 7-minute full load runtime, 23-minute ½-load runtime, with a typical runtime of up to 60 minutes. Transfer time shall be 2-4 milliseconds.

2.5.1.4 UPS shall provide a 480 Joule suppression rating and current suppression protection for 36,000 Amps and provide 90 percent recharge capability in two to four hours. Suppression response time shall be instantaneous.

2.5.1.5 UPS low voltage switching shall occur when supply voltage is less than 94 Volts. UPS shall be provided with modem surge suppression and LAN port connections.

3 EXECUTION

3.1 INSTALLATION

3.1.1 Installation shall meet or exceed all applicable federal requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

3.1.2 All installation shall be in accordance with manufacturer's published recommendations.

3.1.3 Set up workstations and printers as indicated on the Drawings. Install all software and verify that the systems are fully operational.

3.1.4 No license, software component, key or any piece of information required for installing, configuring, operating, diagnosing and maintaining the system shall be withheld from the Owner.

3.1.5 Install electronic control system Operation and Maintenance Manuals, programming guides, network configuration tools, and control Shop Drawings etc. on each OWS and CSS. Provide interface or shortcuts to guide user to the appropriate information.

3.1.6 Set up portable operator terminal and configure it as the remote workstation. Install all software and verify that the system is operational.

END OF SECTION

Project Name: *SSHA YOUTH SHELTER*
Project No.: *2023-0233*
Section Name: ***Field Panels***
Section No.: ***25 14 00***
Date: *April 22, 2024*

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1 **GENERAL**

1.1 GENERAL

1.1.1 Sections 20 00 00 and 25 00 00 – General Requirements shall apply to and govern this Section.

1.2 SCOPE OF WORK

1.2.1 Provide all labour, materials, tools, equipment, training, commissioning and certification required to complete the work as shown on the Drawings and specified in this Section, including:

1.2.1.1 Application Nodes (ANs)

1.2.1.2 Application Specific Controllers (ASCs)

1.2.2 Furnish and install DDC Control units and/or Smart Devices required to support specified building automation system functions.

2 **PRODUCTS**

2.1 GENERAL

2.1.1 All materials shall meet or exceed all applicable referenced standards, federal requirements, and conform to codes and ordinances of authorities having jurisdiction.

2.2 CONTROLLERS – APPLICATION NODES (AN)

2.2.1 Controls AN shall provide both standalone and networked direct digital control of mechanical and electrical building systems as required by the Specifications. The primary AN shall support a minimum of [2,000] field points together with all associated features, sequences, schedules, applications as required for fully functional distributed processing operations.

2.2.2 A dedicated AN shall be configured and provided for each building.

2.2.3 Each AN shall retain program, control algorithms, and setpoint information for at least 72 hours in the event of a power failure and shall return to normal operation upon stable restoration of normal line power.

2.2.4 Each AN shall monitor and report its communication status to the Controls Systems Application. The Controls Systems shall provide a system advisory upon communication failure and restoration.

2.2.5 Provide a means to prevent unauthorized personnel from accessing setpoint adjustments and equipment control definitions at the AN.

2.2.6 The AN shall provide the functionality to download and upload configuration data, both locally at the AN and via the Controls Application networks.

2.2.7 The AN shall perform the functional monitoring of all Controls Application variables, both from real hardware points, software variables, and controller parameters such as setpoints.

2.2.8 The primary AN shall manage and direct all information traffic on the Tier 1 network, between the Tier 1 and Tier 2 networks and to the Server(s).

2.2.9 All AN on the Tier 1 network shall be equipped with all software and functionality necessary to operate the complete user interface, including graphics, via a Browser connected to the Node on the network or directly via a local port on the AN.

2.2.10 The AN shall be capable of direct connection to multiple field busses using different protocols simultaneously as indicated below. Should the AN not support multiple field busses then install multiple AN in parallel to achieve this functionality.

2.2.10.1 An RS-485 serial field bus such as MSTP or the manufacturer's open field bus.

2.2.10.2 A LON field bus for supervision and control of LON based controllers that conform to the Lon Talk standard.

2.2.11 The AN shall integrate data from both field busses into a common and conformal object structure. Data from both field busses shall appear in common displays throughout the Operator Interface in the same format. Conformal formatting shall be provided for each type of data not dependent on the type of field bus from which the data originated.

2.2.12 The AN shall be designed, packaged, installed, programmed and commissioned in consideration of their specific service and prevailing operating conditions. They shall be proven standard product of their original manufacturer and not a custom product for this Project.

2.2.13 A failure at an AN shall not cause failures or non-normal operation

at any other system AN other than the possible loss of active real-time information from the failed AN.

2.2.14 Ancillary AN equipment, including interfaces and power supplies, shall not be operated at more than 80% of their rated service capacity.

2.2.15 Each AN shall report its communication status to the Application. The Application shall provide a system advisory upon communication failure and restoration.

2.2.16 The AN shall incorporate the ability to download and upload configuration data, both locally at the AN and via the Application communications network.

2.3 APPLICATION SPECIFIC CONTROLLERS (ASCS)

2.3.1 Each ASC shall be a microprocessor-based, multi-tasking, real-time digital control processor. Each ASC shall operate as a stand-alone controller capable of performing its specified control sequences.

2.3.2 ASCs shall support all the necessary point inputs and outputs to perform the specified control sequences in a totally stand-alone fashion.

2.3.3 ASCs shall have a library of control processes to perform the sequence of operation specified in the "Execution" portion of this specification. Control processes shall include:

2.3.3.1 Two Position Control

2.3.3.2 Proportional, Integral, plus Derivative Control

2.3.3.3 Industry standard VAV terminal box control process

2.3.3.4 Industry standard fan coil control process

2.3.3.5 Industry standard heat pump control process

2.3.3.6 Industry standard AC system control process

2.3.3.7 Industry standard AHU system control process

2.3.4 Each ASC shall have sufficient memory to support its own operating system and databases, including control processes, energy management applications, operator I/O and local alarm

management.

2.3.5 Each ASC shall perform its own limit and status monitoring and analysis to maximize network performance by reducing unnecessary communications.

2.3.6 Powerfail Protection

2.3.6.1 All controller setpoints, proportional bands, control algorithms, and any other programmable parameters shall be stored such that a power failure of any duration does not necessitate reprogramming the ASC.

2.3.6.2 All controller memory containing program configuration and control parameters shall be either non-volatile EEPROM/EPROM memory or shall be provided with battery back-up sufficient to sustain the contents of RAM memory for a minimum of one (1) year. Alternatively, provide 72-hour battery backup for program & data memory.

2.3.7 Configuration and Download

2.3.7.1 The ASCs shall have the capability of receiving configuration and program loading by all of the following:

2.3.7.1.1 Locally, via a direct portable laptop service tool;

2.3.7.1.2 Over the network, from the portable laptop service tool;

2.3.7.1.3 From the Operator Workstation, via the communication networks.

3 EXECUTION

3.1 PREPARATION

3.1.1 Examine areas and conditions under which control systems are to be installed. Do not proceed with the Work until unsatisfactory conditions have been corrected in manner acceptable to the BAS Contractor.

3.2 INSTALLATION

3.2.1 Installation shall meet or exceed all applicable federal requirements, referenced standards, and conform to codes and ordinances of authorities having jurisdiction.

3.2.2 All installation shall be in accordance with manufacturer's

published recommendations.

3.2.3 All equipment installed shall be mechanically stable and, as necessary, fixed to wall or floor. Anti-vibration mounts to be provided, if required, for the proper isolation of equipment.

3.2.4 Install equipment to allow for easy maintenance access. Ensure equipment does not interfere in any way with access to adjacent equipment and personal traffic in the surrounding space.

3.2.5 Install equipment in locations providing ventilation and ambient conditions for its specified function.

3.3 CONTROLLER QUALITY AND LOCATION

3.3.1 Digital Control Stations (DCS) are referenced to indicate allocation of points to each DCS and DCS location. Digital control stations shall consist of one or multiple controllers to meet requirements of the Division 25 Specification Sections.

3.3.2 Where a DCS is referenced, the BAS Contractor shall provide at least one (1) controller, and additional controllers as required, in sufficient quantity to meet the requirements of the Division 25 Specification Sections. Restrictions in applying controllers are specified under this Section. The BAS Contractor shall extend power to the DCS from an acceptable power panel. If the BAS supplier wishes to further distribute panels to other locations, the BAS Contractor is responsible for extending power to that location also. Furthermore, the BAS Contractor is responsible for ensuring adequate locations for the panels that do not interfere with other requirements of the Project and maintain adequate clearance for maintenance access.

3.3.3 The BAS Contractor shall locate DCS's as referenced in the Contract Documents. It is the BAS Contractor's responsibility to provide enough controllers to ensure a completely functioning system, according to the point list and sequence of operations.

3.3.4 The BAS Contractor shall provide a minimum of the following:

3.3.4.1 One DCS (including at least one controller) in each chilled water/hot water plant mechanical room

3.3.4.2 One DCS (including at least one controller) for each air handler located in applicable mechanical room

3.3.4.3 One DCS (including at least one controller) for each critical fan system

3.3.4.4 One DCS (including at least one controller) for each pumping system

3.3.4.5 One DCS (including at least one controller) for each steam pressure reducing station

3.3.4.6 One controller for each piece of terminal equipment located at the equipment.

3.4 SURGE PROTECTION

3.4.1 The BAS Contractor shall furnish and install any power supply surge protection, filters, etc. as necessary for proper operation and protection of all BCs, AAC/ASCS, routers, gateways, and other hardware and interface devices. All equipment shall be capable of handling voltage variations 10 percent above or below measured nominal value, with no effect on hardware, software, communications, and data storage.

3.5 CONTROL POWER SOURCE AND SUPPLY

3.5.1 The BAS Contractor shall extend all power source wiring required for operation of all equipment and devices provided under this Section.

3.5.2 General requirements for obtaining power include the following:

3.5.2.1 In the case where additional power is required, obtain power from a source that feeds the equipment being controlled such that both the control component and the equipment are powered from the same panel. Where equipment is powered from a 600V source, obtain power from the electrically most proximate 120V source fed from a common origin.

3.5.2.2 Where control equipment is located inside a new equipment enclosure, coordinate with the equipment manufacturer and feed the control with the same source as the equipment. If the equipment's control transformer is large enough and is the correct voltage to supply the controls, it may be used. If the equipment's control transformer is not large enough or of the correct voltage to supply the controls, provide separate transformer

3.5.2.3 Where a controller controls multiple systems on varying levels of

power reliability (normal, emergency, and/or interruptible), the controller shall be powered by the highest level of reliability served. Furthermore, the controller in that condition shall monitor each power type served to determine so logic can assess whether a failure is due to a power loss and respond appropriately. A three-phase monitor into a digital input shall suffice as power monitoring.

3.6 IDENTIFICATION OF EQUIPMENT

3.6.1 Identify each piece of equipment, including sensors, controlled devices, and control panels, with a nameplate identifying the equipment and functions with a letter and number designation.

3.6.2 Nameplates shall be minimum size 75mm x 25mm (3" x 1") and 3.2mm (1/8") thick laminated plastic with black face and white center and 6.4mm (1/4") deep engraved lettering. Nameplates shall be securely attached to the equipment.

3.6.3 Printed nametags are acceptable for cabinet mounted components providing they are securely attached.

END OF SECTION

Project Name: *SSHA YOUTH SHELTER*
Project No.: *2023-0233*
Section Name: ***Software and Programming***
Section No.: ***25 15 00***
Date: *April 22, 2024*

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1 GENERAL

1.1 GENERAL

1.1.1 Sections 20 00 00 and 25 00 00 – General Requirements shall apply to and govern this Section.

1.2 SCOPE OF WORK

1.2.1 Provide all labour, including calibration, commissioning, software programming and data base generation, generation of colour graphics and additional work necessary to provide a complete and fully operating system.

1.3 LICENSING

1.3.1 Provide or upgrade all licensing for all software packages at all required workstations. BAS licensing shall allow unlimited simultaneous users for access to all aspects of the system including system access, workstations, points, programming, database management, graphics etc. No restrictions shall be placed on the licensing. All operator interfaces, programming environment, networking, database management, and any other software used by the Contractor to install the system or needed to operate the system to its full capabilities shall be licensed and provided to the Owner.

1.3.2 All software should be available on all Operator Workstations (OWS) provided, and on all Portable Operator Terminals. Hardware and software keys to provide all rights shall be installed on all workstations. At least two (2) sets of compact discs or USB drives shall be provided with backup software for all software provided, so that the Owner may reinstall any software as necessary. Include all licensing for workstation operating systems, and all required third-party software licenses.

1.3.3 Provide licensing and original software copies for each OWS.

1.3.4 Provide licensing and original software copies for each remote graphic workstation. Licenses for remote graphic workstations shall allow for access to any Site and shall not be restricted to accessing only the LANs included in this Project.

1.3.5 In the last month of the Warranty Period, upgrade all software and firmware packages to the latest release (version) in effect at the end of the Warranty Period.

2 PRODUCTS

2.1 GENERAL

2.1.1 All materials shall meet or exceed all applicable referenced standards, federal, provincial, and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

2.2 OPERATOR INTERFACES

2.2.1 The Controls Systems Operator Interfaces shall be user friendly, readily understood and shall make maximum use of colours, graphics, icons, embedded images, animation, text based information and data visualization techniques to enhance and simplify the use and understanding of the displays by authorized users at the Operator's Workstation (OWS).

2.2.2 User access shall be protected by a flexible and Owner redefinable software-based password access protection. Password protection shall be multi-level and partitionable to accommodate the varied access requirements of the different user groups to which individual users may be assigned. Provide the means to define unique access privileges for each individual authorized user. Provide the means to on-line manage password access control under the control of a project specific Master Password. Provide an audit trail of all user activity on the Controls Systems including all actions and changes.

2.2.3 The Operator Interface shall incorporate comprehensive support for functions including, but not necessarily limited to, the following:

2.2.3.1 User access for selective information retrieval and control command execution.

2.2.3.2 Monitoring and reporting.

2.2.3.3 Alarm and non-normal condition annunciation.

2.2.3.4 Selective operator override and other control actions.

2.2.3.5 Information archiving, manipulation, formatting, display, and reporting.

2.2.3.6 Controls Systems internal performance supervision and diagnostics.

2.2.3.7 On-line access to user HELP menus.

2.2.3.8 On-line access to current as-built records and documentation. At minimum, one (1) copy of all record documentation shall be stored on a designated OWS or Server and be accessible to the Owner.

2.2.3.9 Means for the controlled re-programming, re-configuration of systems operation and for the manipulation of database information in compliance with the prevailing codes, approvals, and regulations for the component applications and elements.

2.2.3.10 Means to archive all Controls Systems Contract Project specific configuration databases, software programs, and other pertinent operational data such that any component of the software and project specific operational databases may be reloaded on Site from archived data.

2.2.3.11 Provide on-line reports and displays making maximized use of simple English language descriptions and readily understood acronyms, abbreviations, icons and the like to assist user understanding and interpretation. All text naming conventions shall be consistent in their use and application throughout the Controls Systems.

2.3 OPERATOR WORKSTATIONS

2.3.1 The Operator Interface provided shall include the functionality to selectively combine data and information from any system element or component in the Controls Systems Application on a single Browser window display panel at the Operator's option. This shall include both current information and historical data stored on the Server.

2.3.2 Each Controls Systems Application fixed and portable OWS shall be on-line configurable for specific functionalities and associated groups of system points and elements.

2.3.3 Navigation Trees

2.3.3.1 Provide the capability to display multiple navigation trees that aid the operator in navigating throughout all systems and points connected. At minimum, provide a tree that identifies all systems on the Controls Systems networks.

2.3.3.2 Provide the capability for the Operator to add custom trees. The Operator shall be able to define any logical grouping of systems or points and arrange them on the tree in any selected order. Provide the capability to nest groups within other groups. Provide at

minimum for five levels of nesting.

2.3.3.3 The navigation trees shall be “dockable” to other displays in the Operator interface including graphic displays. The trees shall appear as part of the display and may be individually detached and minimized to the Windows task bar or closed. Provide for a single keystroke to reattach the navigation tree to a primary display.

2.3.4 Divisible Display Windows

2.3.4.1 Provide for the operator to divide the display area within a single Browser window into multiple display panels. The content of each display panel can be any of the standard summaries and graphics provided in the Controls Systems Application.

2.3.4.2 Provide each display panel with minimize, maximize, and close icons.

2.3.5 Alarms

2.3.5.1 Alarms shall be routed directly from primary Controls Systems Application Nodes to OWS and Server. Provide for specific alarms from specific points to be routed to selectable OWS and Server. The alarm management portion of the Controls Systems software shall, at minimum, provide the following functions:

2.3.5.2 Log date and time of alarm occurrence.

2.3.5.3 Generate a “Pop-Up” window on the Browser display panel, with audible alarm, informing the Operator that an alarm has been received.

2.3.5.4 Allow an Operator, with the appropriate password, to acknowledge, temporarily silence or cancel an alarm.

2.3.5.5 Provide an audit trail on hard drive for alarms by recording user acknowledgement, deletion, or cancelling of an alarm. The audit trail shall include the ID of the user, the alarm, the action taken on the alarm and a time/date stamp.

2.3.5.6 Provide the ability to direct alarms to an e-mail address or alphanumeric pager. This must be provided in addition to the pop-up window described herein. Controls Systems that use e-mail and pagers as the exclusive means of annunciating alarms are not acceptable.

2.3.5.7 Provide for any attribute of any object in the Controls Systems to

be designated to report as an alarm.

2.3.5.8 The Controls Systems Application shall annunciate systems diagnostic alarms indicating system failures and non-normal operating conditions.

2.3.5.9 The Controls Systems Application shall annunciate controls alarms at minimum as required by Part 3.

2.3.5.10 Provide the on-line means to display alarms within the Browser windows by date/time of occurrence, priority class, point designation, value, or other defined text keywords.

2.3.6 Operator Transaction Archiving

2.3.6.1 Provide the means to automatically archive all Operator activities on the Controls Systems Application and for the recall of same for reporting.

2.3.6.2 Provide the means to sort and report archived activities by Operator, date/time, activity type and system area.

2.3.6.3 Provide access protection to preclude the unauthorized removal or tampering with archived records.

2.3.6.4 Provide management support facilities for the deletion and re-initializing of archived record logs under Master Password control or equal means.

2.3.7 Reports

2.3.7.1 Reports shall be generated and directed to one or more of the following: User interface displays, printers archived at the Owner's defined option. As a minimum, the Controls Systems Application shall provide the following reports:

- All points in the Controls Systems Application.
- All points in a specific Controls Systems.
- All points in a user-defined group of points.
- All points currently in alarm.
- All points locked out.
- All Controls Systems Application schedules.

• All user defined and adjustable variables, schedules, interlocks, diagnostics, systems status reports, and the like.

2.3.7.2 Provide all applicable original manufacturers standard reports for the Controls Systems.

2.3.8 Dynamic Colour Graphics

2.3.8.1 Provide for any number of real-time colour graphic displays shall be able to be generated and displayed in the Controls Systems Application limited only by memory data storage capacity.

2.3.8.2 Graphics shall be based on Scalar Vector Graphic (SVG) technology.

2.3.8.3 Values of real-time attributes displayed on the graphics shall be dynamic and updated on the displays.

2.3.8.4 The graphic displays shall be able to display and provide animation based on real-time data that is acquired, derived, or entered into the operating Controls Systems.

2.3.8.5 Provide for the Owner to be able to change values (setpoints) and states in system controlled equipment directly from the graphic display.

2.3.8.6 Provide a graphic editing tool that allows for the creation and editing of graphic files. It shall be possible to edit the graphics directly while they are on line, or at an off line location for later downloading to the AN.

2.3.8.7 Provide a complete user expandable symbol library containing all of the basic symbols used to represent components of a typical system. Implementing these symbols in a graphic shall involve dragging and dropping them from the library to the graphic.

2.3.9 Schedules

2.3.9.1 Provide multiple schedule input forms for automatic time-of-day scheduling and override scheduling of operations. At a minimum, the following spreadsheet types shall be accommodated:

• Weekly schedules.

• Temporary override schedules.

• Special “Only Active If Today Is A Holiday” schedules.

• Monthly schedules.

2.3.9.2 Schedules shall be provided for each group, system, and sub-system in the Controls Systems Application. It shall be possible to include all or any commandable points residing within the Controls Systems in any custom schedule. Each point shall have a unique schedule of operation relative to the system use schedule, allowing for sequential starting and control of equipment within the system. Scheduling and rescheduling of points shall be accomplished easily via the system schedule spreadsheets.

2.3.9.3 Multiple monthly calendars for a 12-month period shall be provided that allow for simplified scheduling of holidays and special days in advance. Holidays and special days shall be user-selected with the pointing device or keyboard, and shall automatically reschedule equipment operation as previously defined on the weekly schedules.

2.3.10 Historical Trending And Data Collection

2.3.10.1 Trend and store point history data for all actual and virtual (software) points and values as required by the Owner.

2.3.10.2 The trend data shall be stored in a manner that allows custom queries and reports using industry-standard software tools.

2.3.10.3 At a minimum, provide the capability to perform statistical functions on the historical database:

• Average.

• Arithmetic mean.

• Maximum/minimum values.

• Range – difference between minimum and maximum values.

• Standard deviation.

• Sum of all values.

• Variance.

2.3.11 Operator Access Security (Combined Password and User ID)

2.3.11.1 Provide for Operator access into the Controls Systems via the use of on-line Owner defined software Password and User Identification (ID) pairs, unique for each Operator and unique throughout the Controls Systems Application, to supplement

standard password access control.

2.3.11.2 Stored password/user ID definitions shall be stored in encrypted formats whether at the Controls Server or at the application node.

2.3.11.3 Password logins shall not be echoed on any screen or printer except during Master Password definition processes. An Operator defining a password shall be required to re-enter to confirm authenticity.

2.3.11.4 Operator access privileges shall be definable in terms of functions and Project areas.

2.3.11.5 As part of the access privileges definition for each user the Owner shall be able to define at minimum the following:

- Access times by day.
- Permanent or temporary, with expiry date, password.
- Number of incorrect access attempts allowed before the password is disabled.
- Whether or not the Operators are able to redefine their own password.
- A field for the Operator's e-mail address.
- A field for the Operator's contact phone number.
- Definition of the Operator's access privilege functionalities including viewing only, full control, selected functions, etc.

2.3.12 Texting/E-mail Notification

2.3.12.1 Provide the means of automatic alphanumeric notification of personnel for Owner defined events.

2.3.12.2 The Controls System shall support both numeric and alphanumeric notification, using Alphanumeric, PET, or IXO Protocol at the Owner's option and/or service by the owners wireless service provider.

2.3.12.3 Users shall have the ability to modify the phone number or message to be displayed on the pager through the Controls System software.

3 **EXECUTION**

3.1 SYSTEM CONFIGURATION

3.1.1 Contractor shall thoroughly and completely configure BAS system software, supplemental software, network communications, CSS, OWS, remote operator workstation, portable operators terminal, printer, and remote communications.

3.2 OPERATOR INTERFACES

3.2.1 Set up workstations and printers as indicated on the Drawings. Install all software and verify that the systems are fully operational.

3.2.2 No license, software component, key or any piece of information required for installing, configuring, operating, diagnosing and maintaining the system shall be withheld from the Owner.

3.2.3 Install electronic control system Operation and Maintenance Manuals, programming guides, network configuration tools, and control Shop Drawings etc. on each OWS and CSS. Provide interface or shortcuts to guide user to the appropriate information.

3.2.4 Set up portable operator terminal and configure it as the remote workstation. Install all software and verify that the system is operational.

3.3 GRAPHIC SCREENS

3.3.1 Floor Plan Screens: The Contract Document Drawings will be made available to the Contractor in AutoCAD format upon request. These Drawings may be used only for developing backgrounds for specified graphic screens; however the Owner does not guarantee the suitability of these Drawings for the Contractor's purpose. Graphic Screens shall be submitted for approval.

3.3.1.1 Provide graphic floor plan screens for each floor of each building.

3.3.1.1.1 Indicate the location of all equipment that is not located on the equipment room screens.

3.3.1.1.2 Indicate the location of temperature sensors associated with each temperature-controlled zone (i.e., VAV terminals, fan-coils, single-zone AHUs, etc.) on the floor plan screens.

3.3.1.1.3 Display the space temperature point adjacent to each temperature sensor symbol. Use a distinct line symbol to demarcate each terminal unit zone boundary. Use distinct colors to demarcate each air handling unit zone.

3.3.1.1.4 Mechanical floor plan Drawings will be made available to the Contractor upon request for the purpose of determining zone boundaries. Indicate room numbers as provided by the Owner.

3.3.1.1.5 Provide a drawing link from each space temperature sensor symbol and equipment symbol shown on the graphic floor plan screens to each corresponding equipment schematic graphic screen.

3.3.1.2 Provide graphic floor plan screens for each mechanical equipment room and a plan screen of the roof. Indicate the location of each item of mechanical equipment. Provide a drawing link from each equipment symbol shown on the graphic plan view screen to each corresponding mechanical system schematic graphic screen.

3.3.1.3 If multiple floor plans are necessary to show all areas, provide a graphic building key plan. Use elevation views and/or plan views as necessary to graphically indicate the location of all of the larger scale floor plans. Link graphic building key plan to larger scale partial floor plans. Provide links from each larger scale graphic floor plan screen to the building key plan and to each of the other graphic floor plan screens.

3.3.1.4 Provide a graphic site plan with links to and from each building plan.

3.3.2 System Schematic Screens: Provide graphic system schematic screen for each HVAC subsystem controlled with each I/O point in the Project appearing on at least one graphic screen. System graphics shall include flow diagrams with status, setpoints, current analog input and output values, operator commands, etc. as applicable. General layout of the system shall be schematically correct. Input/output devices shall be shown in their schematically correct locations. Include appropriate engineering units for each displayed point value. Verbose names (English language descriptors) shall be included for each point on all graphics; this may be accomplished by the use of a pop-up window accessed by selecting the displayed point with the mouse. Indicate all adjustable setpoints on the applicable system schematic graphic screen or, if space does not allow, on a supplemental linked-setpoint screen.

3.3.2.1 Provide graphic screens for each air handling system. Indicate outside air temperature and enthalpy, and mode of operation as applicable (i.e., occupied, unoccupied, warm-up, cool-down). Link screens for air handlers to the heating system and cooling system

graphics. Link screens for supply and exhaust systems if they are not combined onto one screen.

3.3.2.2 Provide a graphic screen for each zone. Provide links to graphic system schematic screens of air handling units that serve the corresponding zone.

3.3.2.3 Provide a cooling system graphic screen showing all points associated with the chillers, cooling towers and pumps. Indicate outside air dry-bulb temperature and calculated wet-bulb temperature. Link screens for chilled water and condenser water systems if they cannot fit onto one cooling plant graphic screen.

3.3.2.4 Provide a heating system graphic screen showing all points associated with the boilers, and pumps. Indicate outside air dry-bulb temperature. Link screens for secondary heating water systems if they cannot fit onto one heating plant graphic screen.

3.3.2.5 Link screens for heating and cooling system graphics to utility history reports showing current and monthly electric uses, demands, peak values, and other pertinent values.

3.3.3 Bar Chart Screens: On each graphic Bar Chart Screen, provide drawing links to the graphic air handling unit schematic screens.

3.3.3.1 Provide a graphic chilled water valve screen showing the analog output signal of all chilled water valves in a bar chart format, with signals expressed as percentage of fully open valve (percentage of full cooling). Indicate the discharge air temperature and setpoint of each air handling unit, cooling system chilled water supply and return temperatures, and the outside air temperature and humidity on this graphic. Provide drawing links between the graphic cooling plant screen and this graphic screen.

3.3.3.2 Provide a graphic heating water valve screen showing the analog output signal of all air handling unit heating water valves in a bar chart format, with signals expressed as percentage of fully open valve (percentage of full heating). Indicate the temperature of the controlled medium (such as AHU discharge air temperature or zone hot water supply temperature) and the associated setpoint and the outside air temperature and humidity. Provide drawing links between the graphic heating plant screen and this graphic screen.

3.3.4 Alarms: Each programmed alarm shall appear on at least one graphic screen. In general, alarms shall be displayed on the

graphic system schematic screen for the system that the alarm is associated with (for example, chiller alarm shall be shown on graphic cooling system schematic screen). For all graphic screens, display analog values that are in a 'high alarm' condition in a red color, 'low alarm' condition in a blue color. Indicate digital values that are in alarm condition in a red color.

END OF SECTION

Project Name: *SSHA YOUTH SHELTER*
Project No.: *2023-0233*
Section Name: ***Communication Devices***
Section No.: ***25 30 00***
Date: *April 22, 2024*

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1 **GENERAL**

1.1 GENERAL

1.1.1 Sections 20 00 00 and 25 00 00 – General Requirements shall apply to and govern this Section.

1.2 SCOPE OF WORK

1.2.1 Provide all labour, materials, tools, equipment, training, commissioning and certification required to complete the work as shown on the Drawings and specified in this Section, including:

1.2.1.1 Local Supervisory LAN Gateways/Routers.

1.2.2 Provide all interface devices and software to provide an integrated system connecting ANs, ASCs and Gateways to the Owner's Wide Area Network (WAN).

2 **PRODUCTS**

2.1 GENERAL

2.1.1 All materials shall meet or exceed all applicable referenced standards, federal requirements, and conform to codes and ordinances of authorities having jurisdiction.

2.2 LOCAL SUPERVISORY LAN GATEWAY/ROUTERS

2.2.1 The Supervisory Gateway shall be a microprocessor-based communications device that acts as a gateway/router between the Supervisory LAN CSSs or OWS and the Primary LAN.

2.2.2 The gateway shall perform information translation between the Primary LAN and the Local Supervisory LAN, which is 100 Mbps Ethernet TCP/IP and shall use BACnet over IP.

2.2.3 The gateway shall contain its own microprocessor, RAM, battery, real-time clock, communication ports, and power supply as specified for an AN in Section 25 14 00 – Field Panels. Each gateway/router shall be mounted in a lockable enclosure unless it is a PC that also serves as an OWS.

2.2.4 The gateway/router shall allow centralized overall system supervision, operator interface, management report generation, alarm annunciation, acquisition of trend data, and communication with control units. It shall allow system operators to perform the

following functions from the CSS, OWSs, and POTs:

2.2.4.1 Configure systems.

2.2.4.2 Monitor and supervise control of all points.

2.2.4.3 Change control setpoints.

2.2.4.4 Override input values.

2.2.4.5 Override output values.

2.2.4.6 Enter programmed start/stop time schedules.

2.2.4.7 View and acknowledge alarms and messages.

2.2.4.8 Receive, store and display trend logs and management reports.

2.2.4.9 Upload/Download programs, databases, etc. as specified.

2.2.5 Upon loss of power to the gateway, the battery shall provide for minimum 100 hour backup of all programs and data in RAM.

2.2.6 The gateway shall be transparent to control functions and shall not be required to control information routing on the Primary LAN.

3 EXECUTION

3.1 PREPARATION

3.1.1 Examine areas and conditions under which control systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Subcontractor responsible for the installation of the BAS under the work of Division 25.

3.2 INSTALLATION

3.2.1 Installation shall meet or exceed all applicable federal, provincial, and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

3.2.2 All installation shall be in accordance with manufacturer's published recommendations.

3.2.3 Provide all interface devices and software to provide an integrated system.

3.2.4 Closely coordinate with the Owner, or designated representative, to establish IP addresses and communications to assure proper operation of the BAS with Owner's WAN.

END OF SECTION

Project Name: *SSHA YOUTH SHELTER*
Project No.: *2023-0233*
Section Name: ***Sequences of Operation***
Section No.: ***25 90 00***
Date: *April 22, 2024*

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3.8 Mechanical Room Ventilation
3.9 Miscellaneous Exhaust Fans
3.10 Unit Heaters
3.11 Miscellaneous Control Points

1 **GENERAL**

1.1 GENERAL

1.1.1 Sections 20 00 00 and 25 00 00 – General Requirements shall apply to and govern this Section.

1.2 SCOPE OF WORK

1.2.1 Refer to the below sequence of operation and associated control schematics for the required number of control loops. Provide all hardware and software necessary to achieve specified control. The sequence of events required for each control loop is described for each system in the control sequence.

1.2.2 Revise the controls shop drawing sequences of operation and create an “As-built or As Functioning Sequence of operation “to be included into the Operations and Maintenance Manuals.

1.2.3 The operators’ workstation to include a Sequence of Operation tab to provide a narrative to the operator regarding equipment / system operation.

2 **PRODUCTS**

Not used.

3 **EXECUTION**

3.1 GENERAL

3.1.1 When motorized equipment is operating, BAS shall totalize runtime in hours for use in maintenance operations.

3.1.2 Where parallel or duplex equipment is provided, BAS shall alternate lead equipment such that runtime is equalized.

3.1.3 Provide adjustable time delay between damper or valve opening and equipment start/stop to avoid operation with a closed system.

3.1.4 Select components to fail safe. Priority in descending order is: life safety, protection of equipment, and comfort.

3.1.5 Schedule operation of systems according to schedules provided by the Owner, and/or optimal start/stop program, and/or Operator keyboard entry.

3.1.6 All low limit thermostats (freezestats), in addition to providing a DI control point, shall be hardwired to the equipment starter to shut down the system upon sensing an air temperature below 2°C (36°F).

3.1.7 Shut down fans upon detection (via BAS sensors) of supply or return air temperatures in excess of 67°C (135°F).

3.1.8 Co-ordinate the provision of duct mounted smoke detectors by Division 26 - Electrical. Detectors shall be hardwired to the respective fan starter to shut the fan down upon detection of smoke.

3.1.9 Co-ordinate fire alarm system fan shutdown where provided via the BAS with Division 26 - Electrical.

3.1.10 Fan systems shall not be started if motorized damper end switch indicates that the damper is not fully open. Alarm abnormal status of damper to BAS and start standby system if applicable.

3.1.11 Unscheduled shutdown of either the supply or return fan shall result in a system shutdown, and an abnormal status alarm condition at the BAS, and start-up of the standby system if applicable.

3.1.12 Static pressure control on all VAV air systems shall be sensed at a position 2/3 downstream of the supply fan. Shut system down if static pressure exceeds 498 Pa (2” w.c.)

3.1.13 Airside free cooling control shall be enabled based on enthalpy control.

3.1.14 All noted setpoints shall be operator-adjustable, and subject to tuning during system commissioning.

3.1.15 Status of motors shall be by current draw unless noted otherwise in the Contract Documents.

3.2 LIFE SAFETY INTERFACE

3.2.1 Division 26 – Electrical shall monitor and control all mechanical systems dedicated to life safety, notably the smoke control systems.

3.2.2 The BAS will control all fan shutdowns on fire alarm based on fire alarm zone annunciation via the fire alarm system.

3.3 GENERAL EXHAUST FAN

3.3.1 General exhaust airflow shall be read by the duct mounted airflow station downstream of the exhaust fan.

3.3.2 Fan shall be started if two (2) or more floors are occupied. Floor occupancy shall be indicated by the respective compartment unit status.

3.3.3 On start-up of the fan, the main exhaust air damper shall open. End switch at damper shall start the fan.

3.3.4 Variable frequency drive shall be modulated to maintain airflow setpoint. Setpoint shall be equal to the supply air volume of the make-up air unit less an amount for building pressurization, initially set at 236 L/s (500 cfm) per floor. Setpoint shall be adjustable. Building pressurization offset shall be adjustable.

3.3.5 Alarm at BAS if the fan status does not match fan command after 2 minutes.

3.3.5.1 Variable frequency drive shall have a minimum frequency setpoint of 20 Hz to prevent overheating of the motor.

3.4 ROOFTOP UNIT

3.4.1 Supply fan start/stop:

3.4.1.1 The supply fan will be started according to the schedule. After the supply fan has been started, the control sequence will be enabled.

3.4.1.2 Zone control:

3.4.1.2.1 The mixed air dampers, gas heating stages, and the dx cooling stages will modulate/cycle in sequence to maintain the zone temperature at setpoint.

3.4.1.2.2 Occupied Cooling Setpoint (adjustable): 22°C (+/- 1°C)

3.4.1.2.3 Occupied Heating Setpoint (adjustable): 20°C (+/- 1°C)

3.4.1.3 Economizer dry bulb switchover:

3.4.1.3.1 When the shared outside air temperature is below the switchover setpoint, the economizer will be enabled. When the shared outside air temperature rises above the switchover setpoint plus a differential, the economizer will be disabled.

3.4.1.4 Night setback/night setup:

3.4.1.4.1 When in “unoccupied” mode, the unit will cycle as necessary to maintain the night setback zone temperature at setpoint. A differential prevents the unit from cycling excessively.

3.4.1.4.2 Unoccupied Cooling Setpoint (adjustable): 25°C (+/- 1°C)

3.4.1.4.3 Unoccupied Heating Setpoint (adjustable): 18°C (+/- 1°C)

3.4.1.5 Shutdown:

3.4.1.5.1 When the unit is shut down by either a stop command or system safety the unit will be set as follows:

Supply fan will be off
Outside air damper will close
Return air damper will open
DX cooling will be off
Gas heat will be off

3.5 SANITARY EXHAUST FAN

3.5.1 Fan shall be scheduled from the BAS to start 30 minutes before any of the compartment units is scheduled to start. During unoccupied hours, the fan will only run if a compartment unit has been started by the VAV zone occupancy override.

3.5.2 On start-up of the fan, the main exhaust air damper shall open. End switch at damper shall start the fan.

3.5.3 Alarm at BAS if the fan status does not match fan command after 2 minutes.

3.6 GAS FIRED MAKE-UP AIR UNIT

3.6.1 Building supply airflow shall be read by the duct mounted airflow station down stream of MUA-1.

3.6.2 Unit off:

3.6.2.1 This mode is initiated by loss of supply fan status. Outdoor damper is closed. Gas burner is off. Humidifier is off. Supply fan is off.

3.6.3 Start-up:

3.6.3.1 Start-up is initiated by time of day schedule integral to the DDC controller. During unoccupied hours, the unit shall be enabled whenever any one compartment unit starts.

3.6.3.2 Outdoor damper opens. End switch on damper shall start the supply fan.

3.6.4 Temperature Control:

3.6.4.1 Supply air temperature setpoint is reset by outdoor air temperature. On a call for heating, the gas burner shall be enabled and modulated to maintain supply air temperature.

3.6.4.2 Setpoint reset shall be adjustable at BAS. Initially set as follows:

3.6.4.2.1 OAT < 4.4°C (40°F), Setpoint = 15.6°C (60°F).

3.6.4.2.2 OAT > 12.8°C (55°F), Setpoint = 12.8°C (55°F).

3.6.4.2.3 4.4°C (40°F) < OAT < 12.8°C (55°F), Setpoint is linear between above values.

3.6.4.3 Manufacturer's safety devices (high limit, air proving switch) shall be wired to humidifier to prevent unsafe conditions. The BAS shall monitor duct relative humidity down stream of the humidifier grid to ensure that the supply air humidity level never exceeds 90% RH. Approaching this limit, the BAS shall modulate back the demand signal to the humidifier.

3.6.5 Static Pressure Control:

3.6.5.1 Static pressure sensor shall be located 2/3 of the way down the longest run of supply ductwork. Bypass damper shall modulate to maintain supply air static setpoint. This setpoint shall be set by the air balancer.

3.6.5.2 Alarm at BAS if fan status does not match fan command after 2 minutes.

3.7 <u>ELEVATOR MACHINE ROOM AC UNIT</u>

3.7.1 The elevator machine room unit fan shall run continuously.

3.7.2 The mechanical cooling shall be cycled by switching the fan from low speed to high speed and cycling the DX cooling as required to maintain room setpoint temperature of 23.9°C (75°F).

3.7.3 Monitor the unit for temperature, status, and alarm.

3.8 MECHANICAL ROOM VENTILATION

3.8.1 Through a DDC controller, a space temperature sensor shall sequence the unit heaters, and the supply and exhaust fans to maintain space setpoint temperature according to the following schedule:

- Unit heaters on below 18.9°C (65°F)
- Unit heaters off above 20°C (68°F)
- Supply and exhaust fans on above 23.9°C (75°F)

3.9 MISCELLANEOUS EXHAUST FANS

3.9.1 When exhaust fan is off, close respective damper.

3.9.2 When exhaust fan is activated based on time of day schedule, open damper before starting fan.

3.10 UNIT HEATERS

3.10.1 Unit heaters shall be controlled by line voltage remote reverse acting thermostat. No control valve is required. Set all thermostats at 20°C (68°F). Deadband shall be 1.1°C (2°F). Unit heater shall shut off at 21.1°C (70°F).

3.11 MISCELLANEOUS CONTROL POINTS

3.11.1 Monitor the following additional points via the BAS.

MISCELLANEOUS CONTROL POINTS			
DESCRIPTION	**LOCATION**	**TYPE**	**REMARKS**
Sump Pumps	Sump Pump Control Panel	DI	Alarm High Level (6x)

END OF SECTION

Appendices

Designated Substances and Hazardous Materials Report

ANNUAL SURVEY FOR DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS

Eva Satellite – Youth Centre
25 Canterbury Place
Toronto, Ontario

Presented to:

Sara Reid

City of Toronto
Corporate Services
Facilities Management

Presented By:

ECOH
Project: 16608-B141

August 31, 2016

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1. INTRODUCTION AND REGULATORY REQUIREMENTS

1.1 Introduction and Scope

ECOH Management Inc. (ECOH) was retained by The City of Toronto to conduct a reassessment survey for designated substances and hazardous materials at the Eva Satellite – Youth Centre, located at 25 Canterbury Place in Toronto, Ontario (hereafter referred to as the "facility" or the "project area").

The objective of the survey was to determine the condition of previously identified asbestos-containing materials (ACM), identify and assess the condition of previously-identified designated substances and other hazardous materials, and, if necessary, provide recommendations to assist the City of Toronto in fulfilling requirements to achieve regulatory compliance, as set forth under the Ontario Occupational Health and Safety Act, and enforced by the Ontario Ministry of Labour. This document should be filed as an addendum to the original survey report, which was issued by ECOH in ECOH, 2015.

This designated substances survey report is for management purposes only. It is not intended to be used to establish the presence of designated substances or hazardous materials in building materials prior to demolition or renovation activities. **A pre-renovation/pre-demolition audit of the work area for designated substances and hazardous materials should be conducted prior to any work activities that may disturb building materials potentially containing designated materials or hazardous substances.**

Mr. Steve Bizi of ECOH performed the fieldwork on May 25, 2016.

The following designated substances and hazardous materials were included in the re-assessment, if previously identified in the facility:

- → ***Asbestos***
- → ***Lead***
- → ***Mercury***
- → ***Silica***
- → ***Acrylonitrile***
- → ***Arsenic***
- → ***Mould***
- → ***Benzene***
- → ***Coke Oven Emissions***
- → ***Ethylene Oxide***
- → ***Isocyanates***
- → ***Vinyl Chloride Monomer***
- → ***Polychlorinated Biphenyls (PCB)s***

The following report details the project regulatory requirements, survey and analytical methodologies, findings and recommendations, and survey statement of limitations.

1.2 Regulatory Requirements

Regulatory requirements and guidelines applicable to the designated substances and hazardous materials noted above include, but are not limited to, the following:

- Ontario Occupational Health and Safety Act and applicable Regulations made under the Act including;
  - Designated Substances – Ontario Regulation 490/09, and
  - Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations – Ontario Regulation 278/05.
- Ontario Environmental Protection Act, and applicable regulations made under the Act.

- General – Waste Management – Ontario Regulation 347
- Waste Management – PCB's – Ontario Regulation 362.

- Canadian Environmental Protection Act, 1999 and applicable Regulations made under the Act, including:
  - PCB Regulations (SOR/2008-273), amended Dec 8, 2011.
- Ministry of Labour Guideline, "*Lead on Construction Projects*", dated April 2011,
- Ministry of Labour Guideline, "*Silica on Construction Projects*", dated April 2011.
- Canadian Construction Association, Standard Construction Document CCA 82, 2004; "*Mould Guidelines for the Canadian Construction Industry*",
- Environmental Abatement Council of Ontario (EACO) *Mould Abatement Guidelines*, Ed. 3, 2015.
- Environment Canada Document, *"PCB Identification of Lamp Ballasts Containing PCBs"*, EPS 2/CC/2, dated August 1991.
- Environment Canada Document, "*Handbook on PCBs in Electrical Equipment*" EN 47-310/1988E, dated April 1988.

2. SURVEY METHODOLOGY

2.1 General Approach

To ensure familiarity with the building, and prior to commencing the survey, the surveyor made reference to previous surveys, facility floor plans, and other available documentation. The surveyor looked for the most common applications of building materials made with Designated Substances based on historical applications. The investigation performed was non-intrusive in nature (i.e. did not include demolition of building systems to verify concealed conditions).

Any rooms that could not be accessed during the survey are noted in the Hazardous Materials Inventory Sheet in Appendix I and on project drawings in Appendix V.

2.2 Asbestos Survey Methodology

2.2.1 Asbestos Sampling Strategy and Analytical Methods

Where sampling was required, bulk samples of potentially asbestos-containing materials were collected for analysis. As per the requirements of Ontario Regulation 278/05, multiple samples (ranging from 3 to 7 depending on quantity and type of material) are required to confirm that asbestos is not present in that given material. Only one positive result (i.e. confirmation of the presence of asbestos) is required to classify a material as asbestos-containing. Therefore, ECOH's sampling strategy involves the collection of sufficient numbers of samples to meet regulatory requirements, followed by instructions to the laboratory to cease analysis of all remaining samples within a series when a sample within that series is determined to be asbestos-containing.

Sampling requires a small volume of material to either be removed from a damaged section of suspect material or cut from intact material, which is then repaired by sealing with tape to prevent fibre release. The collected samples are placed in plastic bags, sealed, and shipped to an independent laboratory. A formal chain of custody procedure is maintained between ECOH and the sub-contracted laboratory during sample transport. Samples are analysed following the analytical procedure prescribed by O. Reg. 278/05 U.S. Environmental Protection Agency Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials. June 1993. Although not required by provincial regulation, all laboratories used by ECOH are accredited

under the U.S. National Voluntary Laboratory Accreditation Program (NVLAP) to ensure consistent, accurate and defensible results.

Materials confirmed to be asbestos-containing during any previous assessments of the facility (if applicable) were not re-sampled for this survey. Additionally, samples were not collected of materials that were previously confirmed to be non-asbestos per the requirements of Ontario Regulation 278/05.

With the exception of window caulking and roofing materials, all other potentially asbestos-containing materials (currently recorded as "assumed to contain asbestos") were sampled, unless materials were located at heights exceeding the reach of a surveyor using a 6' step ladder, or were otherwise inaccessible.

Materials assumed or confirmed to contain asbestos in previous years, but not observed during the current survey are retained in the Hazardous Materials Inventory Sheet in Appendix I with a notation that the material was not observed.

2.3 Lead Methodology

Where sampling was required (i.e. where damaged materials were observed), bulk samples of potentially lead-containing materials were collected for analysis by flame atomic absorption spectroscopy. The collected samples were placed in plastic bags, sealed, and shipped to an independent laboratory. A formal chain of custody procedure is maintained between ECOH and the sub-contracted laboratory during sample transport. All laboratories used by ECOH are accredited under the U.S. EPA National Environmental Lead Laboratory Accreditation Program (NLLAP) and/or American Industrial Hygiene Association (AIHA) Environmental Lead Laboratory Accreditation Program (ELLAP) to ensure consistent, accurate and defensible results.

Lead concentrations exceeding 1000ppm (0.1%) are considered to indicate the material is "lead-containing" per City of Toronto policy and applicable guidelines.

2.4 Mould Assessment

The mould assessment of the project area was conducted in accordance with the Canadian Construction Association, Standard Construction Document CCA 82, 2004; "*Mould Guidelines for the Canadian Construction Industry*". Although there are no regulatory requirements or guidelines in Ontario for such an assessment, the preceding protocol has become accepted as the industry standard by most experts, consultants, and the Ontario Ministry of Labour.

2.5 Assessment for PCBs

PCBs in commercial facilities can be present in high concentrations in fluorescent or HID light fixtures, and electrical transformers.

All potential sources of PCBs identified in the Survey for Designated Substances and Hazardous Materials conducted for this facility in 2014 were re-examined. Neither dismantling the lights to investigate the ballasts, nor dismantling the transformers to investigate their interiors, was part of the scope of this survey. Without disassembly, determination of whether light ballasts are PCB-containing is often very difficult. If no labels are present, all such light fixtures are assumed to contain PCB ballasts.

Electrical transformers are not disassembled for safety reasons. Determination of PCB content relies on the comparison of information on labels and nameplates located on the exterior of the transformer with standard PCB Identifier Code literature. Transformers must be assumed to contain PCBs if the results of that comparison do not clearly and specifically indicate the transformer does not contain PCBs.

2.6 Hazardous Materials Survey Inventory

ECOH's surveyor completed a mould, lead and asbestos field data sheet for each room entered. The data sheet contains the room name, a unique room number assigned by the surveyor, the quantity, type and condition of potentially hazardous materials present in the room, and sampling information. The inventory sheet is included as Appendix I.

2.7 Survey of Other Hazardous Materials

Materials or equipment suspected of containing other Designated Substances and/or PCBs are identified by appearance, age and knowledge of historic applications.

3. FINDINGS AND RECOMMENDATIONS

3.1 Asbestos

Assumed ACM identified within the facility includes the following:

- Window Caulking (Non-friable), and
- Roofing Material (Non-friable).

The locations and quantities of materials assumed or confirmed to be asbestos-containing can be found in the hazardous materials inventory sheet, which is included as Appendix I.

Table 1, below, identifies any assumed and/or confirmed ACM observed to be in damaged condition at the time of the reassessment.

TABLE 1
Identified Damaged Asbestos Materials

Location Number	Location Name	Quantity, Type and Condition of Material	Analytical Result
N/A - All Assumed and/or Confirmed ACM Observed to be in Good Condition at the Time of the Reassessment Survey			

Appendix V summarizes the analytical results for all asbestos bulk samples collected during the current survey.

For the purposes of future renovation and/or demolition activities in specific locations within the facility, any building materials not specifically sampled within the renovation project area should be treated as if their asbestos content is not known. Such materials should, therefore, be sampled prior the occurrence of renovation or demolition work.

Additional asbestos-containing materials may be present in areas of the building which were inaccessible at the time of the survey (i.e. above fixed ceilings, behind walls, under flooring, etc.).

3.2 Lead

No potentially lead-containing materials were observed to be damaged during the survey, and, therefore, no lead bulk samples were collected.

No other significant potential sources of lead or lead-containing products were identified during the survey. However, lead may be present in:

- Ceramic tile glazing
- Internal batteries associated with emergency lighting systems,
- Wiring connectors and electric cable sheathing,
- Piping and solder joints on piping, and
- Cast iron pipe joint packing.

3.3 Mould

No mould-affected building materials were observed during the survey.

3.4 Mercury

Mercury is present in minor quantities within the project area in the following forms:

- As a vapour within fluorescent light tubes that are present in the project area,
- As a possible constituent of thermostats, and
- As a possible constituent of paints and adhesives.

3.5 Silica

Free crystalline silica, in the form of common construction sand, is present in all concrete and masonry products within the building.

3.6 Polychlorinated Biphenyls (PCBs)

The following potential sources of Polychlorinated Biphenyls (PCBs) were identified within the facility by ECOH in 2014 (*Survey for Designated Substances and Hazardous Materials* report) and re-evaluated during the current survey. Dismantling lights to investigate ballasts, and/or dismantling transformers to investigate their contents, was not part of the scope of this survey. Therefore, the items listed below must be assumed to contain PCBs, unless specifically stated otherwise:

- Fluorescent light ballasts:
    - Approximately 50 fluorescent light fixtures are present throughout the facility. Ballasts within these fixtures are assumed to contain PCBs.

Additional mechanical equipment or components of mechanical equipment throughout the facility may contain PCBs. These may include, but are not limited to, electrical capacitors and electrical equipment containing capacitors, voltage regulators, switches, re-closers, bushings or electromagnets, cable insulation, heat transfer equipment, hydraulic equipment, vapour diffusion pumps, bridge bearings, and caulking and motor/hydraulic oils. A specific assessment prior to the removal of any mechanical equipment within the facility should be conducted to confirm if PCBs are present within the equipment.

3.7 Other Environmental Considerations

The environmental audit also included an investigation for the following compounds, none of which were found to be present:

- Acrylonitrile
- Arsenic
- Benzene
- Coke Oven Emissions
- Ethylene Oxides
- Isocyanates
- Vinyl Chloride Monomer

Please note: paint, adhesives and plastics present throughout the project area may contain trace amounts of Acrylonitrile, Arsenic, Benzene, Ethylene Oxides, Isocyanates, Lead, Mercury and Vinyl Chloride Monomer. However, none of these materials were observed in a hazardous or unsafe condition, unless noted previously in Section 3.

4. RECOMMENDATIONS

4.1 Asbestos

All assumed and/or confirmed ACM were observed to be in GOOD condition at the time of the reassessment. As such, no corrective actions are recommended at this time.

Ontario Ministry of Labour Regulation 278/05 requires that an Asbestos Management Program (AMP) be implemented as long as asbestos-containing materials are present (or assumed to be present) in a building. The AMP, original survey report and subsequent reassessment reports must be available at the work place, and must identify the type of asbestos, and where asbestos can be found on a room-by-room basis.

NOTE: Interpretation of all sources of asbestos-related information, including but not limited to the original asbestos survey report, asbestos reassessment reports, room-by-room survey data, survey drawings and reports from previous asbestos abatement projects, should be completed by a competent person trained in the historical application of asbestos in building materials, building design and preferably by a person with site-specific knowledge and/or experience.

Information contained within any of the above-noted sources may not relieve the Regulatory responsibility of building Owners, or project Employers/Constructors, to complete a detailed site inspection prior to commencement of a project.

This report should not be used as a substitute for a detailed site inspection to identify asbestos-containing building materials, which must be specifically tailored to the scope and nature of any given project, and completed prior to any maintenance, renovation or demolition work that may cause disturbance to building materials.

4.2 Lead

No potentially damaged lead-containing materials were observed at the time of the reassessment. As such, no corrective actions are required at this time.

Renovation, demolition or general construction work involving the removal of materials containing only trace concentrations of lead (i.e. Concentrations below 0.1% (1000ppm) by dry weight) can be completed without lead specific safety precautions provided that:

a) work does not include 'fume generating activities' (heat producing) such as welding, torching, burning, high temperature cutting, etc.,

b) work does not include dust-generating activities such as grinding, cutting or chemical stripping,

c) dust levels are maintained below $3mg/m^3$, and

d) general health and safety construction procedures are implemented, which would include dust suppression methods, proper respiratory protection (minimum of a 1/2-face respirator) and protective clothing, as is appropriate for the work being completed.

Any work involving the disturbance of building materials assumed to contain lead (e.g. wiring connectors or electric cable sheathing) should be conducted following recommendations detailed

within the Ministry of Labour document *Guideline - Lead on Construction Projects*, dated April 2011.

All lead-containing waste materials must be disposed of following requirements set forth in applicable federal and/or provincial regulations, including Ontario Regulation 347: *General – Waste Management*.

4.3 Mould

No mould growth was observed at the time of the reassessment. As such, no corrective actions are recommended at this time.

4.4 Mercury

The presence of mercury within assembled units (e.g. fluorescent light bulbs and thermostat bulbs) should not be considered a hazard provided that the assembled units remain sealed and intact. Avoid direct skin contact with mercury and avoid inhalation of mercury vapour. If required, dispose of mercury following applicable legislative requirements.

4.5 Silica

Silica-containing building materials are present throughout the facility (e.g. concrete, brick, cement block, etc.). Any work involving the disturbance of materials that may contain silica should be conducted following recommendations detailed in the Ministry of Labour document "*Guideline - Silica on Construction Projects*", dated April 2011.

4.6 Polychlorinated Biphenyls (PCBs)

Fluorescent light ballasts and other mechanical equipment throughout the facility are assumed to contain PCBs, as neither dismantling the lights to investigate the ballasts, nor dismantling the transformers to investigate their contents, was within the scope of this survey.

PCB-containing light ballasts may legally remain in use until December 31, 2025, if they were already in use in the facility on September 5, 2008. However, it is ECOH's general recommendation that PCB ballasts are proactively removed to eliminate the possibility of ballasts rupturing, which can cause the release of high concentrations of PCBs into indoor air for extended periods, and/or result in costly remediation. To determine whether light ballasts contain PCBs, they should be disassembled to observe serial codes and then compared to standard PCB Identifier Code literature. Ballasts with unidentifiable serial codes, or from manufacturers who are not included in the standard PCB Identifier Code literature, or which are not clearly labelled as "PCB Free", or for which no date is clearly visible (ballasts dated 1981 or later do not contain PCBs), must be assumed to contain PCBs.

Disposal of fluorescent light ballasts that contain PCBs must follow Ontario Regulation 347, General –Waste Management, Ontario Regulation 362, Waste Management – PCB's, and the amended PCB Regulations, 2008 established under the Canadian Environmental Protection Act, 1999.

Removal of any other PCB-containing substances or equipment in the facility should follow the amended *PCB Regulations*, 2008, made under the *Canadian Environmental Protection Act, 1999* (CEPA).

4.7 Other Substances

Dust suppression and personal protection procedures should be implemented during the demolition of materials that may contain Acrylonitrile, Arsenic, Benzene, Ethylene Oxides, Isocyanates, and Vinyl Chloride.

5. CORRECTIVE ACTIONS

Corrective actions are not required

6. STATEMENT OF LIMITATIONS

Due to the nature of building construction, some limitations exist as to the possible thoroughness of the designated substance and hazardous materials survey. The field observations, measurements and analysis are considered sufficient in detail and scope to form a reasonable basis for the findings and conclusions presented in this report. The findings and conclusions drawn by ECOH, concerning the designated substance and hazardous materials survey, are limited to the specific scope of work for which ECOH was retained and are based solely on information generated as a result of the specific scope of work authorized by The City of Toronto. The results of the designated substance and hazardous materials survey are limited to visual inspection of areas made accessible to ECOH personnel and information obtained from facility personnel, when obtained.

ECOH warrants that the findings and conclusions contained herein have been made in accordance with generally accepted evaluation methods in the industry and applicable regulations at the time of the performance of the designated substance survey. However, there is no warranty, expressed or implied, that this building survey has uncovered all environmental considerations on the subject site In addition, ECOH cannot guarantee the completeness or accuracy of information supplied by a third party.

This report was prepared by ECOH for The City of Toronto. The material in it reflects ECOH's professional interpretation of information available at the time of report preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

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APPENDIX I

HAZARDOUS MATERIALS INVENTORY SHEET

APPENDIX I - ASBESTOS REASSESSMENT SURVEY FORM

Building Address	25 Canterbury Place	Date(s) of Current Reassessment:	May 25, 2016
Building Name	Eva Satellite - Youth Shelter	Organization completing Asbestos Reassessment:	ECOH

Summary of Findings

Mastic is assumed to be present underneath existing Vinyl Floor Tiles and Vinyl Sheet Flooring throughout the facility. Complete sampling of mastic is recommended prior to any flooring renovations.

Location Number	*Location Name*	*Building System*	*Material Observed*	*Potential Hazardous Material*	*Sample ID*	*Asbestos Type/Content*	*Quantity*	*Condition*	*Notes/Required Action*
0-00	Building Exterior	Roof	Roofing Materials	Asbestos	Not Sampled	**ACM Assumed**	N/A	N/A	
0-00	Building Exterior	Windows	Window Caulking	Asbestos	Not Sampled	**ACM Assumed**	N/A	N/A	
0-01	Gym	Floor	Concrete	N/A	N/A	N/A	N/A	N/A	
0-01	Gym	Wall	Baseboard Mastic 1	Asbestos	15833-B141-ASB-06A	None Detected	N/A	N/A	Beige Sampled During ECOH 2015 Designated Substance Survey
0-01	Gym	Wall	Drywall Joint Compound	Asbestos	15833-B141-ASB-01C	None Detected	N/A	N/A	Sampled During ECOH 2015 Designated Substance Survey
0-01	Gym	Wall	Caulking 1	Asbestos	15833-B141-ASB-08B-C	None Detected	N/A	N/A	Light Grey Sampled During ECOH 2015 Designated Substance Survey
0-01	Gym	Wall	Caulking 2	Asbestos	15833-B141-ASB-09A-C	None Detected	N/A	N/A	White Sampled During ECOH 2015 Designated Substance Survey
0-01	Gym	Ceiling	Drywall Joint Compound	Asbestos	15833-B141-ASB-02C	None Detected	N/A	N/A	Bulkhead Sampled During ECOH 2015 Designated Substance Survey
0-02	Mechanical Room #1	Floor	Concrete	N/A	N/A	N/A	N/A	N/A	
0-02	Mechanical Room #1	Wall	Drywall Joint Compound	Asbestos	16608-B141-ASB-01A	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
0-02	Mechanical Room #1	Ceiling	Drywall Joint Compound	Asbestos	16608-B141-ASB-02A	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
0-03	Mechanical Room #2	Floor	Concrete	N/A	N/A	N/A	N/A	N/A	
0-03	Mechanical Room #2	Wall	Concrete	N/A	N/A	N/A	N/A	N/A	
0-03	Mechanical Room #2	Wall	Drywall Joint Compound	Asbestos	16608-B141-ASB-01B	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
0-03	Mechanical Room #2	Ceiling	Drywall Joint Compound	Asbestos	16608-B141-ASB-02B	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
0-04	Office # 3	Floor	Vinyl Floor Tile 1	Asbestos	15833-B141-ASB-03B	None Detected	N/A	N/A	18" x 18" Grey with Black & White Flecks Sampled During ECOH 2015 Designated Substance Survey
0-04	Office # 3	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 16608-B141-ASB-01 (None Detected)	N/A	N/A	
0-04	Office # 3	Wall	Caulking 1	Asbestos	15833-B141-ASB-08A	None Detected	N/A	N/A	Light Grey Sampled During ECOH 2015 Designated Substance Survey
0-04	Office # 3	Wall	Concrete	N/A	N/A	N/A	N/A	N/A	
0-04	Office # 3	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-02 (None Detected)	N/A	N/A	
0-05	Office # 2	Floor	Vinyl Floor Tile 1	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-03 (None Detected)	N/A	N/A	18" x 18" Grey with Black & White Flecks
0-05	Office # 2	Wall	Drywall Joint Compound	Asbestos	15833-B141-ASB-01D	None Detected	N/A	N/A	Sampled During ECOH 2015 Designated Substance Survey
0-05	Office # 2	Wall	Caulking 1	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-08 (None Detected)	N/A	N/A	Light Grey
0-05	Office # 2	Wall	Concrete	N/A	N/A	N/A	N/A	N/A	

Location Number	Location Name	Building System	Material Observed	Potential Hazardous Material	Sample ID	Asbestos Type/Content	Quantity	Condition	Notes/Required Action
0-05	Office # 2	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-02 (None Detected)	N/A	N/A	
0-06	Mechanical Room #3	Floor	Concrete	N/A	N/A	N/A	N/A	N/A	
0-06	Mechanical Room #3	Wall	Concrete	N/A	N/A	N/A	N/A	N/A	
0-06	Mechanical Room #3	Wall	Drywall Joint Compound	Asbestos	16608-B141-ASB-01C	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
0-06	Mechanical Room #3	Wall	Firestop	Asbestos	15833-B141-ASB-10C	None Detected	N/A	N/A	Light Grey Sampled During ECOH 2015 Designated Substance Survey
0-06	Mechanical Room #3	Ceiling	Drywall Joint Compound	Asbestos	16608-B141-ASB-02C	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
0-07	Washroom	Floor	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
0-07	Washroom	Wall	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
0-07	Washroom	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-02 (None Detected)	N/A	N/A	
0-08	Medical/First Aid Room	Floor	Vinyl Floor Tile 2	Asbestos	15833-B141-ASB-04A	None Detected	N/A	N/A	12"x12" Dull Brown with Dark Blue & Yellow Dots Sampled During ECOH 2015 Designated Substance Survey
0-08	Medical/First Aid Room	Floor	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	In Washroom
0-08	Medical/First Aid Room	Wall	Baseboard Mastic 1	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-06 (None Detected)	N/A	N/A	Beige
0-08	Medical/First Aid Room	Wall	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
0-08	Medical/First Aid Room	Wall	Concrete	N/A	N/A	N/A	N/A	N/A	
0-08	Medical/First Aid Room	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 16608-B141-ASB-01 (None Detected)	N/A	N/A	
0-08	Medical/First Aid Room	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-02 (None Detected)	N/A	N/A	
0-09	Stairs #1	Floor	Concrete	N/A	N/A	N/A	N/A	N/A	
0-09	Stairs #1	Floor	Vinyl Floor Tile 2	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-04 (None Detected)	N/A	N/A	12"x12" Dull Brown with Dark Blue & Yellow Dots Sampled During ECOH 2015 Designated Substance Survey
0-09	Stairs #1	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 16608-B141-ASB-01 (None Detected)	N/A	N/A	
0-09	Stairs #1	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-02 (None Detected)	N/A	N/A	
0-10	Bulk Storage	Floor	Concrete	N/A	N/A	N/A	N/A	N/A	
0-10	Bulk Storage	Wall	Firestop	Asbestos	15833-B141-ASB-10A-B	None Detected	N/A	N/A	Light Grey Sampled During ECOH 2015 Designated Substance Survey
0-10	Bulk Storage	Wall	Concrete	N/A	N/A	N/A	N/A	N/A	
0-10	Bulk Storage	Wall	Drywall Joint Compound	Asbestos	16608-B141-ASB-01D	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
0-10	Bulk Storage	Ceiling	Drywall Joint Compound	Asbestos	16608-B141-ASB-02D	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey

Location Number	Location Name	Building System	Material Observed	Potential Hazardous Material	Sample ID	Asbestos Type/Content	Quantity	Condition	Notes/Required Action
0-11	Office #1	Floor	Vinyl Floor Tile 1	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-03 (None Detected)	N/A	N/A	18" x 18" Grey with Black & White Flecks
0-11	Office #1	Wall	Baseboard Mastic 2	Asbestos	15833-B141-ASB-07A-B	None Detected	N/A	N/A	Dark Grey Sampled During ECOH 2015 Designated Substance Survey
0-11	Office #1	Wall	Caulking 1	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-08 (None Detected)	N/A	N/A	Light Grey
0-11	Office #1	Wall	Concrete	N/A	N/A	N/A	N/A	N/A	
0-11	Office #1	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-02 (None Detected)	N/A	N/A	
0-12	Board Room	Floor	Vinyl Floor Tile 1	Asbestos	15833-B141-ASB-03A	None Detected	N/A	N/A	18" x 18" Grey with Black & White Flecks Sampled During ECOH 2015 Designated Substance Survey
0-12	Board Room	Wall	Baseboard Mastic 2	Asbestos	15833-B141-ASB-07C	None Detected	N/A	N/A	Dark Grey Sampled During ECOH 2015 Designated Substance Survey
0-12	Board Room	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 16608-B141-ASB-01 (None Detected)	N/A	N/A	
0-12	Board Room	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-02 (None Detected)	N/A	N/A	
0-13	Corridor	Floor	Vinyl Floor Tile 1	Asbestos	15833-B141-ASB-03C	None Detected	N/A	N/A	18" x 18" Grey with Black & White Flecks Sampled During ECOH 2015 Designated Substance Survey
0-13	Corridor	Wall	Drywall Joint Compound	Asbestos	16608-B141-ASB-01E	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
0-13	Corridor	Ceiling	Drywall Joint Compound	Asbestos	15833-B141-ASB-02A 16608-B141-ASB-02E	None Detected	N/A	N/A	Sampled During ECOH 2015 Designated Substance Survey Sampled during ECOH 2016 Reassessment Survey
1-00	Vestibule	Floor	Vinyl Floor Tile 2	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-04 (None Detected)	N/A	N/A	Carpet on Top 12"x12" Dull Brown with Dark Blue & Yellow Dots
1-00	Vestibule	Wall	Drywall Joint Compound	Asbestos	15833-B141-ASB-01A	None Detected	N/A	N/A	Sampled During ECOH 2015 Designated Substance Survey
1-00	Vestibule	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-04 (None Detected)	N/A	N/A	
1-01	Lounge/Eating Area	Floor	Vinyl Floor Tile 2	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-04 (None Detected)	N/A	N/A	Carpet on Top 12"x12" Dull Brown with Dark Blue & Yellow Dots
1-01	Lounge/Eating Area	Wall	Baseboard Mastic 1	Asbestos	15833-B141-ASB-06B	None Detected	N/A	N/A	Beige Sampled During ECOH 2015 Designated Substance Survey
1-01	Lounge/Eating Area	Wall	Drywall Joint Compound	Asbestos	15833-B141-ASB-01B	None Detected	N/A	N/A	Sampled During ECOH 2015 Designated Substance Survey
1-01	Lounge/Eating Area	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-04 (None Detected)	N/A	N/A	
1-02	Reception	Floor	Vinyl Floor Tile 3	Asbestos	15833-B141-ASB-05A-C	None Detected	N/A	N/A	12"x12" Light Brown with Light Flecks Sampled During ECOH 2015 Designated Substance Survey
1-02	Reception	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-03 (None Detected)	N/A	N/A	Wood Panel on Drywall
1-02	Reception	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-04 (None Detected)	N/A	N/A	
1-03	Kitchen	Floor	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
1-03	Kitchen	Wall	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	

Location Number	Location Name	Building System	Material Observed	Potential Hazardous Material	Sample ID	Asbestos Type/Content	Quantity	Condition	Notes/Required Action
1-03	Kitchen	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-03 (None Detected)	N/A	N/A	
1-03	Kitchen	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-04 (None Detected)	N/A	N/A	
1-04	Storage	Floor	Vinyl Floor Tile 2	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-04 (None Detected)	N/A	N/A	12"x12" Dull Brown with Dark Blue & Yellow Dots
1-04	Storage	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-03 (None Detected)	N/A	N/A	
1-04	Storage	Ceiling	Drywall Joint Compound	Asbestos	16608-B141-ASB-04A	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
1-05	Washroom	Floor	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
1-05	Washroom	Wall	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
1-05	Washroom	Ceiling	Drywall Joint Compound	Asbestos	15833-B141-ASB-02G	None Detected	N/A	N/A	Sampled During ECOH 2015 Designated Substance Survey
1-06	Bedroom #1	Floor	Wood	N/A	N/A	N/A	N/A	N/A	Laminate
1-06	Bedroom #1	Wall	Drywall Joint Compound	Asbestos	15833-B141-ASB-01G	None Detected	N/A	N/A	Sampled During ECOH 2015 Designated Substance Survey
1-06	Bedroom #1	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-04 (None Detected)	N/A	N/A	
1-07	Intake Office	Floor	Vinyl Floor Tile 2	Asbestos	15833-B141-ASB-04B	None Detected	N/A	N/A	12"x12" Dull Brown with Dark Blue & Yellow Dots Sampled During ECOH 2015 Designated Substance Survey
1-07	Intake Office	Wall	Drywall Joint Compound	Asbestos	15833-B141-ASB-01E	None Detected	N/A	N/A	Sampled During ECOH 2015 Designated Substance Survey
1-07	Intake Office	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-04 (None Detected)	N/A	N/A	
1-08a	Harm Prevention Office	Floor	Vinyl Floor Tile 2	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-04 (None Detected)	N/A	N/A	12"x12" Dull Brown with Dark Blue & Yellow Dots
1-08a	Harm Prevention Office	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-03 (None Detected)	N/A	N/A	
1-08a	Harm Prevention Office	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-04 (None Detected)	N/A	N/A	
1-08b	Office	Floor	Vinyl Floor Tile 2	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-04 (None Detected)	N/A	N/A	12"x12" Dull Brown with Dark Blue & Yellow Dots
1-08b	Office	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-03 (None Detected)	N/A	N/A	
1-08b	Office	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-04 (None Detected)	N/A	N/A	
1-09	Corridor	Floor	Vinyl Floor Tile 2	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-04 (None Detected)	N/A	N/A	12"x12" Dull Brown with Dark Blue & Yellow Dots
1-09	Corridor	Wall	Baseboard Mastic 1	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-06 (None Detected)	N/A	N/A	Beige

Location Number	Location Name	Building System	Material Observed	Potential Hazardous Material	Sample ID	Asbestos Type/Content	Quantity	Condition	Notes/Required Action
1-09	Corridor	Wall	Drywall Joint Compound	Asbestos	16608-B141-ASB-03A	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
1-09	Corridor	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-04 (None Detected)	N/A	N/A	
1-09a-e	Bedrooms	Floor	Wood	N/A	N/A	N/A	N/A	N/A	Laminate
1-09a-e	Bedrooms	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-03 (None Detected)	N/A	N/A	
1-09a-e	Bedrooms	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-04 (None Detected)	N/A	N/A	
1-10	Stairs #5	Floor	Vinyl Floor Tile 2	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-04 (None Detected)	N/A	N/A	12"x12" Dull Brown with Dark Blue & Yellow Dots
1-10	Stairs #5	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-03 (None Detected)	N/A	N/A	
1-10	Stairs #5	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-04 (None Detected)	N/A	N/A	
1-11a-b	Shower	Floor	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
1-11a-b	Shower	Wall	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
1-11a-b	Shower	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-04 (None Detected)	N/A	N/A	
1-12	Washroom	Floor	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
1-12	Washroom	Wall	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
1-12	Washroom	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-03 (None Detected)	N/A	N/A	
1-12	Washroom	Ceiling	Drywall Joint Compound	Asbestos	16608-B141-ASB-04B	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
1-13	Laundry Room	Floor	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
1-13	Laundry Room	Wall	Drywall Joint Compound	Asbestos	16608-B141-ASB-03B	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
1-13	Laundry Room	Ceiling	Drywall Joint Compound	Asbestos	16608-B141-ASB-04C	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
1-14a-b	Washroom/Shower	Floor	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
1-14a-b	Washroom/Shower	Wall	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
1-14a-b	Washroom/Shower	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-04 (None Detected)	N/A	N/A	
1-15	Washroom	Floor	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
1-15	Washroom	Wall	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	

Location Number	Location Name	Building System	Material Observed	Potential Hazardous Material	Sample ID	Asbestos Type/Content	Quantity	Condition	Notes/Required Action
1-15	Washroom	Ceiling	Drywall Joint Compound	Asbestos	16608-B141-ASB-04D	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
1-16	Corridor	Floor	Vinyl Floor Tile 2	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-04 (None Detected)	N/A	N/A	12"x12" Dull Brown with Dark Blue & Yellow Dots
1-16	Corridor	Wall	Baseboard Mastic 1	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-06 (None Detected)	N/A	N/A	Beige
1-16	Corridor	Wall	Drywall Joint Compound	Asbestos	16608-B141-ASB-03C	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
1-16	Corridor	Ceiling	Drywall Joint Compound	Asbestos	15833-B141-ASB-02F 16608-B141-ASB-04E	None Detected	N/A	N/A	Sampled During ECOH 2015 Designated Substance Survey Sampled during ECOH 2016 Reassessment Survey
1-17	Storage	Floor	N/A	N/A	N/A	N/A	N/A	N/A	**No Access During ECOH 2016 Designated Substance Survey**
1-17	Storage	Wall	N/A	N/A	N/A	N/A	N/A	N/A	
1-17	Storage	Ceiling	N/A	N/A	N/A	N/A	N/A	N/A	
1-18	Stairs #4	Floor	Vinyl Floor Tile 2	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-04 (None Detected)	N/A	N/A	12"x12" Dull Brown with Dark Blue & Yellow Dots
1-18	Stairs #4	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-03 (None Detected)	N/A	N/A	
1-18	Stairs #4	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-02 16608-B141-ASB-04 (None Detected)	N/A	N/A	
2-00	Stairs #2	Floor	Vinyl Floor Tile 2	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-04 (None Detected)	N/A	N/A	12"x12" Dull Brown with Dark Blue & Yellow Dots
2-00	Stairs #2	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-00	Stairs #2	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-01	Bedroom #17	Floor	Wood	N/A	N/A	N/A	N/A	N/A	Laminate
2-01	Bedroom #17	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-01	Bedroom #17	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-02	Bedroom #16	Floor	Wood	N/A	N/A	N/A	N/A	N/A	Laminate
2-02	Bedroom #16	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-02	Bedroom #16	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-03	Washroom	Floor	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
2-03	Washroom	Wall	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	

Location Number	Location Name	Building System	Material Observed	Potential Hazardous Material	Sample ID	Asbestos Type/Content	Quantity	Condition	Notes/Required Action
2-03	Washroom	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-04	Shower	Floor	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
2-04	Shower	Wall	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
2-04	Shower	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-05	Shower	Floor	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
2-05	Shower	Wall	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
2-05	Shower	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-06	Janitor Closet	Floor	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
2-06	Janitor Closet	Wall	Drywall Joint Compound	Asbestos	16608-B141-ASB-05A	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
2-06	Janitor Closet	Ceiling	Drywall Joint Compound	Asbestos	16608-B141-ASB-06A	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
2-07	Laundry Room 1	Floor	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
2-07	Laundry Room 1	Wall	Drywall Joint Compound	Asbestos	16608-B141-ASB-05B	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
2-07	Laundry Room 1	Wall	Paint - Beige	Lead	15833-B141-PB-03A-B	< 90 ppm, < 180 ppm (NEGATIVE - Trace concentrations only)	N/A	N/A	10 SF Beige Paint Peeling Sampled During ECOH 2015 Designated Substance Survey
2-07	Laundry Room 1	Ceiling	Drywall Joint Compound	Asbestos	16608-B141-ASB-06B	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
2-08	Corridor by Bedroom #16	Floor	Vinyl Floor Tile 2	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-04 (None Detected)	N/A	N/A	12"x12" Dull Brown with Dark Blue & Yellow Dots
2-08	Corridor by Bedroom #16	Wall	Baseboard Mastic 1	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-06 (None Detected)	N/A	N/A	Beige
2-08	Corridor by Bedroom #16	Wall	Drywall Joint Compound	Asbestos	16608-B141-ASB-05C	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
2-08	Corridor by Bedroom #16	Ceiling	Drywall Joint Compound	Asbestos	16608-B141-ASB-06C	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
2-09	Program Space	Floor	Vinyl Floor Tile 2	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-04 (None Detected)	N/A	N/A	12"x12" Dull Brown with Dark Blue & Yellow Dots
2-09	Program Space	Wall	Drywall Joint Compound	Asbestos	16608-B141-ASB-05D	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
2-09	Program Space	Wall	Paint - Off-White	Lead	15833-B141-PB-02A-B	< 90 ppm, < 90 ppm (NEGATIVE - Trace concentrations only)	N/A	N/A	Sampled During ECOH 2015 Designated Substance Survey
2-09	Program Space	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-10	Bedroom #7	Floor	Wood	N/A	N/A	N/A	N/A	N/A	Laminate
2-10	Bedroom #7	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	

Location Number	Location Name	Building System	Material Observed	Potential Hazardous Material	Sample ID	Asbestos Type/Content	Quantity	Condition	Notes/Required Action
2-10	Bedroom #7	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-11	Bedroom #8	Floor	Wood	N/A	N/A	N/A	N/A	N/A	Laminate
2-11	Bedroom #8	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-11	Bedroom #8	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-12	Bedroom #9	Floor	Wood	N/A	N/A	N/A	N/A	N/A	Laminate
2-12	Bedroom #9	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-12	Bedroom #9	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-13	Bedroom #10	Floor	Wood	N/A	N/A	N/A	N/A	N/A	Laminate
2-13	Bedroom #10	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-13	Bedroom #10	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-14	Bedroom #11	Floor	Wood	N/A	N/A	N/A	N/A	N/A	Laminate
2-14	Bedroom #11	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-14	Bedroom #11	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-15	Bedroom #12	Floor	Wood	N/A	N/A	N/A	N/A	N/A	Laminate
2-15	Bedroom #12	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-15	Bedroom #12	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-16	Bedroom #13	Floor	Wood	N/A	N/A	N/A	N/A	N/A	Laminate
2-16	Bedroom #13	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-16	Bedroom #13	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-17	Bedroom #14	Floor	Wood	N/A	N/A	N/A	N/A	N/A	Laminate

Location Number	Location Name	Building System	Material Observed	Potential Hazardous Material	Sample ID	Asbestos Type/Content	Quantity	Condition	Notes/Required Action
2-17	Bedroom #14	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-17	Bedroom #14	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-18	Corridor by Bedroom #12	Floor	Vinyl Floor Tile 2	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-04 (None Detected)	N/A	N/A	12"x12" Dull Brown with Dark Blue & Yellow Dots
2-18	Corridor by Bedroom #12	Wall	Baseboard Mastic 1	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-06 (None Detected)	N/A	N/A	Beige
2-18	Corridor by Bedroom #12	Wall	Drywall Joint Compound	Asbestos	16608-B141-ASB-05E	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
2-18	Corridor by Bedroom #12	Ceiling	Drywall Joint Compound	Asbestos	15833-B141-ASB-02E	None Detected	N/A	N/A	Sampled During ECOH 2015 Designated Substance Survey
2-19	Office	Floor	Vinyl Floor Tile 2	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-04 (None Detected)	N/A	N/A	12"x12" Dull Brown with Dark Blue & Yellow Dots
2-19	Office	Wall	Drywall Joint Compound	Asbestos	16608-B141-ASB-05F	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
2-19	Office	Ceiling	Paint - White	Lead	15833-B141-PB-01A	< 90 ppm (NEGATIVE - Trace concentrations only)	N/A	N/A	Sampled During ECOH 2015 Designated Substance Survey
2-19	Office	Ceiling	Drywall Joint Compound	Asbestos	15833-B141-ASB-02B	None Detected	N/A	N/A	2 SF Damaged Sampled During ECOH 2015 Designated Substance Survey
2-20	Laundry Room 2	Floor	Vinyl Floor Tile 2	Asbestos	15833-B141-ASB-04C	None Detected	N/A	N/A	12"x12" Dull Brown with Dark Blue & Yellow Dots Sampled During ECOH 2015 Designated Substance Survey
2-20	Laundry Room 2	Wall	Baseboard Mastic 1	Asbestos	15833-B141-ASB-06C	None Detected	N/A	N/A	Beige Sampled During ECOH 2015 Designated Substance Survey
2-20	Laundry Room 2	Wall	Drywall Joint Compound	Asbestos	15833-B141-ASB-01F	None Detected	N/A	N/A	Sampled During ECOH 2015 Designated Substance Survey
2-20	Laundry Room 2	Ceiling	Drywall Joint Compound	Asbestos	15833-B141-ASB-02D	None Detected	N/A	N/A	Sampled During ECOH 2015 Designated Substance Survey
2-21	Washroom	Floor	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
2-21	Washroom	Wall	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
2-21	Washroom	Ceiling	Drywall Joint Compound	Asbestos	16608-B141-ASB-06D	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
2-22 to 2-27	Showers	Floor	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
2-22 to 2-27	Showers	Wall	Ceramic Tile	Lead	Not Sampled	**Lead Assumed**	N/A	N/A	
2-22 to 2-27	Showers	Ceiling	Paint - White	Lead	15833-B141-PB-01B	< 90 ppm (NEGATIVE - Trace concentrations only)	N/A	N/A	Sampled During ECOH 2015 Designated Substance Survey
2-22 to 2-27	Showers	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-28	Bedroom #15	Floor	Wood	N/A	N/A	N/A	N/A	N/A	Laminate
2-28	Bedroom #15	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	
2-28	Bedroom #15	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 15833-B141-ASB-01 16608-B141-ASB-05 (None Detected)	N/A	N/A	

Location Number	Location Name	Building System	Material Observed	Potential Hazardous Material	Sample ID	Asbestos Type/Content	Quantity	Condition	Notes/Required Action
3-01	Bedroom #2	Floor	Wood	N/A	N/A	N/A	N/A	N/A	Laminate
3-01	Bedroom #2	Wall	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 16608-B141-ASB-07 (None Detected)	N/A	N/A	
3-01	Bedroom #2	Ceiling	Drywall Joint Compound	Asbestos	Not Sampled	Visually consistent with 16608-B141-ASB-07 (None Detected)	N/A	N/A	
3-02	Resource Centre	Floor	Vinyl Floor Tile 2	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-04 (None Detected)	N/A	N/A	12"x12" Dull Brown with Dark Blue & Yellow Dots
3-02	Resource Centre	Wall	Baseboard Mastic 1	Asbestos	Not Sampled	Visually Consistent with 15833-B141-ASB-06 (None Detected)	N/A	N/A	Beige
3-02	Resource Centre	Wall	Drywall Joint Compound	Asbestos	16608-B141-ASB-07A-C	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
3-02	Resource Centre	Ceiling	Drywall Joint Compound	Asbestos	16608-B141-ASB-08A-C	None Detected	N/A	N/A	Sampled during ECOH 2016 Reassessment Survey
Surveyor's Field Notes									

APPENDIX II

RESULTS OF BULK SAMPLE ANALYSES

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L9T 5N4
Tel/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order: 551606681
Customer ID: 55ECOH45
Customer PO: 16608-B141
Project ID: PROJECT# 16608

Attention: STEVE BIZI
ECOH Management, Inc.
75 Courtneypark Drive West
Unit 1
Mississauga, ON L5W 0E3
Project: 16608-B141-25 CANTERBURY PLACE (PROJECT# 16608)

Phone: (647) 923-8725
Fax: (905) 795-2870
Received Date: 06/14/2016 2:56 PM
Analysis Date: 06/20/2016
Collected Date:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
166085-B141-ASB-01A *551606681-0001*	Loc 0-02 - DJC Drywall Joint Compound- Wall	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-01B *551606681-0002*	Loc 0-03 - DJC Drywall Joint Compound- Wall	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-01C *551606681-0003*	Loc 0-06 - DJC Drywall Joint Compound- Wall	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-01D *551606681-0004*	Loc 0-10 - DJC Drywall Joint Compound- Wall	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-01E *551606681-0005*	Loc 0-13 - DJC Drywall Joint Compound- Wall	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-02A *551606681-0006*	Loc 0-02 - DJC Drywall Joint Compound- Ceiling	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-02B *551606681-0007*	Loc 0-03 - DJC Drywall Joint Compound- Ceiling	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-02C *551606681-0008*	Loc 0-06 - DJC Drywall Joint Compound- Ceiling	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-02D *551606681-0009*	Loc 0-07 - DJC Drywall Joint Compound- Ceiling	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-02E *551606681-0010*	Loc 0-10 - DJC Drywall Joint Compound- Ceiling	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-03A *551606681-0011*	Loc 1-09 - DJC Drywall Joint Compound- Wall	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-03B *551606681-0012*	Loc 1-13 - DJC Drywall Joint Compound- Wall	White Fibrous Homogeneous	<1% Glass	100% Non-fibrous (Other)	None Detected
166085-B141-ASB-03C *551606681-0013*	Loc 1-16 - DJC Drywall Joint Compound- Wall	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-04A *551606681-0014*	Loc 1-04 - DJC Drywall Joint Compound- Ceiling	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-04B *551606681-0015*	Loc 1-12 - DJC Drywall Joint Compound- Ceiling	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-04C *551606681-0016*	Loc 1-13 - DJC Drywall Joint Compound- Ceiling	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Initial Report From: 06/21/2016 17:45:00

EMSL Canada Inc.

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EMSL Canada Order: 551606681
Customer ID: 55ECOH45
Customer PO: 16608-B141
Project ID: PROJECT# 16608

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
166085-B141-ASB-04D *551606681-0017*	Loc 1-15 - DJC Drywall Joint Compound- Ceiling	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-04E *551606681-0018*	Loc 1-16 - DJC Drywall Joint Compound- Ceiling	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-05A *551606681-0019*	Loc 2-06 - DJC Drywall Joint Compound- Wall	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-05B *551606681-0020*	Loc 2-07 - DJC Drywall Joint Compound- Wall	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-05C *551606681-0021*	Loc 2-08 - DJC Drywall Joint Compound- Wall	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-05D *551606681-0022*	Loc 2-09 - DJC Drywall Joint Compound- Wall	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-05E *551606681-0023*	Loc 2-18 - DJC Drywall Joint Compound- Wall	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-05F *551606681-0024*	Loc 2-19 - DJC Drywall Joint Compound- Wall	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-06A *551606681-0025*	Loc 2-06 - DJC Drywall Joint Compound- Ceiling	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-06B *551606681-0026*	Loc 2-07 - DJC Drywall Joint Compound- Ceiling	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-06C *551606681-0027*	Loc 2-08 - DJC Drywall Joint Compound- Ceiling	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-06D *551606681-0028*	Loc 2-21 - DJC Drywall Joint Compound- Ceiling	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-07A *551606681-0029*	Loc 3-02 - DJC Drywall Joint Compound- Wall	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-07B *551606681-0030*	Loc 3-02 - DJC Drywall Joint Compound- Wall	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-07C *551606681-0031*	Loc 3-02 - DJC Drywall Joint Compound- Wall	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-08A *551606681-0032*	Loc 3-02 - DJC Drywall Joint Compound- Ceiling	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-08B *551606681-0033*	Loc 3-02 - DJC Drywall Joint Compound- Ceiling	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
166085-B141-ASB-08C *551606681-0034*	Loc 3-02 - DJC Drywall Joint Compound- Ceiling	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Initial Report From: 06/21/2016 17:45:00

EMSL Canada Inc.
2756 Slough Street Mississauga, ON L9T 5N4
Tel/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order:	551606681
Customer ID:	55ECOH45
Customer PO:	16608-B141
Project ID:	PROJECT# 16608

Analyst(s)

Ronald Ng (22)
Romeo Samson (12)

Matthew Davis
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported 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. Interpretation and use of test results are the responsibility of the client. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Samples received in good condition unless otherwise noted. Estimated accuracy, precision and uncertainty data available upon request. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Reporting limit is 1%

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial Report From: 06/21/2016 17:45:00

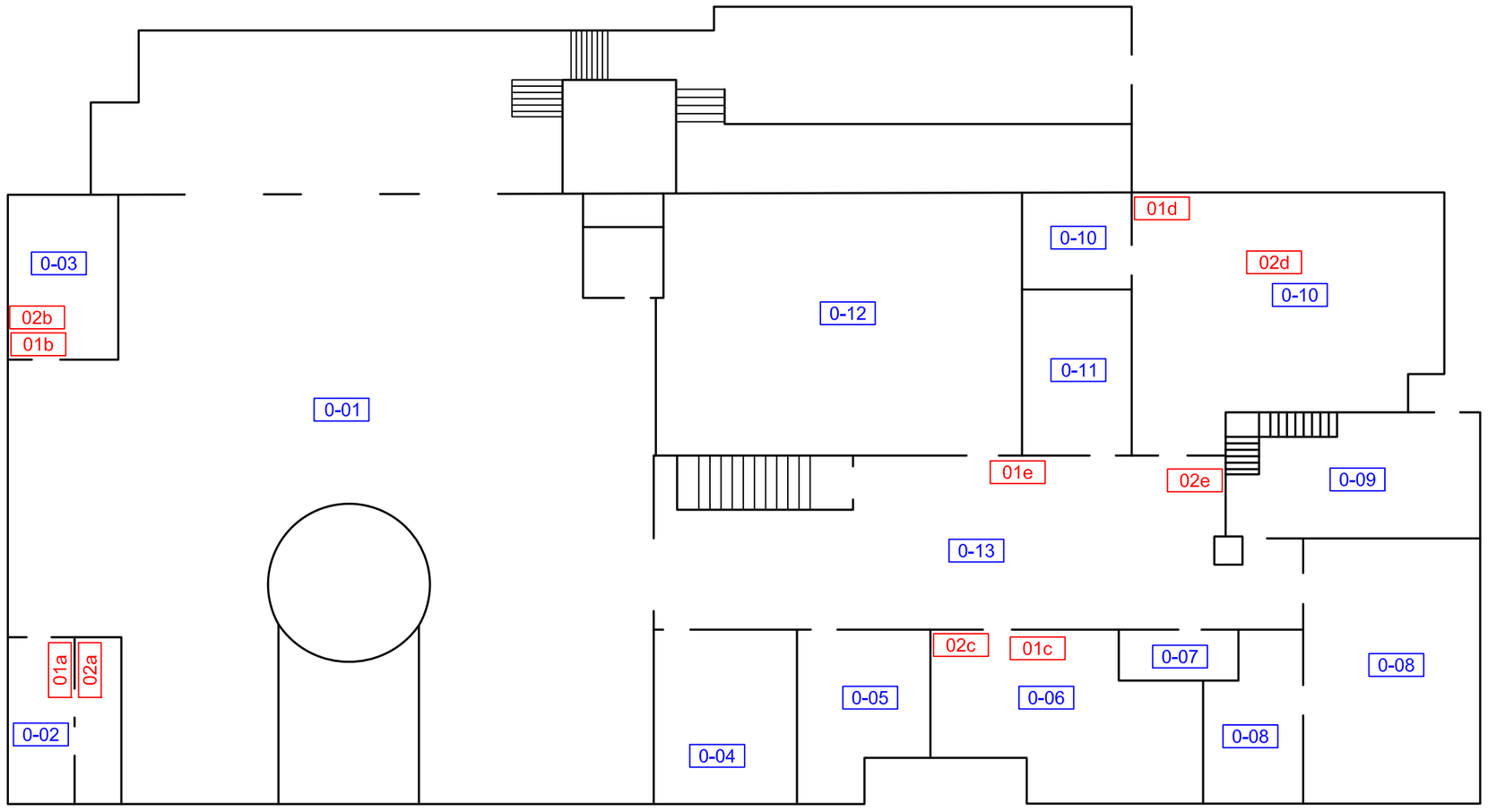
APPENDIX III

VISUALLY IDENTIFIABLE ASBESTOS-CONTAINING MATERIALS INFORMATION SHEET

(NO INFORMATION TO REPORT)

APPENDIX IV

SURVEY DRAWINGS



Legend

- Assumed or Confirmed Asbestos Containing Material
- PCB Transformers
- 1-01 — Location Number
- 01a — Asbestos Sample Location Number
- Pb-01 — Lead Sample Location Number
- NAR — No Access to Room

The drawing does not illustrate locations of drywall joint compound, plaster, texture finish, window caulking or roofing materials, for reasons discussed in Section 6 of the Standard Operating Procedure for Asbestos Reassessment Surveys. Please refer to the Asbestos Reassessment Survey Form in Appendix I for information regarding the locations and asbestos-content of these materials.

Figure 1

LOCATION:

25 Canterbury Place,
Toronto, Ontario

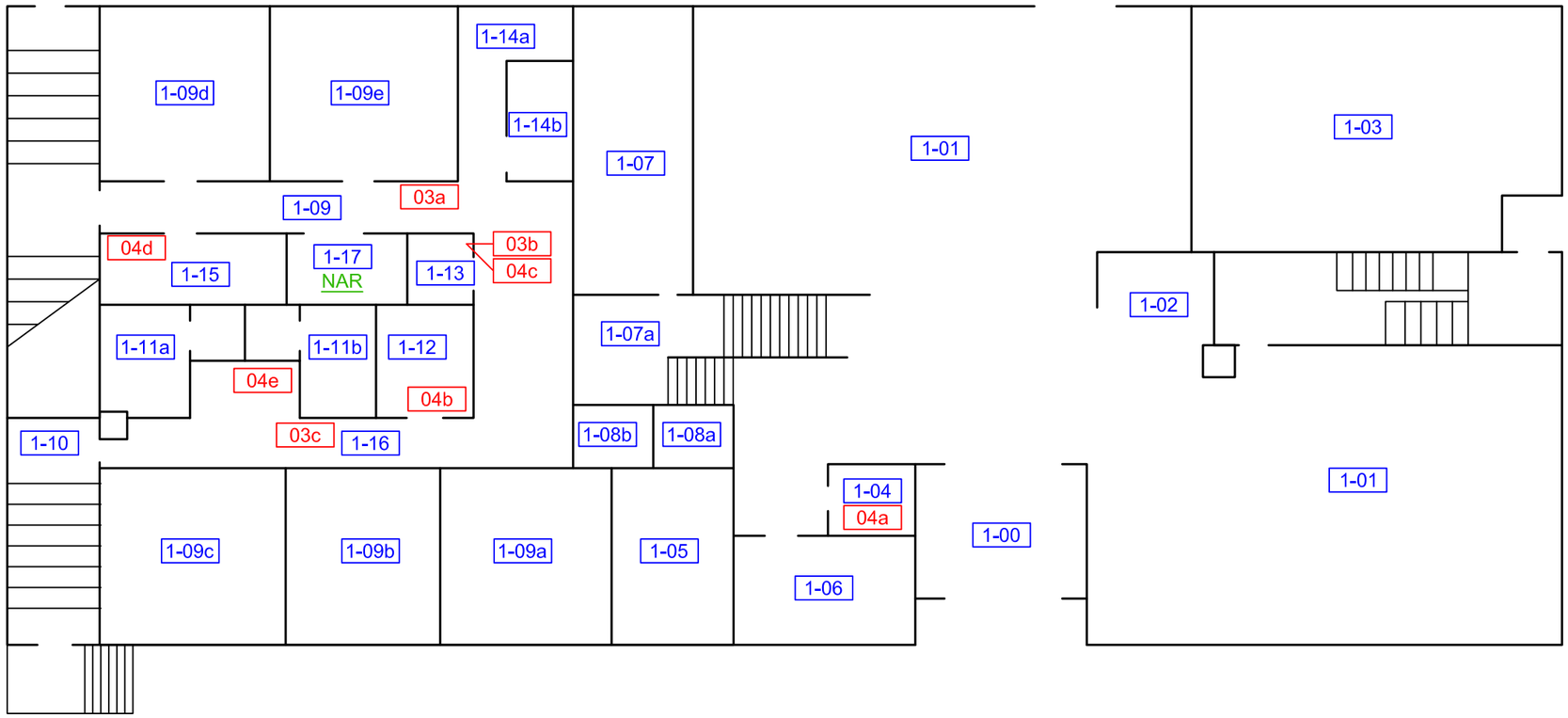
BUILDING NAME:

Eva Satellite - Youth Shelter

Basement Floor Plan

CLIENT: City of Toronto		
PROJECT NUMBER: 16608-B141	DATE: August 2016	DRW BY: CAB
CAD FILE: FIG1-3 P16608-B141 ACM Eva Satellite	SCALE: Not to Scale	CHK BY: CM

TORONTO



Legend

- Assumed or Confirmed Asbestos Containing Material
- PCB Transformers
- 1-01 — Location Number
- 01a — Asbestos Sample Location Number
- Pb-01 — Lead Sample Location Number
- NAR — No Access to Room

The drawing does not illustrate locations of drywall joint compound, plaster, texture finish, window caulking or roofing materials, for reasons discussed in Section 6 of the Standard Operating Procedure for Asbestos Reassessment Surveys. Please refer to the Asbestos Reassessment Survey Form in Appendix I for information regarding the locations and asbestos-content of these materials.

Figure 2

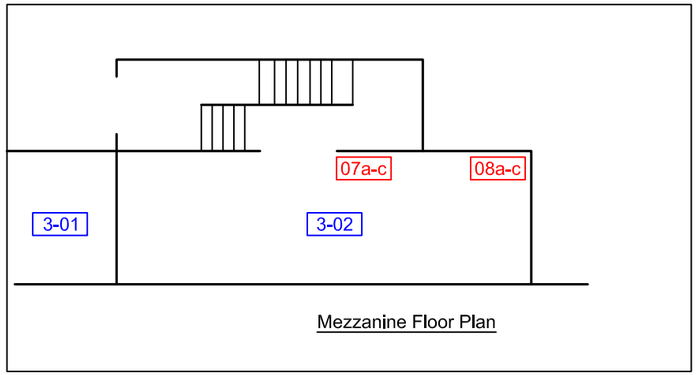
LOCATION:
25 Canterbury Place,
Toronto, Ontario

BUILDING NAME:
Eva Satellite - Youth Shelter

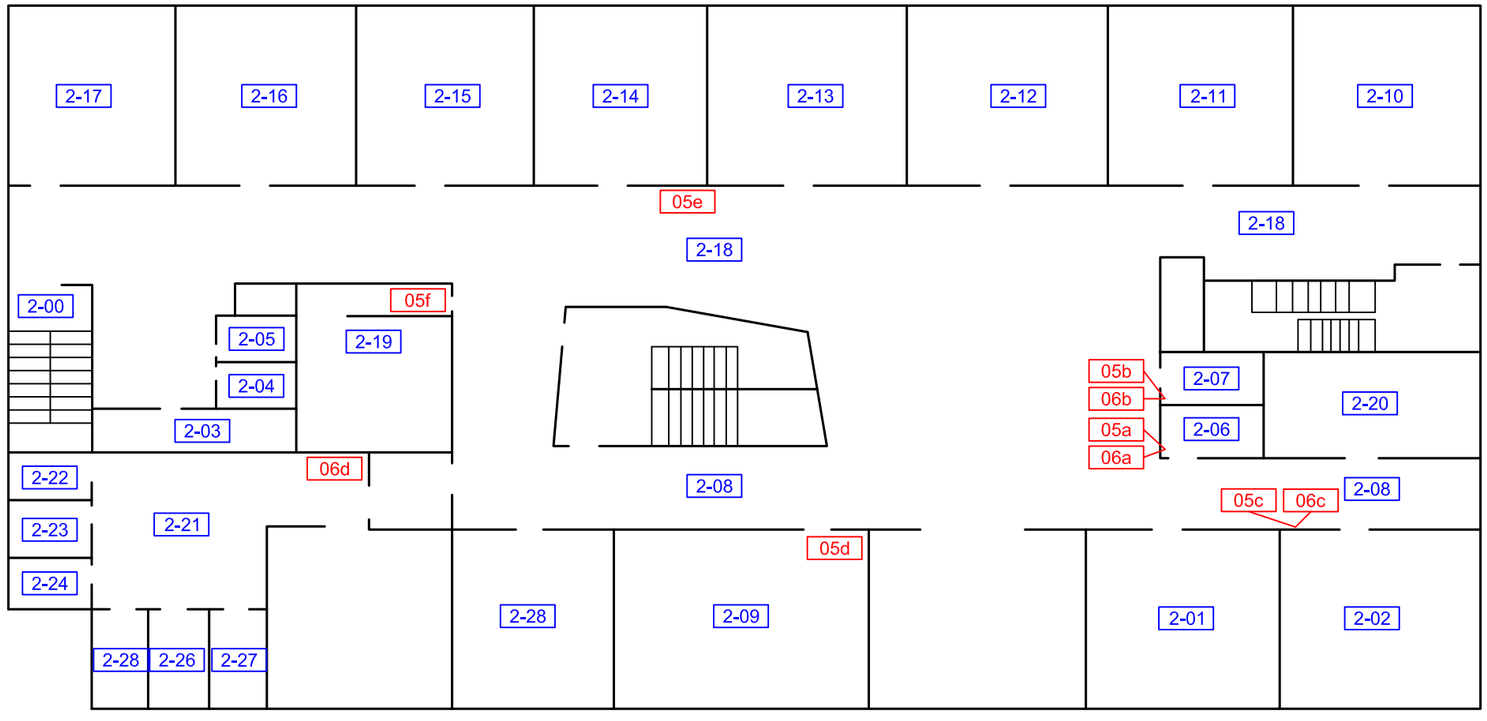
Main Floor Plan

CLIENT: City of Toronto		
PROJECT NUMBER: 16608-B141	DATE: August 2016	DRW BY: CAB
CAD FILE: FIG1-3 P16608-B141 ACM Eva Satellite	SCALE: Not to Scale	CHK BY: CM

TORONTO



Mezzanine Floor Plan



Legend

- Assumed or Confirmed Asbestos Containing Material
- PCB Transformers
- 1-01 — Location Number
- 01a — Asbestos Sample Location Number
- Pb-01 — Lead Sample Location Number
- NAR — No Access to Room

The drawing does not illustrate locations of drywall joint compound, plaster, texture finish, window caulking or roofing materials, for reasons discussed in Section 6 of the Standard Operating Procedure for Asbestos Reassessment Surveys. Please refer to the Asbestos Reassessment Survey Form in Appendix I for information regarding the locations and asbestos-content of these materials.

Figure 3

LOCATION:

25 Canterbury Place,
Toronto, Ontario

BUILDING NAME:

Eva Satellite - Youth Shelter

Second Floor Plan

CLIENT: City of Toronto			
PROJECT NUMBER: 16608-B141	DATE: August 2016	DRW BY: CAB	
CAD FILE: FIG1-3 P16608-B141 ACM Eva Satellite	SCALE: Not to Scale	CHK BY: CM	

TORONTO

APPENDIX V

SUMMARY OF ANALYSIS – ASBESTOS BULK SAMPLES

Summary of Analysis - Asbestos Bulk Samples				
Sample Number	**Location Number**	**Location Name**	**Sample Description**	**Analytical Result**
16608-B141-ASB-01A	0-02	Mechanical Room #1	Drywall Joint Compound (Wall)	None Detected
16608-B141-ASB-01B	0-03	Mechanical Room #2	Drywall Joint Compound (Wall)	None Detected
16608-B141-ASB-01C	0-06	Mechanical Room #3	Drywall Joint Compound (Wall)	None Detected
16608-B141-ASB-01D	0-10	Bulk Storage	Drywall Joint Compound (Wall)	None Detected
16608-B141-ASB-01E	0-13	Corridor	Drywall Joint Compound (Wall)	None Detected
16608-B141-ASB-02A	0-02	Mechanical Room #1	Drywall Joint Compound (Ceiling)	None Detected
16608-B141-ASB-02B	0-03	Mechanical Room #2	Drywall Joint Compound (Ceiling)	None Detected
16608-B141-ASB-02C	0-06	Mechanical Room #3	Drywall Joint Compound (Ceiling)	None Detected
16608-B141-ASB-02D	0-10	Bulk Storage	Drywall Joint Compound (Ceiling)	None Detected
16608-B141-ASB-02E	0-13	Corridor	Drywall Joint Compound (Ceiling)	None Detected
16608-B141-ASB-03A	1-09	Corridor	Drywall Joint Compound (Wall)	None Detected
16608-B141-ASB-03B	1-13	Laundry Room	Drywall Joint Compound (Wall)	None Detected
16608-B141-ASB-03C	1-16	Corridor	Drywall Joint Compound (Wall)	None Detected
16608-B141-ASB-04A	1-04	Storage	Drywall Joint Compound (Ceiling)	None Detected
16608-B141-ASB-04B	1-12	Washroom	Drywall Joint Compound (Ceiling)	None Detected
16608-B141-ASB-04C	1-13	Laundry Room	Drywall Joint Compound (Ceiling)	None Detected
16608-B141-ASB-04D	1-15	Washroom	Drywall Joint Compound (Ceiling)	None Detected
16608-B141-ASB-04E	1-16	Corridor	Drywall Joint Compound (Ceiling)	None Detected

Summary of Analysis - Asbestos Bulk Samples				
Sample Number	**Location Number**	**Location Name**	**Sample Description**	**Analytical Result**
16608-B141-ASB-05A	2-06	Janitor Closet	Drywall Joint Compound (Wall)	None Detected
16608-B141-ASB-05B	2-07	Laundry Room 1	Drywall Joint Compound (Wall)	None Detected
16608-B141-ASB-05C	2-08	Corridor by Bedroom #16	Drywall Joint Compound (Wall)	None Detected
16608-B141-ASB-05D	2-09	Program Space	Drywall Joint Compound (Wall)	None Detected
16608-B141-ASB-05E	2-18	Corridor by Bedroom #12	Drywall Joint Compound (Wall)	None Detected
16608-B141-ASB-05F	2-19	Office	Drywall Joint Compound (Wall)	None Detected
16608-B141-ASB-06A	2-06	Janitor Closet	Drywall Joint Compound (Ceiling)	None Detected
16608-B141-ASB-06B	2-07	Laundry Room 1	Drywall Joint Compound (Ceiling)	None Detected
16608-B141-ASB-06C	2-08	Corridor by Bedroom #16	Drywall Joint Compound (Ceiling)	None Detected
16608-B141-ASB-06D	2-21	Washroom	Drywall Joint Compound (Ceiling)	None Detected
16608-B141-ASB-07A	3-02	Resource Centre	Drywall Joint Compound (Wall)	None Detected
16608-B141-ASB-07B	3-02	Resource Centre	Drywall Joint Compound (Wall)	None Detected
16608-B141-ASB-07C	3-02	Resource Centre	Drywall Joint Compound (Wall)	None Detected
16608-B141-ASB-08A	3-02	Resource Centre	Drywall Joint Compound (Ceiling)	None Detected
16608-B141-ASB-08B	3-02	Resource Centre	Drywall Joint Compound (Ceiling)	None Detected
16608-B141-ASB-08C	3-02	Resource Centre	Drywall Joint Compound (Ceiling)	None Detected
	Pink highlighted rows, if present, indicate asbestos-containing materials			

Assessment Letter for Asbestos Management Program

January 10, 2017

City of Toronto
Facilities Management
Metro Hall, 55 John Street, 2nd Floor
Toronto, ON M5V 3C6

Attention: **Ms. Sara Reid, Environmental Project Manager**

Re: **Asbestos Management Program - 2016**
Eva's Satellite – Youth Shelter
25 Canterbury Place, Toronto, ON
ECOH Project No.: 16608-B141

ECOH Management Inc. (ECOH) was retained by the City of Toronto to conduct a designated substance and hazardous materials assessment at the above-named facility, for the purposes of ensuring regulatory compliance.

During the assessment, all accessible, potentially asbestos-containing materials within the building were sampled and submitted for laboratory analysis, as per the requirements of Ontario Regulation 278/05: *Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations.* **All accessible building materials located within the facility were determined to contain <0.5% asbestos (and therefore are considered not to be "asbestos-containing materials" per O. Reg. 278/05).** As such, ECOH recommends that an annual re-assessment survey for asbestos-containing materials is no longer required. The building asbestos record should continue to be updated should the City of Toronto become aware of new information with respect to asbestos-containing materials in the building.

Please note that materials on the exterior of the facility, on the roof, above accessible heights, hidden above fixed ceilings, below floors or behind walls, or which are otherwise not generally accessible and have not been sampled, may contain asbestos (e.g. window caulking, roofing materials, etc.). A copy of the full assessment report prepared by ECOH in 2016 has been provided to City of Toronto Facilities Management. A copy of the report can be provided by Facilities Management staff, upon request (see contact info below).

Please note that a project-specific Designated Substances Survey report may be required prior to renovation, demolition or other construction work undertaken within the facility. Prior to undertaking such work, facility representatives should contact Ms. Sara Reid (416-392-6966), Ms. Reshma Fazlullah (416.338.1378) or Ms. Meaghan Aldcroft (416-392-9024) at City of Toronto Facilities Management to determine if such a survey is needed.

Sincerely,

ECOH
Environmental Consulting
Occupational Health

Prepared by:

Craig Maunder, M.Sc.
Project Manager

Investigation of Mould Growth

FINAL

Investigation of Mould Growth

Eva's Youth Shelter
25 Canterbury Place, Toronto, Ontario

Prepared for:

City of Toronto
55 John Street, 2nd Floor
Toronto, Ontario, M5V 3C6

February 10, 2023

Pinchin File: 316954

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Issued to:	**City of Toronto**
Issued on:	**February 10, 2023**
Pinchin File:	**316954**
Issuing Office:	**Mississauga, ON**

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1.0 INTRODUCTION AND SCOPE

1.1 Statement of Understanding

Pinchin Ltd. (Pinchin) was retained by the City of Toronto (Client) to conduct an investigation of potential mould growth at Eva's Youth Shelter located at 25 Canterbury Place, Toronto, Ontario. This investigation was conducted to verify and delineate mould growth in the building prior to planned construction.

Pinchin has completed multiple mould and water damage assessments at this site including the following:

- "Investigation of Mould Growth". Pinchin File 113232, dated April 6, 2016
- "Final Investigation of Mould Growth", Pinchin File 235005, dated February 28, 2019
- "Phase 1 Mould Remediation Report ", Pinchin File 235005, dated April 17, 2019
- "Water Damage Remediation", Pinchin File 246811, dated November 5, 2019
- "Investigation of Mould Growth", Pinchin File 296103, dated July 23, 2021

1.2 Scope of Work

Pinchin performed the investigations on December 19 and 21, 2022. The investigations addressed all accessible areas of the building.

The investigation involved the following activities:

- Spot readings of moisture content of building materials.
- Walkthrough site review for water damage or mould growth.
- Collection and analysis of the following (including field blanks).
    - Five mould tape-lift samples
    - Eight bulk samples to test for lead in paint

2.0 METHODOLOGY

2.1 Site Reviews

Pinchin performed a walkthrough site review for indications of suspect mould growth and/or water damage on accessible building materials, paying particular attention to areas where past water damage had been reported.

Where deemed necessary, the investigator assessed concealed conditions by removing baseboards and making intrusive cuts into the wall and ceiling finishes.

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The investigator used a moisture meter to test for elevated moisture levels in building materials.

Pinchin identified suspect hazardous building materials within the area of expected water damage and mould remediation. Pinchin collected paint samples while on-site and will be completing a hazardous building materials assessment on February 14, 2023 to identify all hazardous building materials in the building.

2.2 Test Methods and Criteria

The following table presents the parameters tested in this investigation, recommended limits or interpretation guides, the units of measurement, and the instruments and sampling/analytical methods employed.

Table I – Parameters Tested, Recommended Limits and Instruments or Methods Used

Parameter	Unit of Measurement	Recommended Limit or Guide to Interpretation	Instrumentation or Test Method
Temperature, T	°C	Consider the risk of condensation on cold surfaces to prevent mould growth	Extech® Psychrometer
Relative Humidity, RH	%RH	Maintain long term below 80 %, to prevent mould growth[1]	
Moisture in building materials (Note: detects surface moisture only, may not detect deeper moisture)	% Moisture	Threshold for mould growth:[2] Drywall, 0.7% Wood materials, 17%	Protimeter® Aquant Delmhorst® BD-2100
Mould in bulk, swab, tape-lift samples (DME)	Presence or absence of Mould Growth, to genus, and Light, Moderate or Heavy density [3]	Current guidelines recommend remediation of all interior mould growth, regardless of species	Direct Microscope Examination with staining
Lead in paint	% Lead	Threshold for mandatory precautions set in provincial regulations	Flame Atomic Absorption

1 O.A.G. Adan, R.A. Samson (Editors): *Fundamentals of Mold Growth in Indoor Environments and Strategies for Healthy Living*. Wageningen, The Netherlands: Wageningen Academic Publishers, 2011
2 Macher, J. (Ed): *Bioaerosols, Assessment and Control*. Cincinnati OH: American Conference of Governmental Industrial Hygienists, 1999.
3 The density of mould growth is ranked by the Pinchin Environmental Microbiology Laboratory as: Light (covers less than about 10% of specimen); Moderate (covers 10-20% of specimen); or Heavy (covers more than about 20% of specimen).

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2.3 Laboratory Analysis

The analysis for mould was performed at the Pinchin Environmental Microbiology Laboratory, Mississauga. The Pinchin laboratory is independently accredited to ISO/IEC 17025:2017 for mould and bacteria analysis, by the American Industrial Hygiene Association Laboratory Accreditation Program LLC (AIHA LAP LLC) (Lab ID 158835)[4] and the Quebec government (Lab ID 495).[5]

Analysis for lead in paints or surface coatings is performed at an accredited laboratory in accordance with EPA Method No. 3050B/Method No. 7420; flame atomic absorption.

Pinchin does not perform sampling of materials for silica, mercury, or Polychlorinated Biphenyls (PCBs).

3.0 FINDINGS

3.1 Facility Description

Table II – Facility Description

Item	Details
Construction Date	2000
Number of Floors	2 + Basement, Mezzanine, and Rooftop Mechanical
Exterior Cladding	Brick
Roof	Built-up
Flooring	Vinyl floor tile, ceramic floor tile, vinyl sheet flooring, wood laminate
Interior Walls	Drywall, ceramic tile
Ceilings	Lay-in acoustic ceiling tiles, drywall

3.2 Results of Site Reviews and Testing

This section presents the findings of the walkthrough investigation and any tests for mould or lead. Appendix I presents the drawings. The analytical certificates for the mould tests are given in Appendix II. The results of the lead tests are given in Appendix III.

4 Accredited by the American Industrial Hygiene Association Laboratory Accreditation Program LLC (AIHA LAP LLC) under the Environmental Microbiology Laboratory Accreditation Program (EMLAP), for Bulk, Surface and Air testing for moulds, Escherichia coli, Legionella by the ISO 11731 method and for Legionella pneumophila by qPCR ISO 12869 method (Lab ID 158835).
5 Accredited by the Quebec government under the Programme d'accreditation des laboratoires d'analyses (PALA) program for Air Microbiology – domains 601, 603, 604, 605, 606.

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Table III – Basement

Temperature	13.7 °C	Extent of Mould Growth	80 ft²
Relative Humidity	38.4 %RH	Extent of Water Damage Including Mould Growth	220 ft²

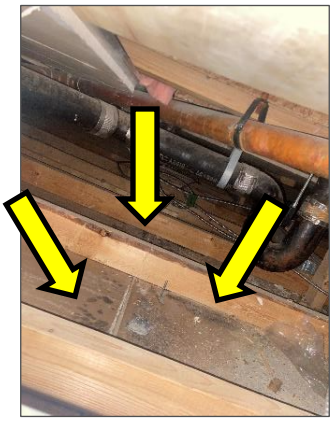

Photo 1 - Mould growth and water stains on the back side of the Gym ceiling.

Photo 2 - Water damaged (stains) drywall ceiling in the Storage Room.

Photo 3 - Water stained fibreglass pipe insulation in the Storage Room.

Moisture Measurements

Material/Location	Results	Material	Results
Drywall walls	0.1% -- DRY		

Observations and Comments

Pinchin identified the following:

- A musty odour throughout the Gym and Storage Room.
- Mould growth on the back side of the drywall ceiling and on the north drywall wall in the Gym. Three inspection cuts were made in the drywall ceiling.
- Water damaged drywall ceiling in the Storage Room.
- Water stains on fibreglass pipe insulation in the Storage Room.

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Table IV – Ground Floor/Mezzanine

Temperature	15.4 °C	Extent of Mould Growth	120 ft²
Relative Humidity	37.1 %RH	Extent of Water Damage Including Mould Growth	>200 ft²

Photo 4 - Mould growth and water damaged ceiling in Stairwell #3.

Photo 5 - Mould growth on a wooden baseboard in Bedroom #2.

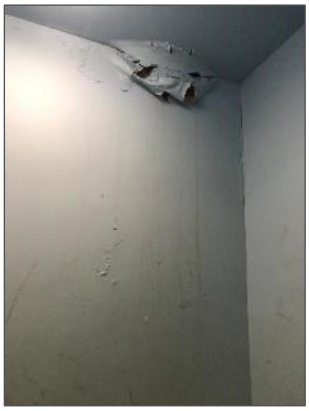

Photo 6 - Water damage on the wall and ceiling in Storage Room #2.

Photo 7 - Water damaged drywall ceiling in Bedroom #2.

Photo 8 - Mould growth on drywall and wood baseboard in Bedroom #2.

Photo 9 - Mould growth on drywall in the hallway outside the Laundry Room.

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Table IV – Ground Floor/Mezzanine

Moisture Measurements			
Material/Location	**Results**	**Material**	**Results**
Drywall wall outside washrooms	0.1 – 10.6% -- WET	Ceramic tiles (Dry reference 212)	187 – 225 -- DRY
Vinyl floor tiles (Dry reference 200)	164 – 217 -- DRY	Drywall walls/Mezzanine Offices	0.02% -- DRY

Sample Log		
Sample Type/ Location	**Sample No.**	**Result**
Mould Tape-Lift/Drywall behind peeling paint in Storage Room #2	TL-03	Confirmed mould growth
Mould Tape-Lift/Hallway drywall behind vinyl baseboard	TL-04	Confirmed mould growth
Lead/ Hallway/Beige paint	LD-02	<0.0065%
Lead/ Bedroom #3/Pink paint	LD-03	<0.0053%
Lead/ Bedroom #6/Purple paint	LD-05	<0.0064%
Lead/ Southwest Office/Yellow paint	LD-06	<0.0066%
Lead/ Storage Room #2/White paint	LD-08	<0.0054%

Observations and Comments

Pinchin identified the following:

- A musty odour throughout the floor.
- Peeling paint in the southwest corner of the Office on the Mezzanine Floor and in Storage Room #2.
- Water damage on windowsills in Bedroom #5 and Washroom #3.
- Water damaged laminate flooring and vinyl floor tiles in Bedrooms #1, #2, #5 and #6, Storage Room #2 and the Café Area.
- Water damaged drywall ceiling in the Lounge, Bedroom #2, Hallway, Shower #2 and Washroom #2.
- Mould growth on drywall ceiling in Stairwell #3 and Storage Room #2.
- Mould growth on wood baseboards throughout the bedrooms, and on drywall walls in Stairwell #2 & 4, Bedroom #2, Storage Room #2 and the hallway.

Pinchin made approximately 16 inspection cuts throughout this floor. Areas of the Kitchen and Laundry Room were inaccessible due to appliances; these areas are indicated on Drawing 2.

Table V – Second Floor

Temperature	13.7 °C	Extent of Mould Growth	>200 ft²
Relative Humidity	36.4 %RH	Extent of Water Damage Including Mould Growth	>500 ft²

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Table V – Second Floor

Photo 10 - Mould growth on drywall behind a wood baseboard in Bedroom #15.

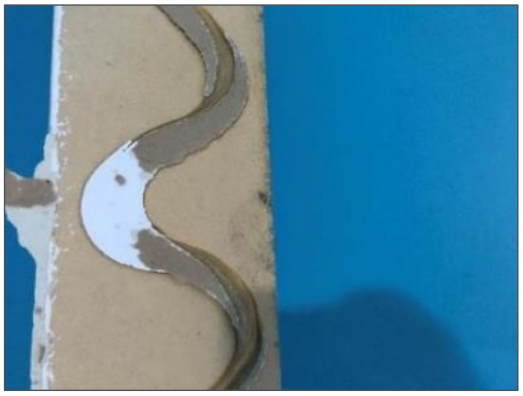

Photo 11 - Mould growth on a wood baseboard in Bedroom #15.

Photo 12 - Lifting and water damaged laminate wood floor in Bedroom #9.

Photo 13 - Mould growth in the hallway outside the washroom.

Photo 14 - Mould growth behind vinyl baseboards in Office #4.

Moisture Measurements

Material/Location	Results	Material	Results
Drywall wall/ Washroom and Stairwell #4	0.1% - 10.1% -- Wet	Vinyl floor tiles (Dry reference 200)	164 – 217 -- Dry

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Table V – Second Floor

Ceramic tiles (Dry reference 212)	187 – 225 -- Dry	Laminate wood flooring (Dry reference 176)	164 – 207 -- DRY

Sample Log

Sample Type/Location	Sample No.	Result
Mould Tape-Lift/ Bedroom #17 (wall cavity behind clean wood baseboard)	TL-01	Confirmed mould growth
Mould Tape-Lift/ Bedroom #15 (wood baseboard bottom edge)	TL-02	Confirmed mould growth
Lead/ Bedroom #13/ Light Blue paint	LD-01	<0.0058%
Lead/ Office/ Orange paint	LD-04	<0.0063%
Lead/ Community Office/ Brown paint	LD-07	<0.0058%

Observations and Comments

Pinchin identified the following:

- Water damaged wood laminate flooring throughout the bedrooms, Office #4, and hallway.
- Bird droppings and dead birds in the Janitor's Closet and Laundry Room.
- Water stains/damage and/or mould growth on the drywall ceiling in the hallway washroom, Bedroom #10 and Stairwell #4.
- Wet drywall walls in Stairwell #4 and the adjacent hallway.
- Mould growth on drywall walls in Bedrooms #15 & 17, the hallway, Stairwell #4, Washroom #2 and Office #4.
- Mould growth on wood baseboards throughout all bedrooms.
- Peeling paint in the Community Office.

Pinchin had previously identified mould growth throughout Washroom #1, and it has not been remediated previously and therefore is still present. Pinchin also previously identified warped ceramic tile flooring throughout Washroom #1 which indicates trapped moisture. Pinchin did not identify any mould growth on the sub-floor through the inspection cut made during this site visit.

Pinchin made 13 inspection cuts and several others were made previously and still present.

Access to the walls in the Washer/Dryer Room, Janitor's Closet and Laundry Room was limited due to appliances as indicated on Drawing 4.

3.3 Summary of Hazardous Materials

Based on sampling, the age of the building and a review of available previous reports, the following is a summary of the designated substances, limited to the materials being impacted by the recommended remediation work.

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3.3.1 *Asbestos*

Ceramic tile thin set is presumed to contain asbestos until further sampling can be completed. A hazardous building materials assessment will be completed on February 14, 2023 to identify any hazardous materials for the building. The thin set will be sampled at that time.

3.3.2 *Lead*

No paints in the remediation work area contain sufficient lead to require special precautions.

Lead may be present in a number of materials which were not assessed and/or sampled. The following materials, where found, should be considered to contain lead.

- Electrical components, including wiring connectors, grounding conductors, and solder
- Solder on pipe connections
- Glazing on ceramic tiles

3.3.3 *Silica*

Crystalline silica is a presumed component of concrete, masonry, mortar, ceramic tiles, grout and plaster.

3.3.4 *Mercury*

Materials that could contain mercury are not impacted by the recommended remediation work.

3.3.5 *Polychlorinated Biphenyls*

Materials that could contain PCBs are not impacted by the recommended remediation work.

4.0 DISCUSSION

4.1 Discussion of Water Damage and Mould Growth

4.1.1 *Basement*

Pinchin identified mould growth in the Gym on wall and ceiling finishes, water damage on drywall ceiling in the Storage Room and water-stained pipe insulation. The cause of the water damaged in the Storage Room is likely related to previous leaks and from previous investigations in the building, it is assumed that the 2nd Floor washroom showers have caused leaks into the Gym; however, it has never been confirmed. Discussion in regard to further investigation and recommendations for repairs can be found in Pinchin's Building Sciences Report, "Limited Building Envelope Condition Assessment", File 317304, dated January 31, 2023.

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4.1.2 Ground Floor / Mezzanine

Pinchin identified water damaged and/or mouldy ceiling and bulkhead finishes in the Lounge, Bedroom 2, Shower #2, Washroom #2, Laundry Room, Stairwell #3, Storage Room #2, and Hallway on the Ground Floor. Pinchin identified water damaged windowsills in Bedroom #5 and Washroom #3 on the Ground Floor. Pinchin identified water damaged flooring in Bedrooms #1, 2, 5 and 6, the Café Area, Lounge, Storage Room #2, Washroom #3 and the Hallway on the Ground Floor. Pinchin identified peeling paint in the Office on the Mezzanine Level and in Storage Room #2 on the Ground Floor. Pinchin identified mould growth on drywall wall finishes in the Hallways, Bedroom #2, Storage Room #2 and Stairwell #4.

Pinchin also identified water damaged and/or mouldy wood baseboards in all bedrooms throughout the Ground Floor. Due to the presence of mould growth on the backside of wooden baseboards, including areas that appear not to have been water damaged, it is recommended by Pinchin that all walls and baseboards in the bedrooms be remediated to a height of four feet.

The Kitchen and Laundry Room had areas that were inaccessible due to the presence of appliances. During renovations, efforts to investigation building material conditions behind the appliances should be considered.

The cause of the mould growth/water damage in the bedrooms is likely from previous water leaks that were not adequately addressed, from miss-use of the spaces and from poor janitorial practices. The mould growth and/or water damage in the hallways, Storage Room #2, Lounge, washrooms and Café Area are also likely from previous plumbing leaks and from poor janitorial practices. From previous investigations in the building, it is assumed that the 2nd Floor washroom showers have caused leaks into Stairwell #3. Discussion in regard to further investigation and recommendations for repairs can be found in Pinchin's Building Sciences Report, "Limited Building Envelope Condition Assessment", File 317304, dated January 31, 2023.

4.1.3 2nd Floor

Pinchin identified water damaged and/or mouldy ceiling and bulkhead finishes in Washroom #1, Stairwell #4, Bedroom #10 and the Hallway. Pinchin identified water damaged flooring in throughout Bedrooms #7-18, Office #4 and the hallways immediately outside the washrooms. Pinchin did not identify any mould growth on the sub-floor, through the inspection cut, and Pinchin did not see any warping or feel any "spongy" like flooring through Washroom #1. The client reported that the ceramic tile in this washroom was replaced sometime between 2016 and 2019. Pinchin identified peeling paint in the Community Office and the hallway outside Bedroom #10. Pinchin identified mouldy drywall finishes and/or wooden baseboards through Bedrooms #7-18, Washroom #2, Stairwell #4, and the Hallway. Pinchin had

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previously identified mould growth throughout Washroom #1, and it has not been remediated previously and therefore is still present.

Pinchin also identified water damaged and/or mouldy wood baseboards in all bedrooms throughout the Ground Floor. Due to the presence of mould growth on the backside of wooden baseboards, including areas that appear not to have been water damaged, it is recommended by Pinchin that all walls and baseboards in the bedrooms be remediated to a height of four feet.

The Washer/Dryer Room, Janitor's Closet and Laundry Room had areas that were inaccessible due to the presence of appliances. During renovations, efforts to investigation building material conditions behind the appliances should be considered.

The cause of the mould growth/water damage in the bedrooms is likely from previous water leaks that were not adequately addressed, from miss-use of the spaces and from poor janitorial practices. The mould growth in the washrooms, Office #4, Stairwell #4, and hallway are also likely from previous water leaks and from poor janitorial practices. The cause of the water damaged/mouldy drywall ceilings in the 2nd Floor hallway, Washroom #1 and Stairwell #4, stairwells may be from previous roof leaks. Further discussion in regard to further investigation and recommendations for repairs can be found in Pinchin's Building Sciences Report, "Limited Building Envelope Condition Assessment", File 317304, dated January 31, 2023.

Bird droppings and dead birds were identified in the Laundry Room and Janitor's Closet. It is believed that the birds came from the HVAC on the rooftop due to exposed ductwork shafts that were observed by Pinchin in each room. Further investigation is recommended and/or the necessary repairs made to ensure birds can not enter. The dead birds should be removed, and these areas cleaned and disinfected as part of this remediation work. The guano contamination found in this investigation should be remediated following Environmental Abatement Council of Canada (EACC) procedures for clean-up of bird and bat droppings.

4.2 Mould Remediation and Site Reviews

Mould growth in buildings can be a risk factor for adverse health effects.[6] The mould growth found in this investigation should be remediated as soon as possible following currently accepted procedures. Pinchin recommends that mould remediation follow the procedures set by the Environmental Abatement Council of Canada (EACC).[7] The work should be performed by a contractor with appropriate training, experience

6 US Environmental Protection Agency: *Mold Remediation in Schools and Commercial Buildings*. US EPA. 2001.
7 Environmental Abatement Council of Canada: *Mould Abatement Guidelines*. Toronto, ON: EACC, 2021.

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and insurance coverage. Ensure that remaining building materials are dry prior to reinstating mould-susceptible finishes, to prevent future mould growth.

4.3 Communication and Interim Risk Management

The findings of this report should be communicated to the occupants as recommended by current mould guidelines, and in workplaces, as mandated by occupational health and safety legislation. The Client should consider any interim risk management actions that would be appropriate under the circumstances, until the mould growth can be remediated. Interim risk management might include isolating an area of the building or relocating persons experiencing adverse health effects or with greater sensitivity to mould.

5.0 RECOMMENDATIONS

Pinchin offers the following recommendations to improve air quality in this building and address any mould growth or other microbial contamination found. Pinchin would be pleased to assist with further investigations indicated by this investigation, make recommendations for remediation contractors, and provide services for the planning and review of the recommended remediation work.

1. Communicate the findings of this report as required.
2. During renovations, efforts to investigation building material conditions behind the appliances should be considered.
3. Make any necessary repairs to the roof prior to re-installation of ceiling finishes on the 2nd Floor.
4. Conduct further investigation in the 2nd Floor Laundry Room and Janitor's Closet to the exposed ductwork. Make repairs to prevent birds from entering and nesting.
5. Arrange for the preparation of a detailed Scope of Work for the mould remediation including any required asbestos precautions and finalize a site review and oversight plan.
6. Using Environmental Abatement Council of Canada (EACC) procedures for the Clean-up of Bird and Bat Droppings, perform the following work:
    a. Remove and dispose of the dead birds.
    b. Remove and dispose of bulk guano. Clean and disinfect impacted surfaces in the Laundry Room and Janitor's Closet.
7. Following Environmental Abatement Council of Canada (EACC) Level 1 mould methods, perform the following, as indicated on the drawings:
    a. Clean then remove all the remaining furniture and contents within the work areas.
    b. Remove and dispose of the water damaged (peeling paint) wall finishes to full height in the Mezzanine Office.

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8. Following Environmental Abatement Council of Canada (EACC) Level 3 mould methods, perform the following, as indicated on the drawings:
    a. Remove and dispose of the water-stained pipe insulation in the Basement Storage Room.
    b. Remove and dispose of the mouldy/water damaged wall finishes (including but not limited to drywall, wood/vinyl baseboard, etc.) to a height of four feet throughout the building with the exception of Washroom #1 and Washroom #2.
    c. Remove and dispose of the water damaged wood laminate flooring and/or damaged vinyl floor tiles throughout the building.
    d. Remove and dispose of the mouldy/impacted drywall ceiling finishes (including drywall bulkheads) to one foot beyond mould and/or water damage.
    e. Remove and dispose of the peeling paint on the wall finishes to full height in Storage Room #2 on the Ground Floor and in the North Hallway on the 2nd Floor.
    f. Remove and dispose of the water damaged drywall on the windowsills in Bedroom #5 and Washroom #3 to one foot beyond any visible water damage or mould growth.
9. Following Environmental Abatement Council of Canada (EACC) Level 3 mould methods in conjunction with O.Reg. 278/05 Type 1 asbestos precautions, perform the following, as indicated on the drawings:
    a. Remove and dispose of the mouldy wall finishes in Washroom #1 and Washroom #2 on the 2nd Floor to a height of four feet.
10. Finalize a site review and testing plan to document the mould remediation. To confirm, Pinchin will perform site reviews at the following stages:
    a. Clean Site Preparation
    b. Post-Remediation Site Review
    c. Post-Remediation Air Sampling

6.0 TERMS AND LIMITATIONS

This work was performed subject to the Terms and Limitations presented or referenced in the proposal for this project. All work will be performed in accordance with the City of Toronto, Blanket Contract #47024791.

Information provided by Pinchin is intended for Client use only. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law. Any use by a third party of reports or documents authored by Pinchin or any reliance by a third party on or decisions made by a third

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party based on the findings described in said documents, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted. No other warranties are implied or expressed.

\\pinchin.com\miss\Job\316000s\0316954.000 CityTor,25Canterbury,Toronto,MLD,IEQ\Deliverables\Final Report\316954 Final Mould Report, 25Canterbury,Toronto, City Tor, Feb 10, 2023.docx

Template: Master Mould Investigation Report, IEQ, August 10, 2022

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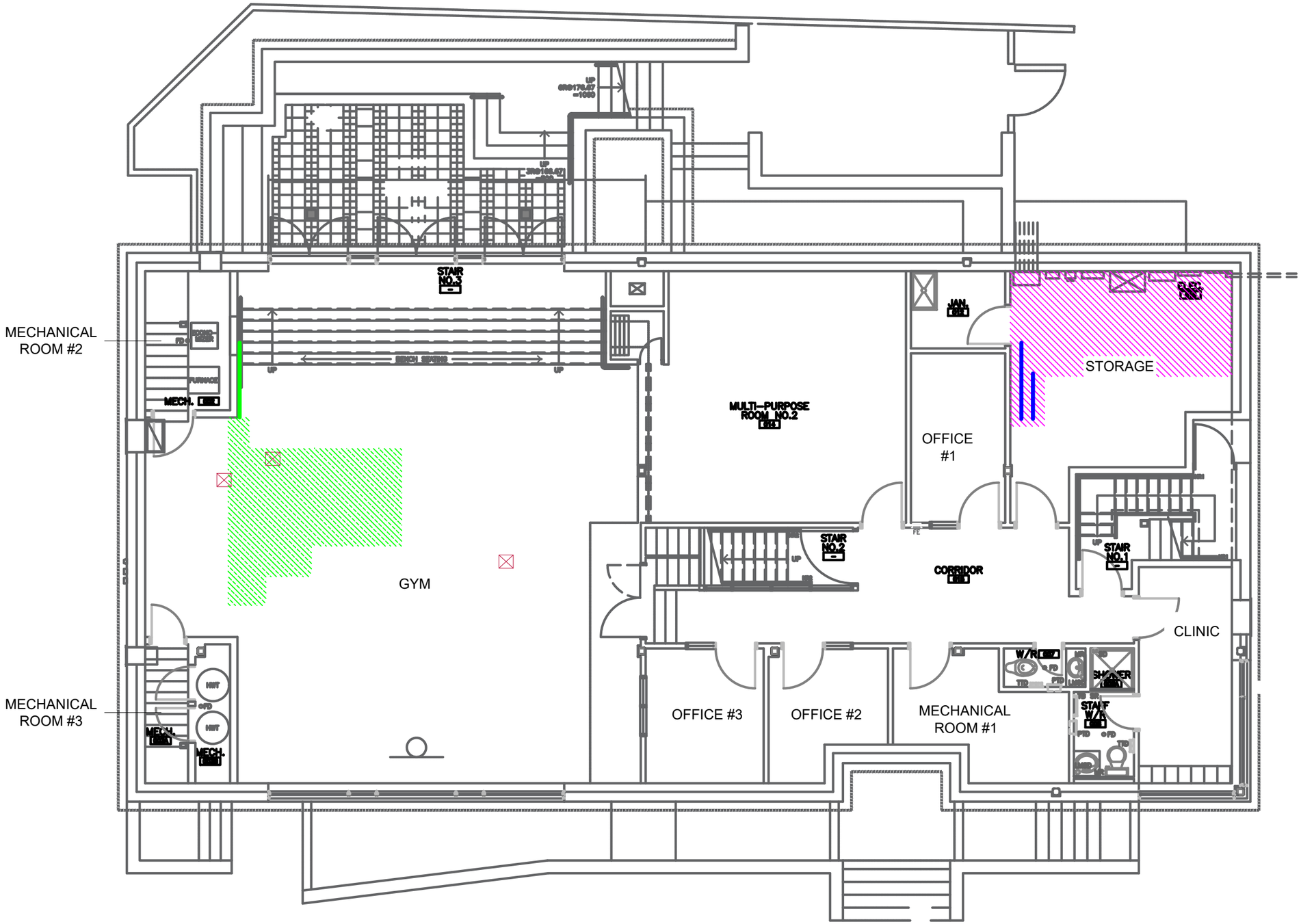
APPENDIX I

Drawings



N

LEGEND

- TAPE LIFT SAMPLE
- LEAD BULK SAMPLE
- WATER STAINED PIPE INSULATION
- WATER DAMAGED/WET/MOULDY DRYWALL WALL
- WATER DAMAGED OR MOULDY WOOD BASEBOARDS
- PEELING PAINT TO FULL HEIGHT
- INTRUSIVE INSPECTION CUT
- WATER DAMAGED FLOORING
- MOULDY DRYWALL CEILING AND/OR BULKHEAD
- WATER DAMAGED DRYWALL CEILING/BULKHEAD
- BIRD DROPPINGS
- WATER DAMAGED WINDOW SILL
- WATER STAINED DRYWALL CEILING
- NO ACCESS

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

BASE PLAN PROVIDED BY CLIENT.

PINCHIN

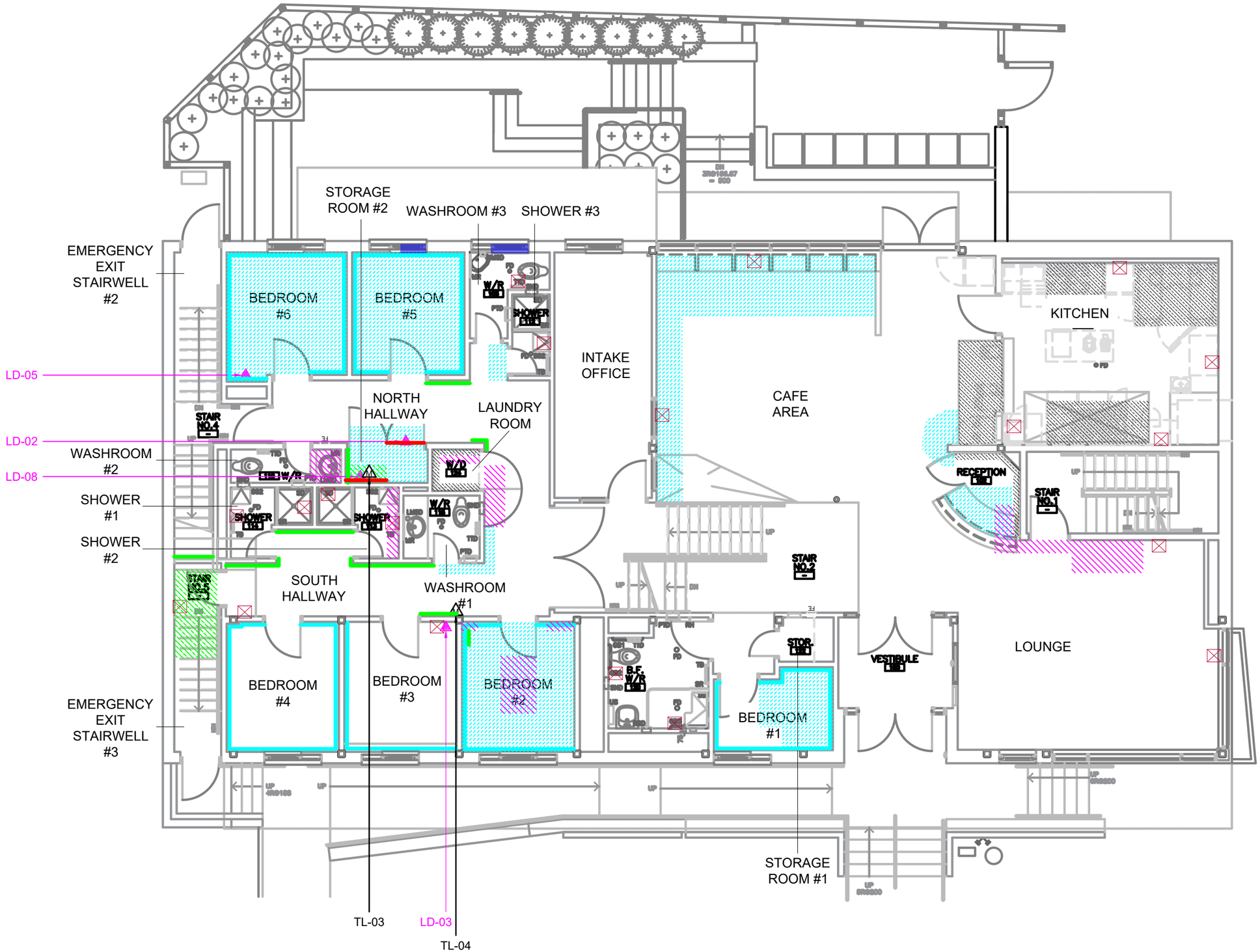
PROJECT NAME:
MOULD INVESTIGATION

CLIENT NAME:
CITY OF TORONTO

PROJECT LOCATION:
25 CANTERBURY PLACE
TORONTO, ONTARIO

FIGURE NAME:
BASEMENT

PROJECT NUMBER:	SCALE:
296103.000	NOT TO SCALE
DRAWN BY:	REVIEWED BY:
JH	CH
DATE:	FIGURE NUMBER:
JULY 2021	1 OF 4



LEGEND

- TAPE LIFT SAMPLE
- LEAD BULK SAMPLE
- WATER STAINED PIPE INSULATION
- WATER DAMAGED/WET/MOULDY DRYWALL WALL
- WATER DAMAGED OR MOULDY WOOD BASEBOARDS
- PEELING PAINT TO FULL HEIGHT
- INTRUSIVE INSPECTION CUT
- WATER DAMAGED FLOORING
- MOULDY DRYWALL CEILING AND/OR BULKHEAD
- WATER DAMAGED DRYWALL CEILING/BULKHEAD
- BIRD DROPPINGS
- WATER DAMAGED WINDOW SILL
- WATER STAINED DRYWALL CEILING
- NO ACCESS

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BASE PLAN PROVIDED BY CLIENT.

PINCHIN

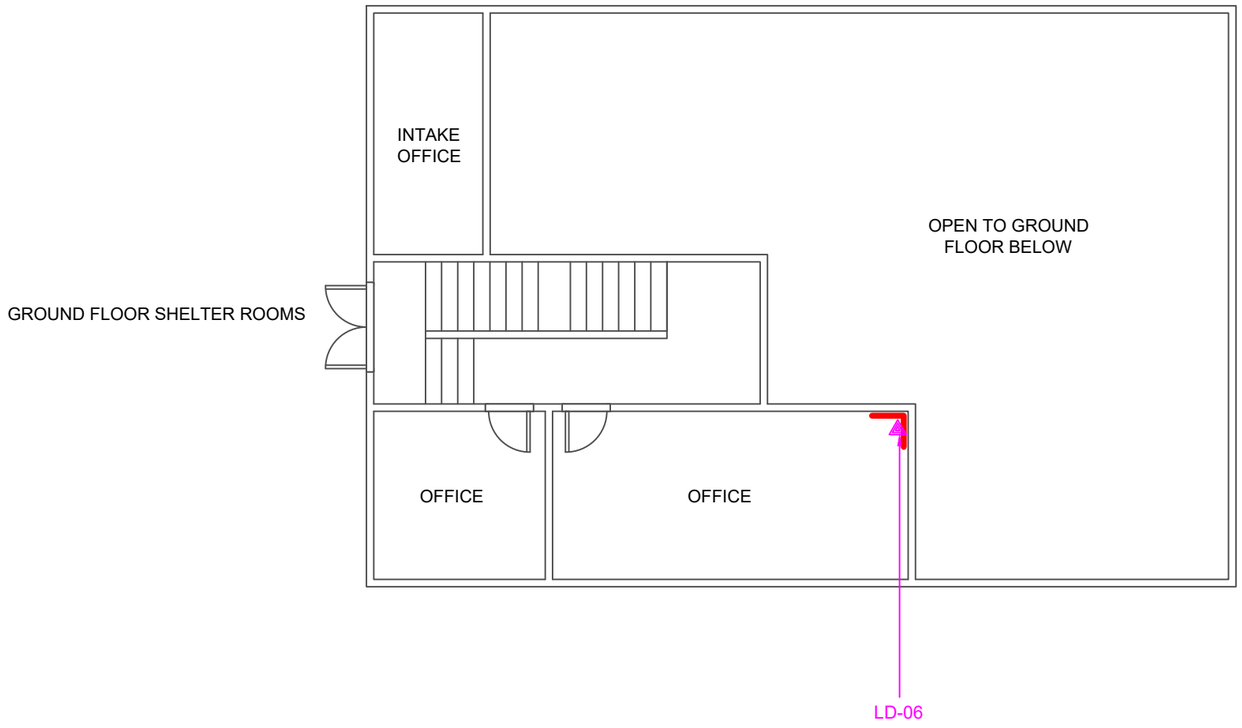
PROJECT NAME: MOULD INVESTIGATION

CLIENT NAME: CITY OF TORONTO

PROJECT LOCATION: 25 CANTERBURY PLACE TORONTO, ONTARIO

FIGURE NAME: GROUND FLOOR

PROJECT NUMBER:	SCALE:
296103.000	NOT TO SCALE
DRAWN BY: JH	REVIEWED BY: CH
DATE: JULY 2021	FIGURE NUMBER: 2 OF 4



LEGEND

- TAPE LIFT SAMPLE
- LEAD BULK SAMPLE
- WATER STAINED PIPE INSULATION
- WATER DAMAGED/WET/MOULDY DRYWALL WALL
- WATER DAMAGED OR MOULDY WOOD BASEBOARDS
- PEELING PAINT TO FULL HEIGHT
- INTRUSIVE INSPECTION CUT
- WATER DAMAGED FLOORING
- MOULDY DRYWALL CEILING AND/OR BULKHEAD
- WATER DAMAGED DRYWALL CEILING/BULKHEAD
- BIRD DROPPINGS
- WATER DAMAGED WINDOW SILL
- WATER STAINED DRYWALL CEILING
- NO ACCESS

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BASE PLAN PROVIDED BY CLIENT.

PINCHIN

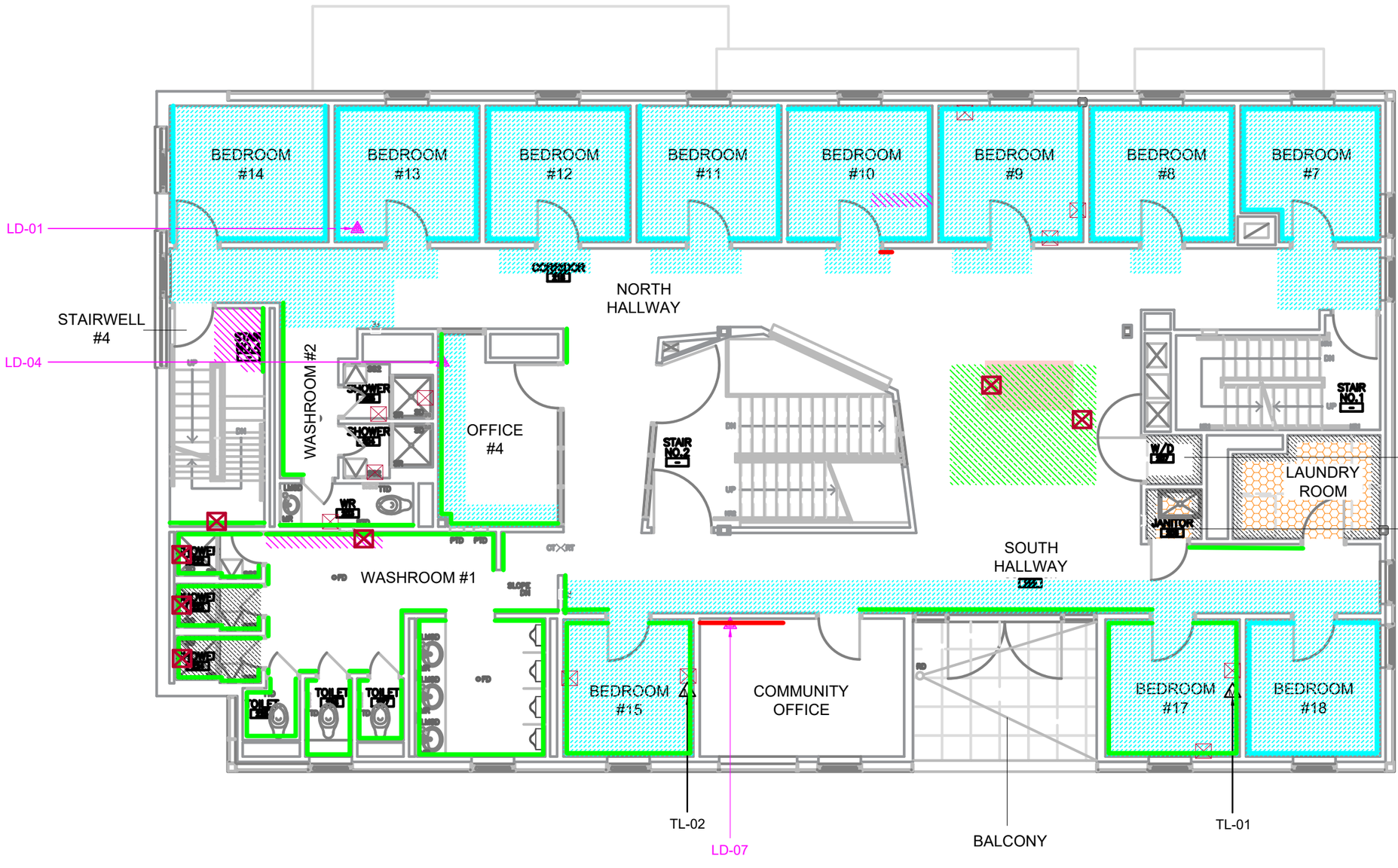
PROJECT NAME:
MOULD INVESTIGATION

CLIENT NAME:
CITY OF TORONTO

PROJECT LOCATION:
25 CANTERBURY PLACE
TORONTO, ONTARIO

FIGURE NAME:
MEZZANINE

PROJECT NUMBER:	SCALE:
296103.000	NOT TO SCALE
DRAWN BY:	REVIEWED BY:
JH	CH
DATE:	FIGURE NUMBER:
JULY 2021	3 OF 4



N

LEGEND

- TAPE LIFT SAMPLE
- LEAD BULK SAMPLE
- WATER STAINED PIPE INSULATION
- WATER DAMAGED/WET/MOULDY DRYWALL WALL
- WATER DAMAGED OR MOULDY WOOD BASEBOARDS
- PEELING PAINT TO FULL HEIGHT
- INTRUSIVE INSPECTION CUT
- WATER DAMAGED FLOORING
- MOULDY DRYWALL CEILING AND/OR BULKHEAD
- WATER DAMAGED DRYWALL CEILING/BULKHEAD
- BIRD DROPPINGS
- WATER DAMAGED WINDOW SILL
- WATER STAINED DRYWALL CEILING
- NO ACCESS

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

BASE PLAN PROVIDED BY CLIENT.

PINCHIN

PROJECT NAME: MOULD INVESTIGATION

CLIENT NAME: CITY OF TORONTO

PROJECT LOCATION: 25 CANTERBURY PLACE TORONTO, ONTARIO

FIGURE NAME: 2ND FLOOR

PROJECT NUMBER:	SCALE:
296103.000	NOT TO SCALE
DRAWN BY: JH	REVIEWED BY: CH
DATE: JULY 2021	FIGURE NUMBER: 4 OF 4

APPENDIX II

Results of Mould Samples

2555 Meadowpine Blvd, Unit 2
Mississauga, ON L5N 6C3
T: (905) 363-0678
E: microbiolab@pinchin.com

Laboratoire d'analyse accrédité par le gouvernement du Québec
Lab ID# 495

Lab ID # 158835

Pinchin Environmental Microbiology Laboratory

Certificate of Analysis

CUSTOMER: Doug Hawkins, Cheryl Hunt
COMPANY: Pinchin Ltd.
ADDRESS: 2360 Meadowpine Blvd., Unit 2
Mississauga, ON L5N 6S2

PROJECT NAME: Mould Remediation
PROJECT NO.: 316954
LAB REFERENCE NO.: m284300
TYPE OF SAMPLE(S): TAPE-LIFT
SAMPLE CONDITION: Acceptable
DATE COLLECTED: December 19, 2022
DATE RECEIVED: December 20, 2022
DATE ANALYSED: January 4, 2023
DATE REPORTED: January 4, 2023
ANALYST: Rawah Naeeim, M.Sc.
TITLE: Environmental Microbiologist
REVIEWER: Lubov Beliakov, CMS (PhD)
TITLE: Environmental Microbiologist

Method of Analysis: Analysis of Bulk and Tape-lift Samples by Direct Microscope Examination (SOP: DME-BLK, Rev. 9, December 18, 2019)

This SOP is based on methods described in: "AIHA's Field Guide for Determination of Biological Contaminants in Environmental Samples", "Samson et al's Food and Indoor Fungi", and the "IRRST method 360". Bulk samples are scanned under a stereomicroscope for the presence of mould growth; cellotape samples taken from these are mounted on glass slides and examined under light microscope at X400, X600 or X1000 magnifications as appropriate. Moulds are identified to the genus using keys in relevant books and literature. Mould growth is assessed as Heavy, Moderate or Slight by examining the mycelium cover on the sample and/or the slide preparations. Some moulds may be difficult to identify from bulk samples and these are reported as "Unidentified mould". Spores observed in the absence of an established mycelium are identified whenever possible and rated as "few" for 5-50 spores or "masses" for >50 spores. Results are not corrected for blanks. Estimation of uncertainty is provided upon request.

COMMENTS/OBSERVATIONS (IF ANY):

Notes:
1. The laboratory is not responsible for sample collection.
2. The report applies to the samples submitted to the laboratory and, the result(s) relate only to sample(s) tested.
3. The report shall not be reproduced except in full, without written approval of the laboratory.
4. Services are subject to Pinchin Ltd. Standard Terms and Conditions for Laboratory Services.

PINCHIN

2555 Meadowpine Blvd, Unit 2
Mississauga, ON L5N 6C3
T: (905) 363-0678
E: microbiolab@pinchin.com

Laboratoire d'analyse accrédité par le gouvernement du Québec
Lab ID# 495

Pinchin Environmental Microbiology Laboratory

Certificate of Analysis

CUSTOMER: Doug Hawkins, Cheryl Hunt
PROJECT NAME: Mould Remediation
LAB REFERENCE NO: m284300 **PROJECT NO.:** 316954
DATE ANALYSED: January 4, 2023 **ANALYST:** Rawah Naeeim, M.Sc.

RESULTS FOR TAPE-LIFT DME ANALYSIS

Customer Sample No.	Lab Sample ID.	Description	Mould Identified, in Rank Order	Comments (if any)
TL-00	m284300-1	Field Blank	No mould detected	
TL-01	m284300-2	Bedroom #17 Wall Cavity (Behind clean wood Baseboard)	*Chaetomium* sp *Penicillium* sp *Ulocladium* sp	Heavy growth
TL-02	m284300-3	Bedroom #15 Wood Baseboard Bottom Edge (Minimal water damage)	*Penicillium* sp	Heavy growth
TL-03	m284300-4	Ground Floor Storage Closet Upper Wall	*Stachybotrys* sp *Chaetomium* sp *Ulocladium* sp *Aspergillus* sp	Heavy growth
TL-04	m284300-5	Ground Floor Behind Vinyl Base	*Acremonium* sp *Chaetomium* sp *Aspergillus* sp *Stachybotrys* sp	Heavy growth

Signature of Analyst:

M284300

2555 Meadowpine Blvd., Unit 2
Mississauga, ON L5N 6C3
tel: 905.363.0678 fax: 905.363.0681
1.855.PINCHIN | pinchin.com

Environmental Microbiology Laboratory
Chain of Custody Form

REPORT RESULTS TO

Contact: Doug Hawkins, Cheryl Hunt			Dept: IEQ
Company: Pinchin Ltd.			Tel: 289.971.1663 Fax:
Mailing Address: 2360 Meadowpine Boulevard, Unit 2			Email: dhawkins@pinchin.com, chunt@pinchin.com
City: Mississauga	Prov: ON	Postal Code: L5N 6S2	Customer Job / P.O. #: 316954
Special Instructions:			Project: Mould Remediation
Report Language: English ☒ French ☐		No. Samples Submitted: 5	Invoice To:

ANALYSIS TYPES

1. ☐ Total Fungal Particulate (Spore Count and Identification)	5. ☐ Bacteria (Quantification / Gram Staining)
2. ☑ Direct Microscope Examination (Fungal)	6. ☐ Heterotrophic Plate Counts (HPC)
3. ☐ Direct Microscope Examination (Particulate): a: Quantitative ☐ b: Qualitative ☐	7. ☐ E. coli / Total Coliforms
4. ☐ Fungal Qualification & Identification (Anderson / RCS)	8. ☐ Legionella — a: Culture ☐ b: QPCR ☐

Sample #	Description	Analysis Requested (e.g. 3a)	Date Sampled	Vol (L) or Area (cm²)	TAT REG.	TAT RUSH	FOR LAB USE ONLY LAB #
TL-00	Field Blank	2	12/19/2022		X		M284300-1
TL-01	Bedroom #17 Wall Cavity (Behind clean wood Baseboard)	2	12/19/2022		X		2
TL-02	Bedroom #15 Wood Baseboard Bottom Edge (Minimal water damage)	2	12/19/2022	✓	X		3
TL-03	Ground Floor Storage Closet Upper Wall	2	12/19/2022		X		4
TL-04	Ground Floor Behind Vinyl Base	2	12/19/2022		X		5

✓

CHAIN OF CUSTODY

Collected by: Doug Hawkins			
Relinquished by: DH	Date/Time: 12/19/2022	Received by:	Date/Time: 12/20/22 2:05
Method of Shipment: Dropoff		Sample Condition Upon Receipt: Acceptable ☒	Other (explain) ☐

Rec'd 1/4/23

Authorized by: _____ **Date:** _____

Customer Signature MUST Accompany Request. Customer accepts Pinchin Ltd. Standard Terms and Conditions for laboratory Services (See Over)

Distribution: White = Laboratory, Yellow = Customer Copy

APPENDIX III

Results of Lead Samples

Analysis for Lead Concentration in Paint Chips

by Flame Atomic Absorption Spectroscopy
EPA SW-846 3050B/6010C/7000B

Customer: Pinchin Ltd.
2470 Milltower Court
Mississauga, ON L5N 7W5

Attn: Doug Hawkins
Cheryl Hunt

Project: 316954 Mould Investigation

Lab Order ID: **10012621**
Analysis: PBP
Date Received: 12/22/2022
Date Reported: 01/03/2023

Sample ID *Lab Sample ID*	Description *Lab Notes*	Mass (g)	Concentration (ppm)	Concentration (% by weight)
LD-01 *10012621_0001*	**Light Blue Paint**	0.0684	<58	**<0.0058%**
LD-02 *10012621_0002*	**Beige Paint**	0.0615	<65	**<0.0065%**
LD-03 *10012621_0003*	**Pink Paint**	0.0761	<53	**<0.0053%**
LD-04 *10012621_0004*	**Orange Paint**	0.0633	<63	**<0.0063%**
LD-05 *10012621_0005*	**Lavender/Purple Paint**	0.0625	<64	**<0.0064%**
LD-06 *10012621_0006*	**Yellow Paint**	0.0602	<66	**<0.0066%**
LD-07 *10012621_0007*	**Brown Paint**	0.0693	<58	**<0.0058%**
LD-08 *10012621_0008*	**White Paint**	0.0745	<54	**<0.0054%**

Disclaimer: Unless otherwise noted blank sample correction was not performed on analytical results. Scientific Analytical Institute participates in the AIHA ELPAT program. ELPAT Laboratory ID: 173190. This report relates only to the samples tested and may not be reproduced, except in full, without the written approval of SAI. Analytical uncertainty available upon request. The quality control samples run with the samples in this report have passed all EPA required specifications unless otherwise noted. RL: (Report Limit for an undiluted 50ml sample is 4µg Total Pb).

Kristina Dumais (8)
Analyst

Approved Signatory

10012621

Client:	Pinchin Ltd.	***Instructions:**	*Version 1-15-2012*
Contact:	Doug Hawkins	*Use Column "B" for your contact info*	
Address:	2360 Meadowpine Boulevard Unit 2		**Invoice to:**
Phone:	905-363-0678	*To See an Example Click the*	Cheryl Hunt
Fax:	905-363-0681	*bottom Example Tab.*	chunt@pinchin.com
Email:	dhawkins@pinchin.com, chunt@pinchin.com		
		Enter samples between "<<" and ">>"	
Project:	316954	***Begin Samples with a "<< "above the first sample***	*Scientific*
	Mould Investigation	***and end with a ">>" below the last sample.***	*Analytical*
Client Notes:		*Only Enter your data on the first sheet "Sheet1"*	*Institute*
P.O. #.		*Note: Data 1 and Data 2 are optional*	***4604 Dundas Dr.***
Date Submitted:	2022-12-20 13:00	*fields that do not show up on the official*	***Greensboro, NC 27407***
		report, however they will be included	***Phone: 336.292.3888***
Analysis:	Lead	*in the electronic data returned to you*	***Fax: 336.292.3313***
TurnAroundTime:	Regular	*to facilitate your reintegration of the report data.*	***Email: lab@sailab.com***

Sample Number	Data 1 (Lab use only)	Sample Description	Data 2 (Lab use only)
<<			
LD-01	[Enter data of your choosing here]	Light Blue Paint	[Enter data of your choosing here]
LD-02	[Enter data of your choosing here]	Beige Paint	[Enter data of your choosing here]
LD-03	[Enter data of your choosing here]	Pink Paint	[Enter data of your choosing here]
LD-04	[Enter data of your choosing here]	Orange Paint	[Enter data of your choosing here]
LD-05	[Enter data of your choosing here]	Lavender/Purple Paint	[Enter data of your choosing here]
LD-06	[Enter data of your choosing here]	Yellow Paint	[Enter data of your choosing here]
LD-07	[Enter data of your choosing here]	Brown Paint	[Enter data of your choosing here]
LD-08	[Enter data of your choosing here]	White Paint	[Enter data of your choosing here]

Accepted ☑

Rejected ☐

Clu 12/22 10:30AM

Mould Remediation

REVISED

Mould Remediation

Eva's Youth Shelter
25 Canterbury Place, Toronto, Ontario

Prepared for:

City of Toronto
55 John Street, 2nd Floor
Toronto, Ontario, M5V 3C6

October 17, 2023

Pinchin File: 316954.004

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Issued to:	**City of Toronto**
Issued on:	**October 17, 2023**
Pinchin File:	**316954.004**
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APPENDIX II Specifications and Drawings
APPENDIX III Site Review Reports

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1.0 INTRODUCTION AND SCOPE

1.1 Introduction

Pinchin Ltd. (Pinchin) was retained by City of Toronto (Client) to provide consulting services for the remediation of mould growth and water damage reported in our prior report, *Final Investigation of Mould Growth, Eva's Youth Shelter, 25 Canterbury Place, Toronto, Ontario,* dated February 10, 2023, Pinchin File 316954, as well as any additional findings noted during the site walkthrough with Pinchin, the City of Toronto and contractors.

Previous remediation work in the building had been completed and the details can be found in the following report, *Mould Remediation, Eva's Youth Shelter, 25 Canterbury Place, Toronto, Ontario*, dated June 8, 2023, Pinchin File 316954.002. This report addresses remediation work in the Ground Floor Café and Lounge Area and Basement Gym.

1.2 Scope of Work for Remediation and Site Reviews

Pinchin provided the following services during the remediation phase:

- Finalization of the remediation scope of work.
- Assistance with the selection of a mould remediation contractor.
- Three site reviews during the remediation work.

2.0 METHODOLOGY

2.1 Site Reviews

Pinchin completed a site review report for each visit, noting site isolation, facilities and equipment, negative pressure ventilation, worker protection, cleaning and disposal, and any required corrective actions. A copy of the report was emailed to the client and contractor.

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3.0 DISCUSSION OF THE REMEDIATION WORK

3.1 Scope of Remediation Work

Pinchin issued an investigation report via email on February 10, 2023, presented in Appendix I. Specifications outlining the remediation Scope of Work were issued on July 27, 2023, presented in Appendix II. Drawings illustrating the work are also given in Appendix II. The final remediation Scope of Work, including any alterations to the initially recommended Scope of Work, was as follows:

1. Following Environmental Abatement Council of Canada (EACC) Level 1 mould methods, perform the following, as indicated on the drawings:
    a. Make 2x2 inspection cuts with fire rated hatches in the Basement Storage Room.
    b. Remove and dispose of the water damaged floor finishes on the Ground Floor.
2. Following Environmental Abatement Council of Canada (EACC) Level 2 mould methods, perform the following, as indicated on the drawings:
    a. Remove and dispose of mouldy/water damaged ceiling/bulkhead finishes on the Ground floor.
3. Following Environmental Abatement Council of Canada (EACC) Level 3 mould methods, perform the following, as indicated on the drawings:
    a. Remove and dispose of the mouldy/water damaged wall finishes (including but not limited to drywall, wood/vinyl baseboard, etc.) in the Basement Gym.
    b. Remove and dispose of the mouldy/water damaged ceiling/bulkhead finishes in the Basement Gym.

3.2 Contractor Selection

Pinchin held a contractor site tour on July 25, 2023. The client retained Inflector Environmental Services to perform the remediation work.

3.3 Discussion of Site Review

The remediation work began on September 22, 2023, and was completed by September 29, 2023.

The site review reports are presented in Appendix III. The major site reviews are discussed below.

3.3.1 Clean Site Preparation – September 22, 2023

The site review confirmed that the enclosures had been properly constructed prior to the start of the remediation work using rip-proof polyethylene sheeting. Hazard warning signs were posted at the entrance to both enclosures. All necessary tools and equipment to complete the remediation work were

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present onsite. Negative air units, HEPA integrity tested September 20, 2023, were present in each enclosure and were venting indoors. The contractors were instructed to proceed with the remediation work.

3.3.2 Bulk Removal – September 26, 2023

Pinchin informed the contractor to wear the appropriate full-face respirator within the EACC Level 3 enclosure. The contractor continued with the bulk removals in both the enclosures.

3.3.3 Post-Remediation Visual Site Review – September 29, 2023

With the exception of a small area of vinyl floor tile to be removed, that were covered by the EACC Level 2 enclosure in Lounge/Café area on the Ground Floor, the site review confirmed that the scope of removal had been completed and that the contractor had achieved an acceptably clean condition. The contractor was advised to send photos of the removed vinyl floor tiles once complete. The contractor sent photos on October 12, 2023; one shown in photo 2 in the table below.

Table II – Photographs of Removed Vinyl Floor Tiles in the Lounge/Café Areas on the Ground Floor

Photo 1 - Vinyl floor tiles remaining covered by EACC Level 2 enclosure, Lounge/Café Area Ground Floor (Photo taken during final visual site review, September 29, 2023)	Photo 2 - Remaining vinyl floor tiles removed, Lounge/Café Area Ground Floor (Photo sent from contractor, October 12, 2023)

Refer to the site review reports in Appendix III for additional photographs from the remediation work.

4.0 CONCLUSION

The mould remediation was satisfactorily completed for this portion of the project and the work areas were fit for re-construction as of October 12, 2023.

Remediation work remains in the Basement Storage/Electrical Room. Pinchin issued the final revised specification for this remaining work to the client on October 6, 2023. It is our understanding that the remaining work will be completed by a general contractor retained by the Client.

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Pinchin has no additional recommendations.

5.0 TERMS AND LIMITATIONS

This work was performed in accordance with the City of Toronto, Blanket Contract #47024791.

Information provided by Pinchin is intended for Client use only. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law. Any use by a third party of reports or documents authored by Pinchin or any reliance by a third party on or decisions made by a third party based on the findings described in said documents, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted. No other warranties are implied or expressed.

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Template: Master Report of Mould Remediation, IEQ, September 20, 2021

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APPENDIX I

Mould Remediation Recommendations from Investigation Report

FINAL

Investigation of Mould Growth

Eva's Youth Shelter
25 Canterbury Place, Toronto, Ontario

Prepared for:

City of Toronto
55 John Street, 2nd Floor
Toronto, Ontario, M5V 3C6

February 10, 2023

Pinchin File: 316954

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Issued to:	**City of Toronto**
Issued on:	**February 10, 2023**
Pinchin File:	**316954**
Issuing Office:	**Mississauga, ON**

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1.0 INTRODUCTION AND SCOPE

1.1 Statement of Understanding

Pinchin Ltd. (Pinchin) was retained by the City of Toronto (Client) to conduct an investigation of potential mould growth at Eva's Youth Shelter located at 25 Canterbury Place, Toronto, Ontario. This investigation was conducted to verify and delineate mould growth in the building prior to planned construction.

Pinchin has completed multiple mould and water damage assessments at this site including the following:

- "Investigation of Mould Growth". Pinchin File 113232, dated April 6, 2016
- "Final Investigation of Mould Growth", Pinchin File 235005, dated February 28, 2019
- "Phase 1 Mould Remediation Report ", Pinchin File 235005, dated April 17, 2019
- "Water Damage Remediation", Pinchin File 246811, dated November 5, 2019
- "Investigation of Mould Growth", Pinchin File 296103, dated July 23, 2021

1.2 Scope of Work

Pinchin performed the investigations on December 19 and 21, 2022. The investigations addressed all accessible areas of the building.

The investigation involved the following activities:

- Spot readings of moisture content of building materials.
- Walkthrough site review for water damage or mould growth.
- Collection and analysis of the following (including field blanks).
    - Five mould tape-lift samples
    - Eight bulk samples to test for lead in paint

2.0 METHODOLOGY

2.1 Site Reviews

Pinchin performed a walkthrough site review for indications of suspect mould growth and/or water damage on accessible building materials, paying particular attention to areas where past water damage had been reported.

Where deemed necessary, the investigator assessed concealed conditions by removing baseboards and making intrusive cuts into the wall and ceiling finishes.

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The investigator used a moisture meter to test for elevated moisture levels in building materials.

Pinchin identified suspect hazardous building materials within the area of expected water damage and mould remediation. Pinchin collected paint samples while on-site and will be completing a hazardous building materials assessment on February 14, 2023 to identify all hazardous building materials in the building.

2.2 Test Methods and Criteria

The following table presents the parameters tested in this investigation, recommended limits or interpretation guides, the units of measurement, and the instruments and sampling/analytical methods employed.

Table I – Parameters Tested, Recommended Limits and Instruments or Methods Used

Parameter	Unit of Measurement	Recommended Limit or Guide to Interpretation	Instrumentation or Test Method
Temperature, T	°C	Consider the risk of condensation on cold surfaces to prevent mould growth	Extech® Psychrometer
Relative Humidity, RH	%RH	Maintain long term below 80 %, to prevent mould growth[1]	
Moisture in building materials (Note: detects surface moisture only, may not detect deeper moisture)	% Moisture	Threshold for mould growth:[2] Drywall, 0.7% Wood materials, 17%	Protimeter® Aquant Delmhorst® BD-2100
Mould in bulk, swab, tape-lift samples (DME)	Presence or absence of Mould Growth, to genus, and Light, Moderate or Heavy density [3]	Current guidelines recommend remediation of all interior mould growth, regardless of species	Direct Microscope Examination with staining
Lead in paint	% Lead	Threshold for mandatory precautions set in provincial regulations	Flame Atomic Absorption

1 O.A.G. Adan, R.A. Samson (Editors): *Fundamentals of Mold Growth in Indoor Environments and Strategies for Healthy Living*. Wageningen, The Netherlands: Wageningen Academic Publishers, 2011
2 Macher, J. (Ed): *Bioaerosols, Assessment and Control*. Cincinnati OH: American Conference of Governmental Industrial Hygienists, 1999.
3 The density of mould growth is ranked by the Pinchin Environmental Microbiology Laboratory as: Light (covers less than about 10% of specimen); Moderate (covers 10-20% of specimen); or Heavy (covers more than about 20% of specimen).

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2.3 Laboratory Analysis

The analysis for mould was performed at the Pinchin Environmental Microbiology Laboratory, Mississauga. The Pinchin laboratory is independently accredited to ISO/IEC 17025:2017 for mould and bacteria analysis, by the American Industrial Hygiene Association Laboratory Accreditation Program LLC (AIHA LAP LLC) (Lab ID 158835)[4] and the Quebec government (Lab ID 495).[5]

Analysis for lead in paints or surface coatings is performed at an accredited laboratory in accordance with EPA Method No. 3050B/Method No. 7420; flame atomic absorption.

Pinchin does not perform sampling of materials for silica, mercury, or Polychlorinated Biphenyls (PCBs).

3.0 FINDINGS

3.1 Facility Description

Table II – Facility Description

Item	Details
Construction Date	2000
Number of Floors	2 + Basement, Mezzanine, and Rooftop Mechanical
Exterior Cladding	Brick
Roof	Built-up
Flooring	Vinyl floor tile, ceramic floor tile, vinyl sheet flooring, wood laminate
Interior Walls	Drywall, ceramic tile
Ceilings	Lay-in acoustic ceiling tiles, drywall

3.2 Results of Site Reviews and Testing

This section presents the findings of the walkthrough investigation and any tests for mould or lead. Appendix I presents the drawings. The analytical certificates for the mould tests are given in Appendix II. The results of the lead tests are given in Appendix III.

4 Accredited by the American Industrial Hygiene Association Laboratory Accreditation Program LLC (AIHA LAP LLC) under the Environmental Microbiology Laboratory Accreditation Program (EMLAP), for Bulk, Surface and Air testing for moulds, Escherichia coli, Legionella by the ISO 11731 method and for Legionella pneumophila by qPCR ISO 12869 method (Lab ID 158835).
5 Accredited by the Quebec government under the Programme d'accreditation des laboratoires d'analyses (PALA) program for Air Microbiology – domains 601, 603, 604, 605, 606.

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Table III – Basement

Temperature	13.7 °C	Extent of Mould Growth	80 ft²
Relative Humidity	38.4 %RH	Extent of Water Damage Including Mould Growth	220 ft²

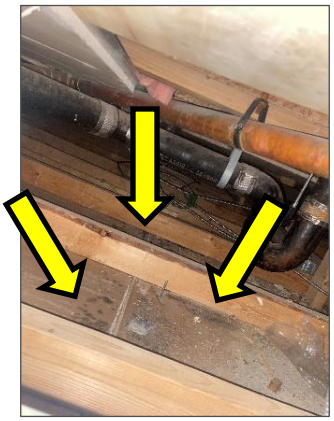

Photo 1 - Mould growth and water stains on the back side of the Gym ceiling.

Photo 2 - Water damaged (stains) drywall ceiling in the Storage Room.

Photo 3 - Water stained fibreglass pipe insulation in the Storage Room.

Moisture Measurements

Material/Location	Results	Material	Results
Drywall walls	0.1% -- DRY		

Observations and Comments

Pinchin identified the following:

- A musty odour throughout the Gym and Storage Room.
- Mould growth on the back side of the drywall ceiling and on the north drywall wall in the Gym. Three inspection cuts were made in the drywall ceiling.
- Water damaged drywall ceiling in the Storage Room.
- Water stains on fibreglass pipe insulation in the Storage Room.

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Table IV – Ground Floor/Mezzanine

Temperature	15.4 °C	Extent of Mould Growth	120 ft²
Relative Humidity	37.1 %RH	Extent of Water Damage Including Mould Growth	>200 ft²

Photo 4 - Mould growth and water damaged ceiling in Stairwell #3.

Photo 5 - Mould growth on a wooden baseboard in Bedroom #2.

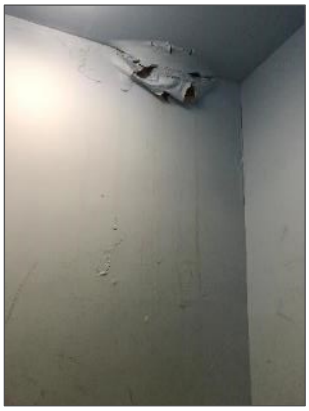

Photo 6 - Water damage on the wall and ceiling in Storage Room #2.

Photo 7 - Water damaged drywall ceiling in Bedroom #2.

Photo 8 - Mould growth on drywall and wood baseboard in Bedroom #2.

Photo 9 - Mould growth on drywall in the hallway outside the Laundry Room.

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Table IV – Ground Floor/Mezzanine

Moisture Measurements			
Material/Location	**Results**	**Material**	**Results**
Drywall wall outside washrooms	0.1 – 10.6% -- WET	Ceramic tiles (Dry reference 212)	187 – 225 -- DRY
Vinyl floor tiles (Dry reference 200)	164 – 217 -- DRY	Drywall walls/Mezzanine Offices	0.02% -- DRY

Sample Log		
Sample Type/ Location	**Sample No.**	**Result**
Mould Tape-Lift/Drywall behind peeling paint in Storage Room #2	TL-03	Confirmed mould growth
Mould Tape-Lift/Hallway drywall behind vinyl baseboard	TL-04	Confirmed mould growth
Lead/ Hallway/Beige paint	LD-02	<0.0065%
Lead/ Bedroom #3/Pink paint	LD-03	<0.0053%
Lead/ Bedroom #6/Purple paint	LD-05	<0.0064%
Lead/ Southwest Office/Yellow paint	LD-06	<0.0066%
Lead/ Storage Room #2/White paint	LD-08	<0.0054%

Observations and Comments

Pinchin identified the following:

- A musty odour throughout the floor.
- Peeling paint in the southwest corner of the Office on the Mezzanine Floor and in Storage Room #2.
- Water damage on windowsills in Bedroom #5 and Washroom #3.
- Water damaged laminate flooring and vinyl floor tiles in Bedrooms #1, #2, #5 and #6, Storage Room #2 and the Café Area.
- Water damaged drywall ceiling in the Lounge, Bedroom #2, Hallway, Shower #2 and Washroom #2.
- Mould growth on drywall ceiling in Stairwell #3 and Storage Room #2.
- Mould growth on wood baseboards throughout the bedrooms, and on drywall walls in Stairwell #2 & 4, Bedroom #2, Storage Room #2 and the hallway.

Pinchin made approximately 16 inspection cuts throughout this floor. Areas of the Kitchen and Laundry Room were inaccessible due to appliances; these areas are indicated on Drawing 2.

Table V – Second Floor

Temperature	13.7 °C	Extent of Mould Growth	>200 ft²
Relative Humidity	36.4 %RH	Extent of Water Damage Including Mould Growth	>500 ft²

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Table V – Second Floor

Photo 10 - Mould growth on drywall behind a wood baseboard in Bedroom #15.

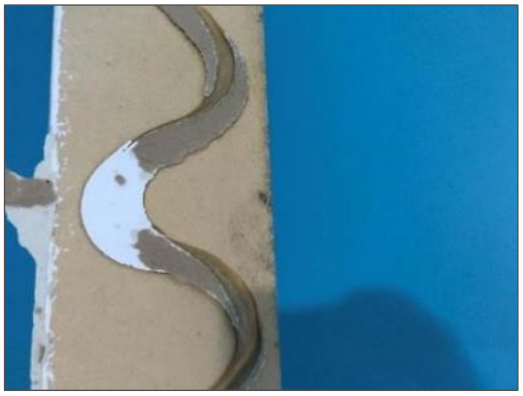

Photo 11 - Mould growth on a wood baseboard in Bedroom #15.

Photo 12 - Lifting and water damaged laminate wood floor in Bedroom #9.

Photo 13 - Mould growth in the hallway outside the washroom.

Photo 14 - Mould growth behind vinyl baseboards in Office #4.

Moisture Measurements

Material/Location	Results	Material	Results
Drywall wall/ Washroom and Stairwell #4	0.1% - 10.1% -- Wet	Vinyl floor tiles (Dry reference 200)	164 – 217 -- Dry

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Table V – Second Floor

Ceramic tiles (Dry reference 212)	187 – 225 -- Dry	Laminate wood flooring (Dry reference 176)	164 – 207 -- DRY

Sample Log

Sample Type/Location	Sample No.	Result
Mould Tape-Lift/ Bedroom #17 (wall cavity behind clean wood baseboard)	TL-01	Confirmed mould growth
Mould Tape-Lift/ Bedroom #15 (wood baseboard bottom edge)	TL-02	Confirmed mould growth
Lead/ Bedroom #13/ Light Blue paint	LD-01	<0.0058%
Lead/ Office/ Orange paint	LD-04	<0.0063%
Lead/ Community Office/ Brown paint	LD-07	<0.0058%

Observations and Comments

Pinchin identified the following:

- Water damaged wood laminate flooring throughout the bedrooms, Office #4, and hallway.
- Bird droppings and dead birds in the Janitor's Closet and Laundry Room.
- Water stains/damage and/or mould growth on the drywall ceiling in the hallway washroom, Bedroom #10 and Stairwell #4.
- Wet drywall walls in Stairwell #4 and the adjacent hallway.
- Mould growth on drywall walls in Bedrooms #15 & 17, the hallway, Stairwell #4, Washroom #2 and Office #4.
- Mould growth on wood baseboards throughout all bedrooms.
- Peeling paint in the Community Office.

Pinchin had previously identified mould growth throughout Washroom #1, and it has not been remediated previously and therefore is still present. Pinchin also previously identified warped ceramic tile flooring throughout Washroom #1 which indicates trapped moisture. Pinchin did not identify any mould growth on the sub-floor through the inspection cut made during this site visit.

Pinchin made 13 inspection cuts and several others were made previously and still present.

Access to the walls in the Washer/Dryer Room, Janitor's Closet and Laundry Room was limited due to appliances as indicated on Drawing 4.

3.3 Summary of Hazardous Materials

Based on sampling, the age of the building and a review of available previous reports, the following is a summary of the designated substances, limited to the materials being impacted by the recommended remediation work.

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3.3.1 *Asbestos*

Ceramic tile thin set is presumed to contain asbestos until further sampling can be completed. A hazardous building materials assessment will be completed on February 14, 2023 to identify any hazardous materials for the building. The thin set will be sampled at that time.

3.3.2 *Lead*

No paints in the remediation work area contain sufficient lead to require special precautions.

Lead may be present in a number of materials which were not assessed and/or sampled. The following materials, where found, should be considered to contain lead.

- Electrical components, including wiring connectors, grounding conductors, and solder
- Solder on pipe connections
- Glazing on ceramic tiles

3.3.3 *Silica*

Crystalline silica is a presumed component of concrete, masonry, mortar, ceramic tiles, grout and plaster.

3.3.4 *Mercury*

Materials that could contain mercury are not impacted by the recommended remediation work.

3.3.5 *Polychlorinated Biphenyls*

Materials that could contain PCBs are not impacted by the recommended remediation work.

4.0 DISCUSSION

4.1 Discussion of Water Damage and Mould Growth

4.1.1 *Basement*

Pinchin identified mould growth in the Gym on wall and ceiling finishes, water damage on drywall ceiling in the Storage Room and water-stained pipe insulation. The cause of the water damaged in the Storage Room is likely related to previous leaks and from previous investigations in the building, it is assumed that the 2nd Floor washroom showers have caused leaks into the Gym; however, it has never been confirmed. Discussion in regard to further investigation and recommendations for repairs can be found in Pinchin's Building Sciences Report, "Limited Building Envelope Condition Assessment", File 317304, dated January 31, 2023.

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4.1.2 Ground Floor / Mezzanine

Pinchin identified water damaged and/or mouldy ceiling and bulkhead finishes in the Lounge, Bedroom 2, Shower #2, Washroom #2, Laundry Room, Stairwell #3, Storage Room #2, and Hallway on the Ground Floor. Pinchin identified water damaged windowsills in Bedroom #5 and Washroom #3 on the Ground Floor. Pinchin identified water damaged flooring in Bedrooms #1, 2, 5 and 6, the Café Area, Lounge, Storage Room #2, Washroom #3 and the Hallway on the Ground Floor. Pinchin identified peeling paint in the Office on the Mezzanine Level and in Storage Room #2 on the Ground Floor. Pinchin identified mould growth on drywall wall finishes in the Hallways, Bedroom #2, Storage Room #2 and Stairwell #4.

Pinchin also identified water damaged and/or mouldy wood baseboards in all bedrooms throughout the Ground Floor. Due to the presence of mould growth on the backside of wooden baseboards, including areas that appear not to have been water damaged, it is recommended by Pinchin that all walls and baseboards in the bedrooms be remediated to a height of four feet.

The Kitchen and Laundry Room had areas that were inaccessible due to the presence of appliances. During renovations, efforts to investigation building material conditions behind the appliances should be considered.

The cause of the mould growth/water damage in the bedrooms is likely from previous water leaks that were not adequately addressed, from miss-use of the spaces and from poor janitorial practices. The mould growth and/or water damage in the hallways, Storage Room #2, Lounge, washrooms and Café Area are also likely from previous plumbing leaks and from poor janitorial practices. From previous investigations in the building, it is assumed that the 2nd Floor washroom showers have caused leaks into Stairwell #3. Discussion in regard to further investigation and recommendations for repairs can be found in Pinchin's Building Sciences Report, "Limited Building Envelope Condition Assessment", File 317304, dated January 31, 2023.

4.1.3 2nd Floor

Pinchin identified water damaged and/or mouldy ceiling and bulkhead finishes in Washroom #1, Stairwell #4, Bedroom #10 and the Hallway. Pinchin identified water damaged flooring in throughout Bedrooms #7-18, Office #4 and the hallways immediately outside the washrooms. Pinchin did not identify any mould growth on the sub-floor, through the inspection cut, and Pinchin did not see any warping or feel any "spongy" like flooring through Washroom #1. The client reported that the ceramic tile in this washroom was replaced sometime between 2016 and 2019. Pinchin identified peeling paint in the Community Office and the hallway outside Bedroom #10. Pinchin identified mouldy drywall finishes and/or wooden baseboards through Bedrooms #7-18, Washroom #2, Stairwell #4, and the Hallway. Pinchin had

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previously identified mould growth throughout Washroom #1, and it has not been remediated previously and therefore is still present.

Pinchin also identified water damaged and/or mouldy wood baseboards in all bedrooms throughout the Ground Floor. Due to the presence of mould growth on the backside of wooden baseboards, including areas that appear not to have been water damaged, it is recommended by Pinchin that all walls and baseboards in the bedrooms be remediated to a height of four feet.

The Washer/Dryer Room, Janitor's Closet and Laundry Room had areas that were inaccessible due to the presence of appliances. During renovations, efforts to investigation building material conditions behind the appliances should be considered.

The cause of the mould growth/water damage in the bedrooms is likely from previous water leaks that were not adequately addressed, from miss-use of the spaces and from poor janitorial practices. The mould growth in the washrooms, Office #4, Stairwell #4, and hallway are also likely from previous water leaks and from poor janitorial practices. The cause of the water damaged/mouldy drywall ceilings in the 2nd Floor hallway, Washroom #1 and Stairwell #4, stairwells may be from previous roof leaks. Further discussion in regard to further investigation and recommendations for repairs can be found in Pinchin's Building Sciences Report, "Limited Building Envelope Condition Assessment", File 317304, dated January 31, 2023.

Bird droppings and dead birds were identified in the Laundry Room and Janitor's Closet. It is believed that the birds came from the HVAC on the rooftop due to exposed ductwork shafts that were observed by Pinchin in each room. Further investigation is recommended and/or the necessary repairs made to ensure birds can not enter. The dead birds should be removed, and these areas cleaned and disinfected as part of this remediation work. The guano contamination found in this investigation should be remediated following Environmental Abatement Council of Canada (EACC) procedures for clean-up of bird and bat droppings.

4.2 Mould Remediation and Site Reviews

Mould growth in buildings can be a risk factor for adverse health effects.[6] The mould growth found in this investigation should be remediated as soon as possible following currently accepted procedures. Pinchin recommends that mould remediation follow the procedures set by the Environmental Abatement Council of Canada (EACC).[7] The work should be performed by a contractor with appropriate training, experience

6 US Environmental Protection Agency: *Mold Remediation in Schools and Commercial Buildings*. US EPA. 2001.
7 Environmental Abatement Council of Canada: *Mould Abatement Guidelines*. Toronto, ON: EACC, 2021.

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and insurance coverage. Ensure that remaining building materials are dry prior to reinstating mould-susceptible finishes, to prevent future mould growth.

4.3 Communication and Interim Risk Management

The findings of this report should be communicated to the occupants as recommended by current mould guidelines, and in workplaces, as mandated by occupational health and safety legislation. The Client should consider any interim risk management actions that would be appropriate under the circumstances, until the mould growth can be remediated. Interim risk management might include isolating an area of the building or relocating persons experiencing adverse health effects or with greater sensitivity to mould.

5.0 RECOMMENDATIONS

Pinchin offers the following recommendations to improve air quality in this building and address any mould growth or other microbial contamination found. Pinchin would be pleased to assist with further investigations indicated by this investigation, make recommendations for remediation contractors, and provide services for the planning and review of the recommended remediation work.

1. Communicate the findings of this report as required.
2. During renovations, efforts to investigation building material conditions behind the appliances should be considered.
3. Make any necessary repairs to the roof prior to re-installation of ceiling finishes on the 2nd Floor.
4. Conduct further investigation in the 2nd Floor Laundry Room and Janitor's Closet to the exposed ductwork. Make repairs to prevent birds from entering and nesting.
5. Arrange for the preparation of a detailed Scope of Work for the mould remediation including any required asbestos precautions and finalize a site review and oversight plan.
6. Using Environmental Abatement Council of Canada (EACC) procedures for the Clean-up of Bird and Bat Droppings, perform the following work:
    a. Remove and dispose of the dead birds.
    b. Remove and dispose of bulk guano. Clean and disinfect impacted surfaces in the Laundry Room and Janitor's Closet.
7. Following Environmental Abatement Council of Canada (EACC) Level 1 mould methods, perform the following, as indicated on the drawings:
    a. Clean then remove all the remaining furniture and contents within the work areas.
    b. Remove and dispose of the water damaged (peeling paint) wall finishes to full height in the Mezzanine Office.

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8. Following Environmental Abatement Council of Canada (EACC) Level 3 mould methods, perform the following, as indicated on the drawings:
    a. Remove and dispose of the water-stained pipe insulation in the Basement Storage Room.
    b. Remove and dispose of the mouldy/water damaged wall finishes (including but not limited to drywall, wood/vinyl baseboard, etc.) to a height of four feet throughout the building with the exception of Washroom #1 and Washroom #2.
    c. Remove and dispose of the water damaged wood laminate flooring and/or damaged vinyl floor tiles throughout the building.
    d. Remove and dispose of the mouldy/impacted drywall ceiling finishes (including drywall bulkheads) to one foot beyond mould and/or water damage.
    e. Remove and dispose of the peeling paint on the wall finishes to full height in Storage Room #2 on the Ground Floor and in the North Hallway on the 2nd Floor.
    f. Remove and dispose of the water damaged drywall on the windowsills in Bedroom #5 and Washroom #3 to one foot beyond any visible water damage or mould growth.
9. Following Environmental Abatement Council of Canada (EACC) Level 3 mould methods in conjunction with O.Reg. 278/05 Type 1 asbestos precautions, perform the following, as indicated on the drawings:
    a. Remove and dispose of the mouldy wall finishes in Washroom #1 and Washroom #2 on the 2nd Floor to a height of four feet.
10. Finalize a site review and testing plan to document the mould remediation. To confirm, Pinchin will perform site reviews at the following stages:
    a. Clean Site Preparation
    b. Post-Remediation Site Review
    c. Post-Remediation Air Sampling

6.0 TERMS AND LIMITATIONS

This work was performed subject to the Terms and Limitations presented or referenced in the proposal for this project. All work will be performed in accordance with the City of Toronto, Blanket Contract #47024791.

Information provided by Pinchin is intended for Client use only. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law. Any use by a third party of reports or documents authored by Pinchin or any reliance by a third party on or decisions made by a third

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party based on the findings described in said documents, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted. No other warranties are implied or expressed.

\\pinchin.com\miss\Job\316000s\0316954.000 CityTor,25Canterbury,Toronto,MLD,IEQ\Deliverables\Final Report\316954 Final Mould Report, 25Canterbury,Toronto, City Tor, Feb 10, 2023.docx

Template: Master Mould Investigation Report, IEQ, August 10, 2022

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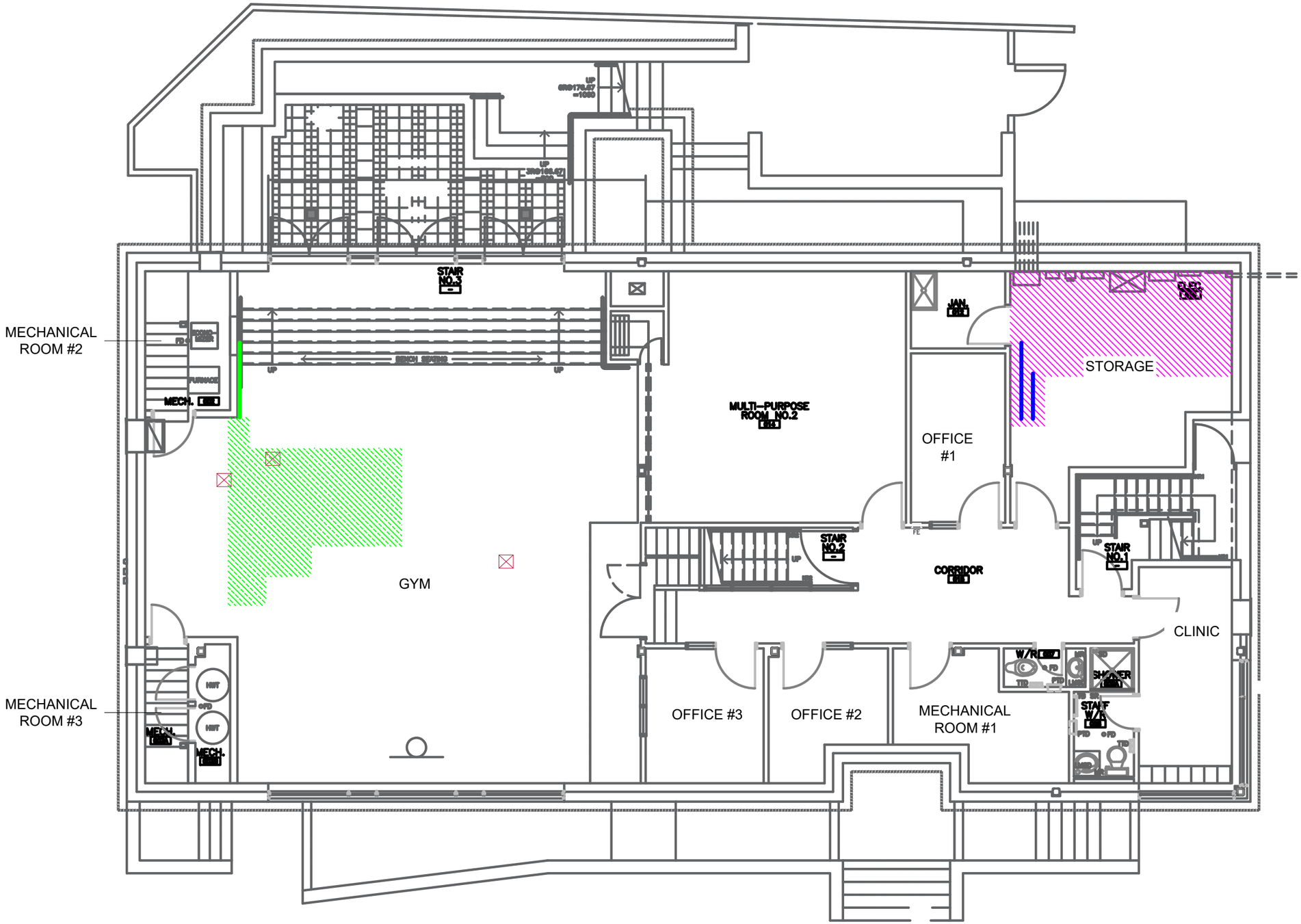
APPENDIX I

Drawings



N

LEGEND

- TAPE LIFT SAMPLE
- LEAD BULK SAMPLE
- WATER STAINED PIPE INSULATION
- WATER DAMAGED/WET/MOULDY DRYWALL WALL
- WATER DAMAGED OR MOULDY WOOD BASEBOARDS
- PEELING PAINT TO FULL HEIGHT
- INTRUSIVE INSPECTION CUT
- WATER DAMAGED FLOORING
- MOULDY DRYWALL CEILING AND/OR BULKHEAD
- WATER DAMAGED DRYWALL CEILING/BULKHEAD
- BIRD DROPPINGS
- WATER DAMAGED WINDOW SILL
- WATER STAINED DRYWALL CEILING
- NO ACCESS

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

BASE PLAN PROVIDED BY CLIENT.

PINCHIN

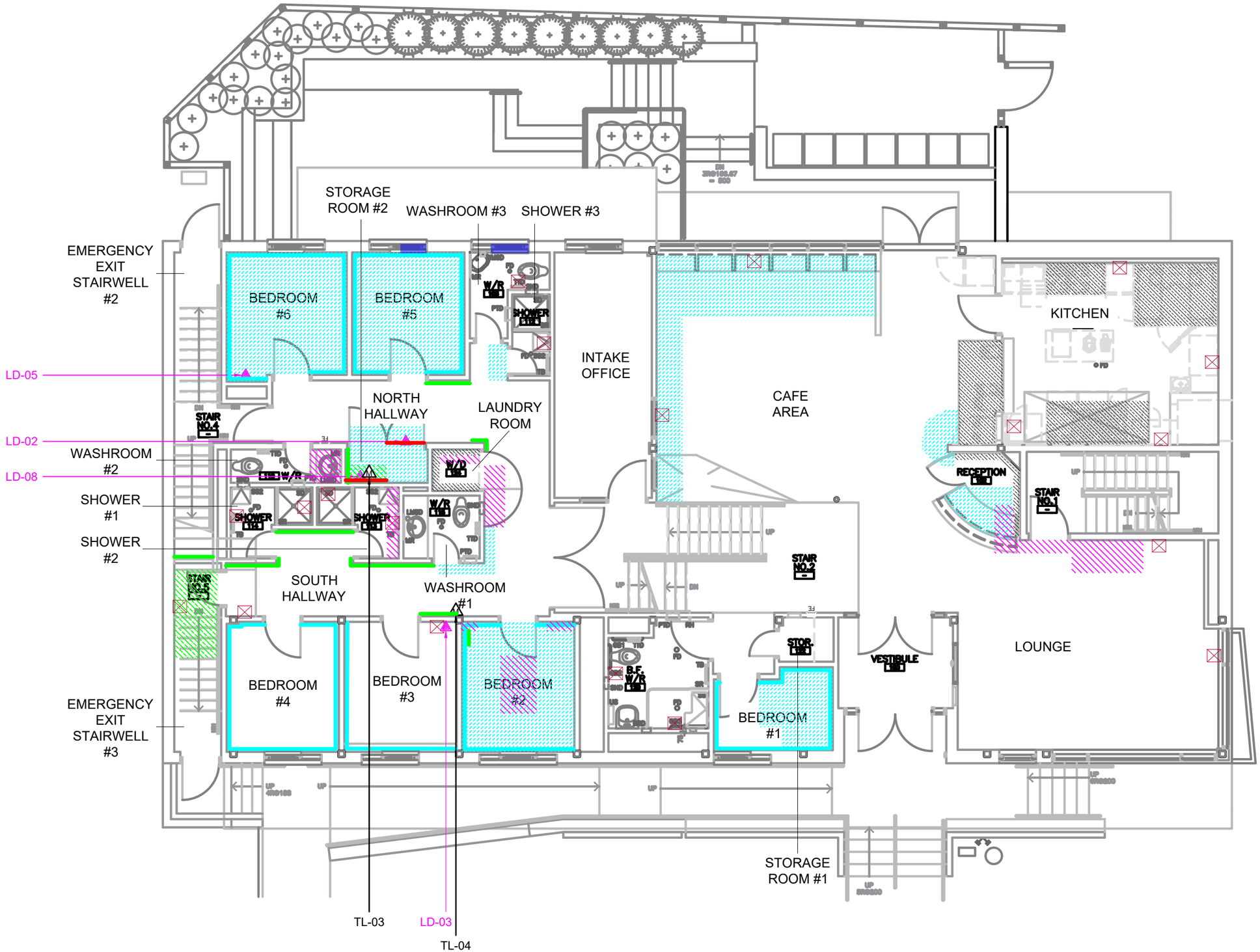
PROJECT NAME:
MOULD INVESTIGATION

CLIENT NAME:
CITY OF TORONTO

PROJECT LOCATION:
25 CANTERBURY PLACE
TORONTO, ONTARIO

FIGURE NAME:
BASEMENT

PROJECT NUMBER:	SCALE:
296103.000	NOT TO SCALE
DRAWN BY:	REVIEWED BY:
JH	CH
DATE:	FIGURE NUMBER:
JULY 2021	1 OF 4



LEGEND

- TAPE LIFT SAMPLE
- LEAD BULK SAMPLE
- WATER STAINED PIPE INSULATION
- WATER DAMAGED/WET/MOULDY DRYWALL WALL
- WATER DAMAGED OR MOULDY WOOD BASEBOARDS
- PEELING PAINT TO FULL HEIGHT
- INTRUSIVE INSPECTION CUT
- WATER DAMAGED FLOORING
- MOULDY DRYWALL CEILING AND/OR BULKHEAD
- WATER DAMAGED DRYWALL CEILING/BULKHEAD
- BIRD DROPPINGS
- WATER DAMAGED WINDOW SILL
- WATER STAINED DRYWALL CEILING
- NO ACCESS

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

BASE PLAN PROVIDED BY CLIENT.

PINCHIN

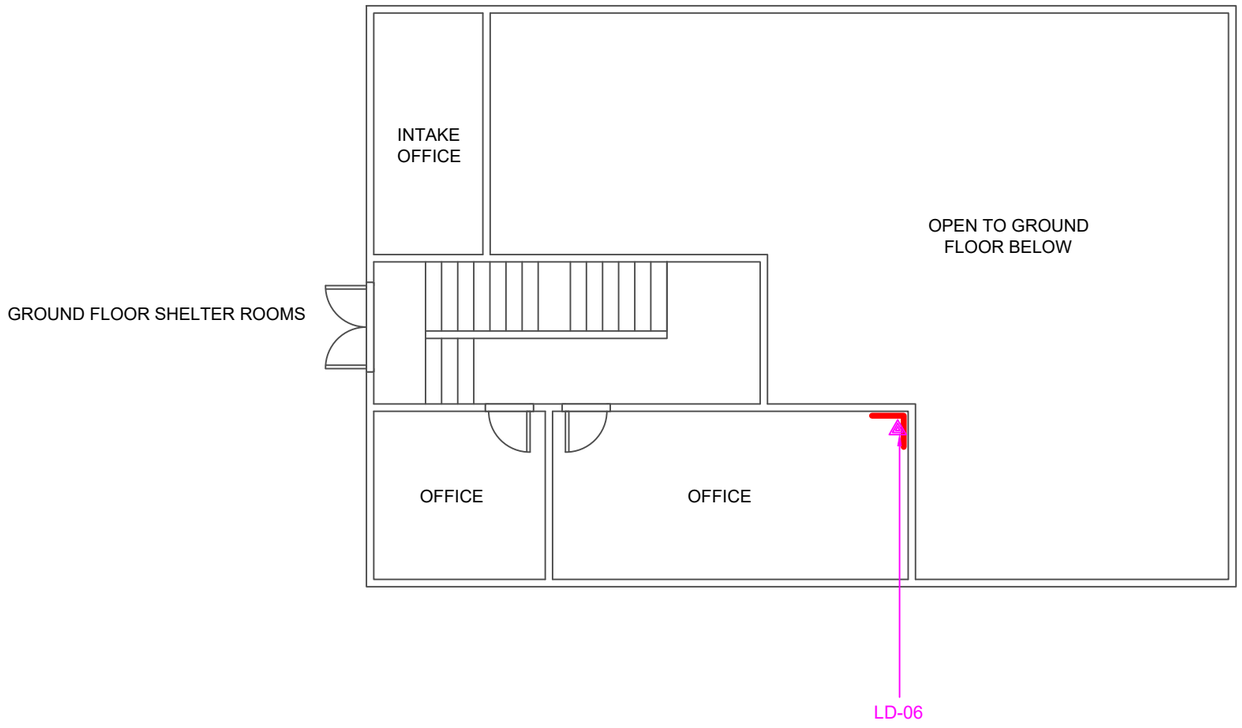
PROJECT NAME: MOULD INVESTIGATION

CLIENT NAME: CITY OF TORONTO

PROJECT LOCATION: 25 CANTERBURY PLACE TORONTO, ONTARIO

FIGURE NAME: GROUND FLOOR

PROJECT NUMBER:	SCALE:
296103.000	NOT TO SCALE
DRAWN BY: JH	REVIEWED BY: CH
DATE: JULY 2021	FIGURE NUMBER: 2 OF 4



LEGEND

- TAPE LIFT SAMPLE
- LEAD BULK SAMPLE
- WATER STAINED PIPE INSULATION
- WATER DAMAGED/WET/MOULDY DRYWALL WALL
- WATER DAMAGED OR MOULDY WOOD BASEBOARDS
- PEELING PAINT TO FULL HEIGHT
- INTRUSIVE INSPECTION CUT
- WATER DAMAGED FLOORING
- MOULDY DRYWALL CEILING AND/OR BULKHEAD
- WATER DAMAGED DRYWALL CEILING/BULKHEAD
- BIRD DROPPINGS
- WATER DAMAGED WINDOW SILL
- WATER STAINED DRYWALL CEILING
- NO ACCESS

LEGEND IS COLOUR DEPENDENT.
NON-COLOUR COPIES MAY ALTER INTERPRETATION.

BASE PLAN PROVIDED BY CLIENT.

PINCHIN

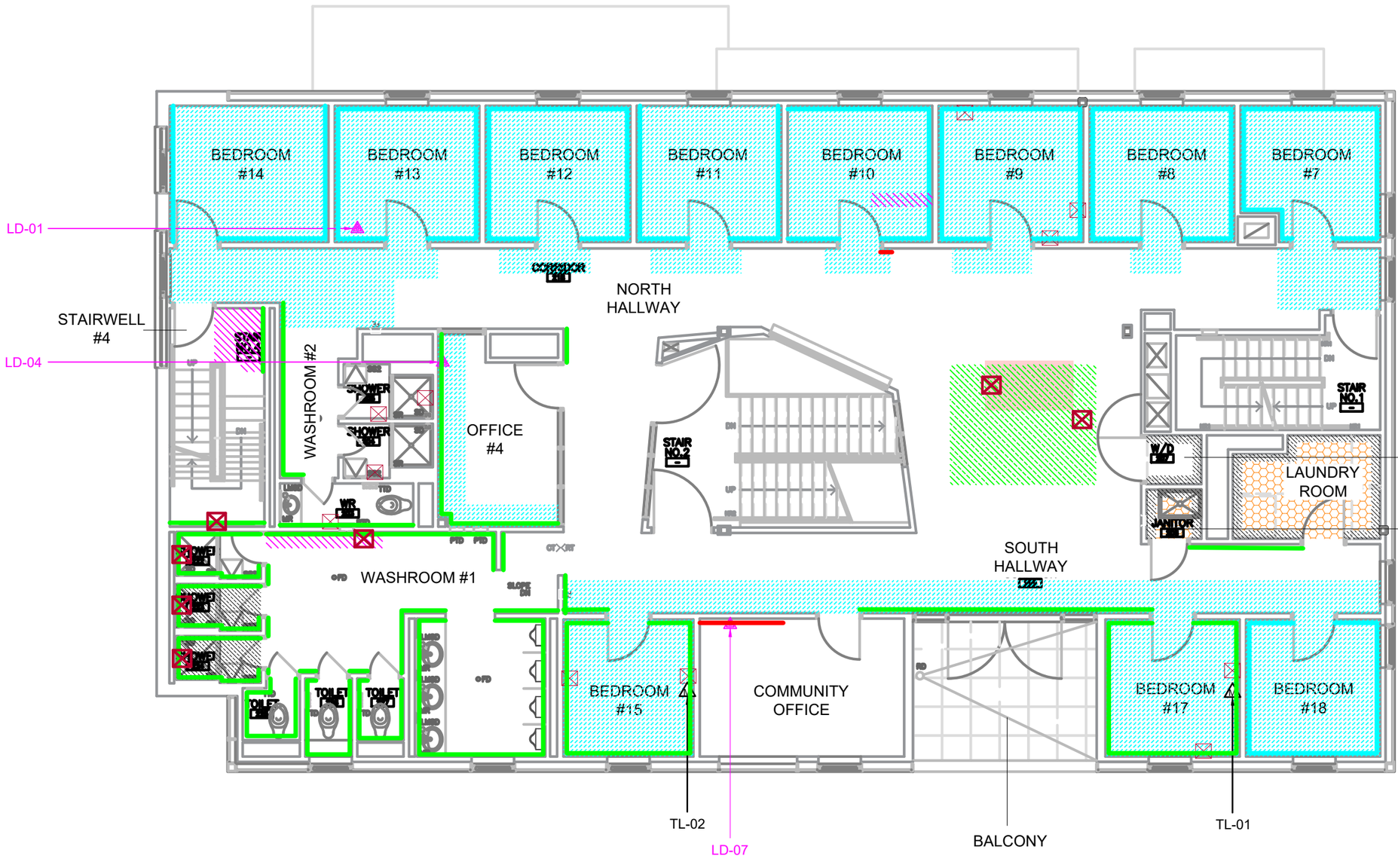
PROJECT NAME:
MOULD INVESTIGATION

CLIENT NAME:
CITY OF TORONTO

PROJECT LOCATION:
25 CANTERBURY PLACE
TORONTO, ONTARIO

FIGURE NAME:
MEZZANINE

PROJECT NUMBER:	SCALE:
296103.000	NOT TO SCALE
DRAWN BY:	REVIEWED BY:
JH	CH
DATE:	FIGURE NUMBER:
JULY 2021	3 OF 4



N

LEGEND

- TAPE LIFT SAMPLE
- LEAD BULK SAMPLE
- WATER STAINED PIPE INSULATION
- WATER DAMAGED/WET/MOULDY DRYWALL WALL
- WATER DAMAGED OR MOULDY WOOD BASEBOARDS
- PEELING PAINT TO FULL HEIGHT
- INTRUSIVE INSPECTION CUT
- WATER DAMAGED FLOORING
- MOULDY DRYWALL CEILING AND/OR BULKHEAD
- WATER DAMAGED DRYWALL CEILING/BULKHEAD
- BIRD DROPPINGS
- WATER DAMAGED WINDOW SILL
- WATER STAINED DRYWALL CEILING
- NO ACCESS

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

BASE PLAN PROVIDED BY CLIENT.

PINCHIN

PROJECT NAME: MOULD INVESTIGATION

CLIENT NAME: CITY OF TORONTO

PROJECT LOCATION: 25 CANTERBURY PLACE TORONTO, ONTARIO

FIGURE NAME: 2ND FLOOR

PROJECT NUMBER:	SCALE:
296103.000	NOT TO SCALE
DRAWN BY: JH	REVIEWED BY: CH
DATE: JULY 2021	FIGURE NUMBER: 4 OF 4

APPENDIX II

Results of Mould Samples

2555 Meadowpine Blvd, Unit 2
Mississauga, ON L5N 6C3
T: (905) 363-0678
E: microbiolab@pinchin.com

Laboratoire d'analyse accrédité par le gouvernement du Québec
Lab ID# 495

Lab ID # 158835

Pinchin Environmental Microbiology Laboratory

Certificate of Analysis

CUSTOMER: Doug Hawkins, Cheryl Hunt
COMPANY: Pinchin Ltd.
ADDRESS: 2360 Meadowpine Blvd., Unit 2
Mississauga, ON L5N 6S2

PROJECT NAME: Mould Remediation
PROJECT NO.: 316954
LAB REFERENCE NO.: m284300
TYPE OF SAMPLE(S): TAPE-LIFT
SAMPLE CONDITION: Acceptable
DATE COLLECTED: December 19, 2022
DATE RECEIVED: December 20, 2022
DATE ANALYSED: January 4, 2023
DATE REPORTED: January 4, 2023
ANALYST: Rawah Naeeim, M.Sc.
TITLE: Environmental Microbiologist
REVIEWER: Lubov Beliakov, CMS (PhD)
TITLE: Environmental Microbiologist

Method of Analysis: Analysis of Bulk and Tape-lift Samples by Direct Microscope Examination (SOP: DME-BLK, Rev. 9, December 18, 2019)

This SOP is based on methods described in: "AIHA's Field Guide for Determination of Biological Contaminants in Environmental Samples", "Samson et al's Food and Indoor Fungi", and the "IRRST method 360". Bulk samples are scanned under a stereomicroscope for the presence of mould growth; cellotape samples taken from these are mounted on glass slides and examined under light microscope at X400, X600 or X1000 magnifications as appropriate. Moulds are identified to the genus using keys in relevant books and literature. Mould growth is assessed as Heavy, Moderate or Slight by examining the mycelium cover on the sample and/or the slide preparations. Some moulds may be difficult to identify from bulk samples and these are reported as "Unidentified mould". Spores observed in the absence of an established mycelium are identified whenever possible and rated as "few" for 5-50 spores or "masses" for >50 spores. Results are not corrected for blanks. Estimation of uncertainty is provided upon request.

COMMENTS/OBSERVATIONS (IF ANY):

Notes:
1. The laboratory is not responsible for sample collection.
2. The report applies to the samples submitted to the laboratory and, the result(s) relate only to sample(s) tested.
3. The report shall not be reproduced except in full, without written approval of the laboratory.
4. Services are subject to Pinchin Ltd. Standard Terms and Conditions for Laboratory Services.

PINCHIN

2555 Meadowpine Blvd, Unit 2
Mississauga, ON L5N 6C3
T: (905) 363-0678
E: microbiolab@pinchin.com

Laboratoire d'analyse accrédité par le gouvernement du Québec
Lab ID# 495

Pinchin Environmental Microbiology Laboratory

Certificate of Analysis

CUSTOMER: Doug Hawkins, Cheryl Hunt
PROJECT NAME: Mould Remediation
LAB REFERENCE NO: m284300 **PROJECT NO.:** 316954
DATE ANALYSED: January 4, 2023 **ANALYST:** Rawah Naeeim, M.Sc.

RESULTS FOR TAPE-LIFT DME ANALYSIS

Customer Sample No.	Lab Sample ID.	Description	Mould Identified, in Rank Order	Comments (if any)
TL-00	m284300-1	Field Blank	No mould detected	
TL-01	m284300-2	Bedroom #17 Wall Cavity (Behind clean wood Baseboard)	*Chaetomium* sp *Penicillium* sp *Ulocladium* sp	Heavy growth
TL-02	m284300-3	Bedroom #15 Wood Baseboard Bottom Edge (Minimal water damage)	*Penicillium* sp	Heavy growth
TL-03	m284300-4	Ground Floor Storage Closet Upper Wall	*Stachybotrys* sp *Chaetomium* sp *Ulocladium* sp *Aspergillus* sp	Heavy growth
TL-04	m284300-5	Ground Floor Behind Vinyl Base	*Acremonium* sp *Chaetomium* sp *Aspergillus* sp *Stachybotrys* sp	Heavy growth

Signature of Analyst:

M284300

2555 Meadowpine Blvd., Unit 2
Mississauga, ON L5N 6C3
tel: 905.363.0678 fax: 905.363.0681
1.855.PINCHIN | pinchin.com

Environmental Microbiology Laboratory
Chain of Custody Form

REPORT RESULTS TO

Contact: Doug Hawkins, Cheryl Hunt			Dept: IEQ
Company: Pinchin Ltd.			Tel: 289.971.1663 Fax:
Mailing Address: 2360 Meadowpine Boulevard, Unit 2			Email: dhawkins@pinchin.com, chunt@pinchin.com
City: Mississauga	Prov: ON	Postal Code: L5N 6S2	Customer Job / P.O. #: 316954
Special Instructions:			Project: Mould Remediation
Report Language: English ☒ French ☐		No. Samples Submitted: 5	Invoice To:

ANALYSIS TYPES

1. ☐ Total Fungal Particulate (Spore Count and Identification)	5. ☐ Bacteria (Quantification / Gram Staining)
2. ☑ Direct Microscope Examination (Fungal)	6. ☐ Heterotrophic Plate Counts (HPC)
3. ☐ Direct Microscope Examination (Particulate): a: Quantitative ☐ b: Qualitative ☐	7. ☐ E. coli / Total Coliforms
4. ☐ Fungal Qualification & Identification (Anderson / RCS)	8. ☐ Legionella — a: Culture ☐ b: QPCR ☐

Sample #	Description	Analysis Requested (e.g. 3a)	Date Sampled	Vol (L) or Area (cm²)	TAT REG.	TAT RUSH	FOR LAB USE ONLY LAB #
TL-00	Field Blank	2	12/19/2022		X		M284300-1
TL-01	Bedroom #17 Wall Cavity (Behind clean wood Baseboard)	2	12/19/2022		X		2
TL-02	Bedroom #15 Wood Baseboard Bottom Edge (Minimal water damage)	2	12/19/2022	✓	X		3
TL-03	Ground Floor Storage Closet Upper Wall	2	12/19/2022		X		4
TL-04	Ground Floor Behind Vinyl Base	2	12/19/2022		X		5

✓

CHAIN OF CUSTODY

Collected by: Doug Hawkins			
Relinquished by: DH	Date/Time: 12/19/2022	Received by:	Date/Time: 12/20/22 2:05
Method of Shipment: Dropoff		Sample Condition Upon Receipt: Acceptable ☒	Other (explain) ☐

Rec'd 1/4/23

Authorized by: _____ **Date:** _____

Customer Signature MUST Accompany Request. Customer accepts Pinchin Ltd. Standard Terms and Conditions for laboratory Services (See Over)

Distribution: White = Laboratory, Yellow = Customer Copy

APPENDIX III

Results of Lead Samples

Analysis for Lead Concentration in Paint Chips

by Flame Atomic Absorption Spectroscopy
EPA SW-846 3050B/6010C/7000B

Customer: Pinchin Ltd.
2470 Milltower Court
Mississauga, ON L5N 7W5

Attn: Doug Hawkins
Cheryl Hunt

Project: 316954 Mould Investigation

Lab Order ID: **10012621**
Analysis: PBP
Date Received: 12/22/2022
Date Reported: 01/03/2023

Sample ID *Lab Sample ID*	Description *Lab Notes*	Mass (g)	Concentration (ppm)	Concentration (% by weight)
LD-01 *10012621_0001*	**Light Blue Paint**	0.0684	<58	**<0.0058%**
LD-02 *10012621_0002*	**Beige Paint**	0.0615	<65	**<0.0065%**
LD-03 *10012621_0003*	**Pink Paint**	0.0761	<53	**<0.0053%**
LD-04 *10012621_0004*	**Orange Paint**	0.0633	<63	**<0.0063%**
LD-05 *10012621_0005*	**Lavender/Purple Paint**	0.0625	<64	**<0.0064%**
LD-06 *10012621_0006*	**Yellow Paint**	0.0602	<66	**<0.0066%**
LD-07 *10012621_0007*	**Brown Paint**	0.0693	<58	**<0.0058%**
LD-08 *10012621_0008*	**White Paint**	0.0745	<54	**<0.0054%**

Disclaimer: Unless otherwise noted blank sample correction was not performed on analytical results. Scientific Analytical Institute participates in the AIHA ELPAT program. ELPAT Laboratory ID: 173190. This report relates only to the samples tested and may not be reproduced, except in full, without the written approval of SAI. Analytical uncertainty available upon request. The quality control samples run with the samples in this report have passed all EPA required specifications unless otherwise noted. RL: (Report Limit for an undiluted 50ml sample is 4µg Total Pb).

Kristina Dumais (8)
Analyst

Approved Signatory

10012621

Client:	Pinchin Ltd.	***Instructions:**	*Version 1-15-2012*
Contact:	Doug Hawkins	*Use Column "B" for your contact info*	
Address:	2360 Meadowpine Boulevard Unit 2		**Invoice to:**
Phone:	905-363-0678	*To See an Example Click the*	Cheryl Hunt
Fax:	905-363-0681	*bottom Example Tab.*	chunt@pinchin.com
Email:	dhawkins@pinchin.com, chunt@pinchin.com		
		Enter samples between "<<" and ">>"	
Project:	316954	***Begin Samples with a "<< "above the first sample***	*Scientific*
	Mould Investigation	***and end with a ">>" below the last sample.***	*Analytical*
Client Notes:		*Only Enter your data on the first sheet "Sheet1"*	*Institute*
P.O. #.		*Note: Data 1 and Data 2 are optional*	***4604 Dundas Dr.***
Date Submitted:	2022-12-20 13:00	*fields that do not show up on the official*	***Greensboro, NC 27407***
		report, however they will be included	***Phone: 336.292.3888***
Analysis:	Lead	*in the electronic data returned to you*	***Fax: 336.292.3313***
TurnAroundTime:	Regular	*to facilitate your reintegration of the report data.*	***Email: lab@sailab.com***

Sample Number	Data 1 (Lab use only)	Sample Description	Data 2 (Lab use only)
<<			
LD-01	[Enter data of your choosing here]	Light Blue Paint	[Enter data of your choosing here]
LD-02	[Enter data of your choosing here]	Beige Paint	[Enter data of your choosing here]
LD-03	[Enter data of your choosing here]	Pink Paint	[Enter data of your choosing here]
LD-04	[Enter data of your choosing here]	Orange Paint	[Enter data of your choosing here]
LD-05	[Enter data of your choosing here]	Lavender/Purple Paint	[Enter data of your choosing here]
LD-06	[Enter data of your choosing here]	Yellow Paint	[Enter data of your choosing here]
LD-07	[Enter data of your choosing here]	Brown Paint	[Enter data of your choosing here]
LD-08	[Enter data of your choosing here]	White Paint	[Enter data of your choosing here]

Accepted ☑

Rejected ☐

Clu 12/22 10:30AM

APPENDIX II

Specifications and Drawings

Bid Form

Pinchin File:	316954.003
Project:	Mould Remediation
Location:	Eva's Youth Shelter, 25 Canterbury Place, North York, Ontario
Submitted To:	Cheryl Britt & Shawna Wilks Pinchin Ltd. cbritt@pinchin.com & swilks@pinchin.com

Quotes are due by email on or before 2:00 PM on August 3, 2023.

We, _____

(Company Name)

of _____

_____

(Business Address)

having examined the Specification Package, as issued by

Pinchin Ltd.

(Consultant)

and having visited the Project Site on July 25, 2023, hereby offer to enter into a Contract with The City of Toronto to perform the work outlined in the Specification Package, with the updated drawing, issued on July 27, 2023.

Ground Floor Ceiling Remediation – lump sum cost of: $_____ plus applicable taxes.

Ground Floor Flooring Remediation – lump sum cost of: $_____ plus applicable taxes.

Basement Storage Room Work – lump sum cost of: $_____ plus applicable taxes.

Basement Gym Remediation – lump sum cost of: $_____ plus applicable taxes.

Total of Everything Above -- $_____ plus applicable taxes.

20% Contingency of Total Above – lump sum cost of: $_____ plus applicable taxes.

Total Including Contingency: $_____ plus applicable taxes.

Appendices to Bid Form:

A - Unit Prices

CONDITIONS

It is understood that:

a. The City of Toronto reserves the right to accept or reject any and all qualified bids.

b. no person, firm or corporation other than the undersigned has any interest in this Bid or in the proposed Contract for which this Bid is made;

c. this Bid open to acceptance for a period of Choose an item days from date of Bid closing;

d. the person signing this form represents and warrants that he or she is duly authorized and has legal capacity to execute and deliver this Bid and has authority to bind the corporation.

SIGNATURES

Signed and submitted for and on behalf of:

Company: _____

(Name)

_____

(Street Address or Postal Box Number)

_____

(City, Province, Postal Code)

Signature: _____

Name and Title: _____

Dated at _____ this _____ day of _____, 2017.

document

Master Template, Bid Form for Scope of Work, IEQ, March 18, 2019

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APPENDIX "A"

UNIT PRICES

The value of changes to the work of this contract (additions or deletions) shall be determined by unit pricing, thorough cleaning of all underlying building substrates included as follows:

Removal of Mould/Water Damage Impacted Materials	Additional Removal
Drywall (per ft^2)	$

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Part 1 General

1.1 GENERAL AND RELATED WORK

.1 It is the intent of the following Section to provide an outline of key requirements and work procedures for the safe handling, removal, enclosure, repair, or clean-up of any Hazardous Material identified under the Contract.

.2 Related work specified elsewhere:

.1 Section 02 87 13.13 Mould Abatement – Level 1 Precautions

.1 Section 02 87 13.14 Mould Abatement – Level 2 Precautions

.2 Section 02 87 13.15 Mould Abatement – Level 3 Precautions

.3 Site Conditions identifies the general location, condition, and quantity of known hazardous building materials within the Project Area. The information provided is for general reference only. The Contractor must confirm existing conditions and quantities on-site prior to tender close.

.4 The specification fulfils the requirements of Section 30 of the Ontario Occupational Health and Safety Act.

.5 Article 1.3 “Outline of Work” identifies the general location, condition, and quantities of hazardous building materials requiring handling, removal, enclosure, repair, or clean-up under the Contract.

.6 Comply with the requirements of this Section during the handling, removal, enclosure, repair, or clean-up of any hazardous materials identified under Contract.

1.2 SITE CONDITIONS

.1 Refer to Drawings MR-01R2 through MR-02R2 for the general locations of mould and water damaged materials within the Project Area.

.2 Immediately stop work in the immediate area and notify the Abatement Consultant should unexpected material or materials suspect of containing or being contaminated by any hazardous material(s) be encountered. Do not resume work in the immediate area until it has been determined if the material encountered is a hazard and written authorization to resume work in the area has been issued by the Abatement Consultant.

.3 Asbestos:

.1 Based on sampling and the age of the building, all building finishes impacted below do not contain asbestos.

.4 Lead:

.1 Paint finishes throughout the building have been confirmed to contain insignificant concentrations of lead.

.5 Mould:

.1 Mould growth and/or water damage is present as follows:

.1 On wall finishes in the Basement Gym.

.2 On ceiling/bulkhead finishes in the Basement Gym and the Ground Floor Lounge.

.3 On vinyl floor in the Ground Floor Lounge and Café Area.

.6 Remaining designated substances including arsenic, acrylonitrile, benzene, coke oven emissions, ethylene oxide, isocyanates, vinyl chloride monomer, are not typically found in building materials in a composition/state that is hazardous and are not presumed to be present within the Project Areas.

.7 General Building Conditions:

.1 Heat and smoke detectors to remain live throughout all phases of the work.

.2 Sprinklers to remain live throughout all phases of the work.

.3 Steam and condensate pipes to remain live throughout all areas of work.

1.3 OUTLINE OF WORK

.1 Refer to applicable Section(s) identified under Article 1.1 General and Related Work for specified personnel protective measures for the safe handling, removal, enclosure, repair, or clean-up of hazardous materials required under Contract.

.2 The City of Toronto will determine who is to provide and pay for site inspection and air monitoring services specified herein.

.3 Visit the site prior to tender close to confirm the location and extent of any hazardous building materials or materials contaminated by hazardous materials.

.4 Refer to information contained in the overall Tender Package (including the Project Manual and any Contract Drawings) for the extent of construction work required under Contract and an outline of the Project Area.

.5 Refer to Drawings MR-01R2 and MR-02R2 for the extent of each Abatement Work Area.

.6 Coordinate the following items with the City of Toronto, Project or Construction Manager, and Contractor including but not limited to: any service disconnects, isolation of any electrical, mechanical or communication systems, GFI and water connections, HVAC and exhaust ventilation system isolation, bin placement, project phasing, etc.

.7 Coordinate, with the Abatement Consultant, City of Toronto, Project or Construction Manager, and Contractor, further investigation of the condition of any building materials behind appliances throughout the building.

.8 Isolate the Abatement Work Area from adjoining Occupied Areas as specified, whether present at an interior or exterior location.

.9 Maintain emergency and fire exits from Abatement Work Area or establish alternative exits satisfactory to Provincial Fire Marshall and local authorities having jurisdiction. Maintain extra routes from occupied areas. Place emergency exit signs at locations to clearly mark exit route. Seal emergency exit doors so as not to impede use of door during emergency evacuation.

.10 Isolate or otherwise disable HVAC systems, vents and diffusers as specified to accommodate the work. System(s) isolated shall remain disabled until completion of

work and final dismantlement of any perimeter barricades.

.11 Where specified, isolate existing furnace(s), boiler(s), hot water tank(s) and any other gas-fired equipment or appliances, and in such a manner as to ensure the safe and uninterrupted use of this equipment. Provide sufficient combustion air to overcome the effect of negative pressure within each work enclosure.

.12 Protect in place, using polyethylene sheeting, drop cloth, or other suitable means as specified, any remaining items, wall and/or floor finishes, etc.

.13 Where specified, maintain each Abatement Work Area under negative pressure via the supply and continued operation of required number of HEPA filtered negative pressure units and/or vacuums.

.14 Perform selective demolition of mechanical and electrical equipment, building components, materials and items scheduled for demolition at locations where such demolition activities will result in the disturbance of hazardous building materials or surfaces contaminated by hazardous building material. Refer to related sections of the Project Manual and any Contract Drawings for further clarification regarding which trades are responsibility for any demolition work.

.15 Maximize waste diversion by use of resale or recycling of any building materials or items scheduled for disposal but are not otherwise contaminated by any hazardous building materials.

.16 It is the responsibility of the contractor to confirm all material quantities and to verify all site conditions to their satisfaction prior to bid submission. Extras to the contract, due to the quantity of any hazardous building materials present on-site, will not be accepted.

.17 Proceed with the following abatement work while adhering to Level 1 Mould Precautions:

.1 Basement Storage Room

.1 Make two 2x2 ft inspection cuts with fire rated hatches (~8 sqft).

.2 Ground Floor

.1 Remove and dispose of water damaged floor finishes (~800 sqft).

.18 Proceed with the following abatement work while adhering to Level 2 Mould Precautions:

.1 Ground Floor:

.1 Remove and dispose of mouldy/water damaged ceiling/bulkhead finishes (~240 sqft).

.2 Proceed with the following abatement work while adhering to Level 3 Mould Precautions:

.1 Basement Gym (~2000 sqft):

.1 Remove and dispose of mouldy/water damaged wall finishes.

.2 Remove and dispose of mouldy/water damaged ceiling/bulkhead finishes.

1.4 SCHEDULE

.1 Provide necessary manpower, supervision, equipment, and materials to maintain and complete the project on schedule.

.2 Work Hours:

.1 Coordinate all work, scheduling, and phasing with the City of Toronto, Project or Construction Manager, and Contractor.

.2 Duration for which HVAC systems may remain shutdown to accommodate quiet hours work will change based on outside weather conditions and internal demand. Duration of quiet hours work will have to be scheduled accordingly and in consultation with the Abatement Consultant, City of Toronto, Project or Construction Manager, and Contractor.

.3 Provide 48 hours written notice to the Abatement Consultant of any request to work outside normal working hours. Obtain written approval before proceeding.

1.5 DEFINITIONS

.1 Abatement Consultant: City of Toronto's Representative providing inspection and air monitoring.

.2 Abatement Contractor: Contractor or sub-contractor performing work of this Section.

.3 Abatement Work Area: Area where work takes place which will, or may, disturb hazardous building materials including, but not necessarily limited to those materials or substances listed and/or referred to under Article 1.2 Site Conditions.

.4 Airlock: Temporary chamber which permits ingress or egress from an Abatement Work Area without permitting air movement through to adjoining areas.

.5 Authorized Visitors: City of Toronto or designated representative(s), Abatement Consultant, and persons representing regulatory agencies.

.6 Competent Person: An individual who can demonstrate knowledge, training and experience in the specific field of hazardous materials abatement in which they are working and are capable of identifying existing hazards in the workplace and selecting appropriate control strategies to address conditions encountered.

.7 Contaminated Waste: Material identified under Site Conditions, including fallen material, settled dust, other debris and materials or equipment deemed to be contaminated by the Abatement Consultant.

.8 Curtained Doorway: Doorway consisting of two (2) overlapping flaps of rip-proof polyethylene arranged to permit ingress and egress from one room to another while permitting minimal air movement between rooms.

.9 DOP Test: A testing method used to determine the integrity of the Negative Pressure Unit or vacuum using a Dispersed Oil Particulate (DOP) or Poly Alpha Olefin (PAO) HEPA

filter leak test. This test is to be conducted on-site where units are to be installed. Refer to the Environmental Abatement Council of Ontario (EACO) DOP/PAO Testing Guideline 2013 or ANSI/ASME N510-2007.

.10 HEPA Filter: High Efficiency Particulate Aerosol filter that is at least 99.97 percent efficient in collecting a 0.3 micrometre aerosol.

.11 HVAC: Heating ventilating and air-conditioning system(s) which serve occupied and/or unoccupied areas of the facility. Includes but is not limited to air handling units, associated duct work, terminal boxes, and vents.

.12 Milestone Inspection: Inspection of the Abatement Work Area at a defined point in the abatement operation.

.13 Mould-Contaminated Material (MCM): Any substance, product, material, or piece of equipment found to be or have supported mould growth or is otherwise contaminated by mould, as identified through visual inspection or laboratory analysis.

.14 Mould Waste: Waste generated during the handling, removal, or clean-up of any mould-containing material or any material or item contaminated by mould.

.15 Mould Work Area: Any area or location where work takes place that may results in the disturbance of building materials or finishes known or suspect of being contaminated by mould.

.16 Negative Pressure: A reduced pressure within the Abatement Work Area (> 5 Pa) of water column) established by extracting air directly from Abatement Work Area and discharging it to exterior of building. Volume of air extracted must be sufficient to provide a minimum of one air change every 20 minutes during wet removal, and once every 15 minutes during dry removal, while ensuring that at all times, air movement flows into the Abatement Work Area, as determined by visual or smoke testing to the satisfaction of the Abatement Consultant.

.17 Occupied Area: Includes any area of the building or adjoining space outside the Abatement Work Area.

.18 Personnel: All Contractor and sub-contractor employees, or supervisors.

.19 PPE: Personnel Protection Equipment.

.20 Project Area: Includes those areas of the building or building site in which any work required under Contract is to take place.

.21 Remove: Remove means remove and dispose of (as applicable type of waste) unless followed by other instruction (e.g. remove and turn over to City of Toronto).

1.6 REGULATIONS AND GUIDELINES

.1 Comply with Federal, Provincial, and local requirements, provided that in any case of conflict among those requirements or with these Specifications, the more stringent requirements shall apply. Work shall be performed under regulations in effect at the time work is performed.

.2 Where regulations are not present, follow accepted industry standards and applicable Guideline documents.

.3 Regulations and Guidelines include but are not limited to the following:

.1 Ministry of Labour, Immigration, Training and Skills Development (MLITSD) Occupational Health and Safety Act Regulations for Construction Projects including Revised Statutes of Ontario 1990, Chapter 0.1 and Ontario Regulation 278/05.

.2 Ministry of the Environment, Conservation and Parks (MECP) Regulation for the disposal of waste, including R.R.O. 1990, Reg. 347 as amended.

.3 Regulation 490/09 Designated Substances.

.4 Ministry of Labour, Guideline, Silica on Construction Projects, 2011.

.5 Environmental Abatement Council of Canada (EACC), Mould Abatement Guideline, Edition 3 (2015).

1.7 QUALITY ASSURANCE

.1 Removal and handling of hazardous materials is to be performed by persons trained in the methods, procedures, and industry practices for abatement in the specified field in which they are engaged in working.

.2 Ensure work proceeds to schedule, meeting all requirements of the Contract.

.3 Complete work so that at no time airborne dust, visible debris, or water runoff contaminate areas outside the Abatement Work Area.

.4 Any contamination of surrounding area (indicated by visual inspection or lab analysis) shall necessitate the clean-up of affected area, and in the same manner applicable to an Abatement Work Area, and at no cost to the City of Toronto.

.5 All work involving electrical, mechanical, carpentry, glazing, etc., shall be performed by licensed persons experienced and qualified for the work required.

.6 The Abatement Consultant will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs required for the Work in accordance with the applicable construction safety legislation, other regulations, or general construction practice. The Abatement Consultant will not be responsible for or have control or charge over the acts or omissions of the Abatement Contractor, his Subcontractors or their agents, employees or other persons performing any of the Work.

1.8 SUPERVISION

.1 Provide on-site, an Overall Superintendent(s), who has authority to oversee all aspects of the work, including but not limited to, estimating and negotiation of changes to the contract, update of submission requirements, scheduling, manpower and equipment requirements, and direct communication and co-ordination with Abatement Consultant and City of Toronto's representative.

.2 Provide on-site, in addition to the Overall Superintendent(s), and for each work shift, a Shift Superintendent, who has authority regarding all aspects related to manpower, equipment and production.

.3 Supervisory personnel overseeing any mould abatement work must hold a recognized certificate proving attendance at a mould removal training course (2-day minimum duration) and have performed supervisory duties on at least five (5) other mould

abatement projects of similar size and complexity.

.4 The Overall Superintendent(s) must be on-site during all work. Failure to comply with this requirement will result in a stoppage of work at no cost to the City of Toronto.

.5 Replace supervisory personnel, with approved replacements, within three (3) working days of a written request from the City of Toronto. City of Toronto reserves the right to request replacement of supervisory personnel without explanation.

.6 Do not replace supervisory personnel without written approval from the City of Toronto.

1.9 INSTRUCTION AND TRAINING

.1 Instruction and training must be provided by a Competent Person.

1.10 SUBMITTALS

.1 Submit prior to starting work:

.1 Insurance certificates specific to coverage provided for any hazardous materials abatement work.

.2 MLITSD Notice of Project form, where applicable.

.3 Copy of Certificate of Approval for disposal of hazardous materials waste and location of landfill.

.4 Pre-removal damage survey of the Abatement Work Area(s), waste transport routes, and bin storage areas.

.2 Submit the following information regarding personnel prior to starting work:

.1 Resumes of the supervisory personnel.

.3 Submit the following information regarding HEPA filtered devices prior to construction of enclosure or commencement of any hazardous materials abatement:

.1 Performance data on HEPA filtered vacuums including DOP tests no more than 3 months old.

.2 Performance data on negative air units including DOP tests which must be no more than 3 months old if the unit is vented directly outdoors or which must be performed on-site immediately prior to initial usage and when HEPA filters are changed if the unit is vented indoors.

.3 DOP tests to be performed by an independent testing company.

.1 DOP testing company is required to submit a detailed technical report of testing protocol, including Introduction, Methodology, Results, Conclusions, and Recommendations, including results of the Air-Aerosol Mixing Uniformity test as per ASME N510-1989 (1995).

.2 DOP testing company must also provide calibration certificates from an independent calibration firm or from the manufacturer of the testing equipment for both the aerosol photometer and the pressure gauge on the aerosol generator dated within 1 calendar year from the on-site testing date.

.3 DOP testing company must also provide the National Sanitation

Foundation (NSF) certification name and number of the on-site technician performing the testing.

.4 Proof of calibration of DOP testing equipment.

.4 Submit the following prior to isolating the work area:

.1 Safety Data Sheets (SDS) for chemicals or material used during the Abatement Project including but not limited to the following, where applicable:

.1 Adhesive Sprays

.2 Encapsulants

.3 Mould Cleaning Solutions or Disinfectants. Information regarding disinfectant must include proof of efficacy and Health Canada DIN information.

.2 Schedule including estimated times for any specified Milestone Inspections.

.5 Submit the following upon completion of the work:

.1 Manifests, waybills, bills of ladings, etc. as applicable for each type of waste.

1.11 INSURANCE

.1 The Contractor, and any Sub-Contractors responsible for any Hazardous Materials Abatement work shall obtain, maintain, and evidence with a Certificate of Insurance Pollution Liability insurance for risks arising out of operations by or on behalf of the CONTRACTOR. “Pollution Liability” as used herein includes, but is not limited to Bodily Injury including Health Hazards; Property Damage; or Environmental Damage; resulting from the discharge, dispersal, release or escape of any solid, liquid, gaseous or thermal irritant or contaminant, including smoke, vapours, soot, fumes, acids, alkalis, toxic chemicals, medical waste and waste materials into or upon land, or any structure on land, the atmosphere or any watercourse or body of water, including groundwater provided such conditions are not naturally presenting the environment in the concentration of amounts discovered. Pollution Liability shall be provided on an “occurrence” basis to cover injury or damage (whether detected or not during the policy period) which happens during the policy period. Without limiting the generality of the foregoing, the policy shall insure the operations of abatement and shall not contain any environmental and/or health hazard exclusions relating to abatement operations.

.2 Forward all certificates to the City of Toronto, and Pinchin Ltd. before work commences, showing the City of Toronto, and Pinchin Ltd. as additional insured as their interest may appear.

.3 The City of Toronto, and Pinchin Ltd. may request a certified true copy of any policies.

.4 The policy shall be endorsed to provide the City of Toronto, and Pinchin Ltd. with 30 days written notice of cancellation or material change or alteration to the policy.

.5 The limits will not be less than:

.1 Pollution Policy: $2,000,000.00 per occurrence and in aggregate

1.12 INSPECTION

.1 From commencement of work until completion of clean-up operations, the Abatement

Consultant is empowered by the City of Toronto to inspect for compliance with the requirements of governing authorities, adherence to specified procedures and materials, and to inspect for final cleanliness and completion.

.2 The Abatement Consultant is empowered by the City of Toronto to order a shutdown of work when leakage of a hazardous material or fugitive emission from the controlled work area has occurred or is likely to occur.

.3 Any deviation from the requirements of the Specifications or governing authorities that is not approved in writing may result in a stoppage of work, at no cost to the City of Toronto.

.4 Additional labour or materials expended by the Contractor to rectify unsatisfactory conditions and to provide performance to the level specified shall be at no additional cost to the City of Toronto.

.5 Any inspections performed as a result of Contractor's failure to perform satisfactorily regarding quality, safety, or schedule, shall be back charged to the Contractor.

.6 Facilitate inspection and provide access as necessary. Make good work disturbed by inspection and testing at no cost to the City of Toronto.

.7 Refer to applicable Section(s) identified under Article 1.1 General and Related Work for specified Milestone Inspections which are to take place at defined points throughout the abatement operation specific to each phase or work area.

.8 Provide 24 hours written notice to the Abatement Consultant of any request for scheduling of milestone inspections or transportation of waste through Occupied Areas.

.9 Do not proceed with next phase of work until written approval of any Milestone Inspections specified is received from the Abatement Consultant.

1.13 INSPECTION

.1 From commencement of work until completion of clean-up operations, the Abatement Consultant will be empowered by the City of Toronto to inspect for compliance with the requirements of governing authorities, adherence to specified procedures and materials, and to inspect for final cleanliness and completion.

.2 The Abatement Consultant is empowered by the City of Toronto to order a shutdown of work when leakage of a hazardous material or fugitive emission from the controlled work area has occurred or is likely to occur.

.3 Any deviation from the requirements of the Specifications or governing authorities that is not approved in writing may result in a stoppage of work, at no cost to the City of Toronto.

.4 Additional labour or materials expended by the Contractor to rectify unsatisfactory conditions, and to provide performance to the level specified, shall be at no additional cost to the City of Toronto.

.5 Any inspections performed as a result of the Contractor's failure to perform satisfactorily regarding quality, safety, or schedule, shall be charged additionally to the Contractor.

.6 Facilitate inspection and provide access as necessary. Make good work disturbed by inspection and testing at no cost to the City of Toronto.

.7 Refer to applicable Section(s) identified under Article 1.1 General and Related Work for specified Milestone Inspections which are to take place at defined points throughout the abatement operation specific to each phase or work area.

.8 Provide 24 hours written notice to the Abatement Consultant of any request for scheduling of milestone inspections or transportation of waste through Occupied Areas.

.9 Do not proceed with next phase of work until written approval of any Milestone Inspections specified is received from the Abatement Consultant.

1.14 AIR MONITORING - MOULD

.1 The Abatement Consultant is empowered by the City of Toronto to collect post-abatement air samples.

.2 Analysis of any mould and/or bacteria samples will be completed at a lab accredited by the AIHA-LAP, LLC and/or the Quebec government.

.3 Results of any air test will be compared against consensus guidelines established by governing authorities, to any outdoor reference samples. Should results prove unacceptable, the Contractor shall re-clean the work area until acceptable results are obtained.

.4 Additional labour or materials expended by the Contractor to rectify unsatisfactory conditions and to provide performance to the level specified shall be at no additional cost to the City of Toronto.

.5 Cost of additional inspection and sampling performed as a result of elevated levels in areas outside the Abatement Work Area or from within the work area following completion of work, will be back-charged to the Contractor.

1.15 WORKER PROTECTION

.1 Instruct workers before allowing entry to the Abatement Work Area. Instruction shall include training in use of respirators, dress, showering, entry and exiting from an Abatement Work Area, and all other aspects of work procedures and protective measures.

.2 Workers shall not eat, drink, chew gum or tobacco, vape or smoke in the Abatement Work Area.

.3 Workers shall be fully protected at all times when possibility of disturbance of hazardous materials exists.

.4 Provide soap, towels, and facilities for washing of hands and face, which shall be used by all personnel when leaving the Abatement Work Area.

.5 Respiratory Protection:

.1 Refer to applicable Sections listed under Article 1.1 General and Related Work for type of respiratory equipment specific to each phase or work area.

.2 Respirators shall be:

.1 Certified by the National Institute of Occupational Safety and Health (NIOSH) or another testing agency acceptable to the MLITSD.

.2 Fitted so that there is an effective seal between the respirator and the worker’s face. Ensure that no person required to enter an Abatement

Work Area has facial hair which affects the seal between respirator and face.

.3 Assigned to a worker for their exclusive use.

.4 Maintained in accordance with manufacturer's specifications.

.5 Cleaned, disinfected, and inspected by a Competent Person after use on each shift, or more often if required.

.6 Repaired or have damaged or deteriorated parts replaced.

.7 Stored in a clean and sanitary location.

.8 Provided with new filters as necessary, according to manufacturer's instructions.

.9 Worn by personnel who have been fit checked by qualitative or quantitative fit-testing.

.10 Instruction on proper use of respirators must be provided by a Competent Person as defined by the Occupational Health and Safety Act.

.6 Provide protective clothing, to all personnel which:

.1 Is made of a material that does not readily retain nor permit penetration of any applicable hazardous building materials.

.2 Consists of head covering and full body covering that fits snugly at the ankles, wrists, and neck.

.3 Once coveralls are worn, treat and dispose of as contaminated waste.

.4 Is replaced or repaired if torn or ripped.

.7 Use hard hats, safety footwear and other protective equipment and apparel required by applicable construction safety regulations.

1.16 VISITOR PROTECTION

.1 Provide clean protective clothing and equipment, including approved respirators to Authorized Visitors.

.2 Ensure Authorized Visitors have received required training prior to granting entry into the Abatement Work Area, including but not limited to use of protective clothing, equipment and entry and exit procedures.

.3 Authorized visitors are required to be fit tested on respirators, prior to entering Abatement Work Area.

1.17 SIGNAGE

.1 Wherever possible, the following signage shall be located out of public view but at a location, and in sufficient numbers, to adequately warn of any hazards.

.2 Mould Abatement Signs: Post signs at access points to the Abatement Work Area, stating at minimum, the following:

.1 There is a mould dust hazard.

.2 Access to the work area is restricted to persons wearing specified protective clothing and equipment.

1.18 WASTE AND MATERIAL HANDLING

.1 Waste bins must be placed at a location approved by the City of Toronto.

.2 All bins for hazardous materials must be covered and locked when waste transfer is not being performed.

.3 Ensure redundant non-hazardous materials, rubble, debris, etc. removed during contaminated work are treated, packaged, transported, and disposed of as appropriate waste.

.4 Clean and wash equipment prior to removal from Abatement Work Area.

.5 Place all equipment, tools, and any unused materials that cannot be cleaned in Abatement Waste Containers prior to disposal and/or transportation to a holding or abatement area.

.6 As work progresses, and at regular intervals, transport sealed and labelled waste containers from the Abatement Work Area to waste bin.

.7 Refer to procedures detailed under applicable Section(s) as listed under Article 1.1 General and Related Work for the safe handling and removal of any waste materials and/or decontamination of tools or equipment removed from the Abatement Work Area.

.8 Transport waste and materials via the predetermined routes and exits. Arrange waste transfer route with City of Toronto. Use a closed, covered cart to transport through Occupied Areas.

.9 Provide workers transporting waste with means to access full personal protective equipment and all tools and supplies required to properly clean up spilled material in the case of a rupture of a Waste Container.

.10 Pick-up and drop off garbage bin at pre-approved times and must not interfere with the City of Toronto's operations.

.11 Cooperate with the provincial Ministry of the Environment inspectors and immediately carry out instructions for remedial work at dump to maintain environment, at no additional cost to the City of Toronto.

1.19 RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS

.1 Coordinate the following with the City of Toronto, Project or Construction Manager, and Contractor.

.2 Re-establish objects and items temporarily relocated or disconnected by the Abatement Contractor to facilitate work of this Section.

.3 Re-establish electrical, communication, HVAC systems, and other services previously disconnected or otherwise isolated to facilitate work of this Section.

.4 Make good at completion of work, all damage not identified in pre-removal survey.

Part 2 Products and Facilities

2.1 MATERIALS AND EQUIPMENT

.1 Refer to applicable Section(s) identified under Article 1.1 General and Related Work for specified materials, equipment, or facilities specific to each phase or work area.

.2 Materials and equipment must be in good condition and free of debris and fibrous materials. Disposable items must be of new materials only.

.3 Airless Sprayer: AC powered pressure washer that allows wetting agent to mix with water, uses no air or compressed air, and has a nozzle to regulate power and pressure.

.4 Differential Pressure Monitor: A high precision instrument for measuring pressure differences in the low range, between the Abatement Work Area and Occupied Area. Calibrate regularly to manufacturer's instructions.

.5 Discharge Ducting: Polyethylene Tubing. Reinforced with wire. Diameter to equal negative pressure machine discharge. Not to be longer than required, or so long that negative pressure is compromised.

.6 Disinfectant: A broad spectrum disinfectant carrying a Health Canada DIN and suitable for the use intended.

.7 Ground Fault Panel: Electrical panel as follows:

.1 Ground fault circuit interrupters of sufficient capacity to power all electrical appetites including any temporary electrical heaters, equipment, and lights in the Abatement Work Area.

.2 Interrupters to have a 5 mA ground fault protection.

.3 Necessary accessories including main switch disconnect, ground fault interrupter lights, test switch to ensure unit is working, and reset switch.

.4 Openings sealed to prevent moisture or dust penetration.

.5 Inspected by the Electrical Safety Authority.

.6 Panel uses CSA approved parts and been constructed, inspected, and installed by a licensed electrician.

.7 Provide one Ground Fault Panel for each 5,000 square feet (500 m^2) of Abatement Work Area.

.8 HEPA Filtered Negative Pressure Unit: Portable air handling system which extracts air directly from the Abatement Work Area and discharges the air to the exterior of the building or Occupied Area. Equipped as follows:

.1 Prefilter and HEPA filter. Air must pass HEPA filter before discharge.

.2 Pressure differential gauge to monitor filter loading.

.3 Auto shut off and warning system for HEPA filter failure.

.4 Separate hold down clamps to retain HEPA filter in place during change of prefilter.

.9 HEPA Vacuum: Vacuum with necessary fittings, tools, and attachments. Discharged air must pass through a HEPA filter.

.10 Mould Cleaning Solution (MCS): A solution comprised of clean, warm water and suitable detergent, such as tri-sodium phosphate (TSP), mixed according to manufacturer's instructions. Ensure detergent selected is suitable for use on surface being cleaned and will not results in any damage, staining or the release of dangerous or offensive vapours.

.11 Mould Encapsulant: Fosters - Interior Defense (Foster 40-50) or approved alternate.

Colour: White.

.12 Mould Waste Container: An impermeable container acceptable to disposal site and Ministry of the Environment comprised of one of the following:

.1 A 6 mil (0.15 mm) sealed polyethylene bag, inside a second clear 6 mil (0.15 mm) sealed polyethylene bag.

.2 A 6 mil (0.15 mm) sealed polyethylene bag, positioned inside or outside a rigid sealed container of sufficient strength to prevent perforation of the container during filling, transportation, and disposal.

.13 OSB: Oriented Strand Board.

.14 Polyethylene Sheeting: 6 mil (0.15 mm) minimum thickness unless otherwise specified, in sheet size to minimize joints.

.15 Protective Clothing: Disposable coveralls complete with head covering and full body covering that fits snugly at the ankles, wrists, and neck. Acceptable products: Dupont Tyvek or Kimberly Clark Kleenguard or approved alternate.

.16 Rip-Proof Polyethylene Sheeting: 8 mil (0.20 mm) fabric made up from 5 mil (0.13 mm) weave and two (2) layers of 1.5 mil (0.05 mm) poly laminate or approved equal. In sheet size to minimize on-site seams and overlaps.

.17 Sprayer: Garden type portable manual sprayer or water hose with spray attachment if suitable.

.18 Tape: Duct tape or tape suitable for sealing polyethylene to surfaces under both dry and wet conditions in the presence of water.

.19 Wetting Agent: Non-sudsing surfactant added to water to reduce surface tension and increase wetting ability.

Part 3 Execution

.1 Refer to applicable Section(s) identified under Article 1.1 General and Related Work for specified procedures for work area preparation, maintenance, site dismantlement, application of lock-down agents and all other procedures for the safe handling, removal, and clean-up of hazardous materials specific to each phase or work area.

END OF SECTION

Part 1 General

1.1 GENERAL AND RELATED WORK

.1 It is the intent of the following Section to provide an outline of key requirements and work procedures for the safe handling, removal, or clean-up of mould present at locations that do not exceed 1 m^2 in size and/or as otherwise specified under this Section.

.2 Refer to the appropriate Section(s) as listed under Article 1.1 General and Related Work in Section 02 81 00.01, Hazardous Materials Abatement – General Provisions, for work procedures and requirements specific to areas impacted by greater amounts of mould.

.3 Related work specified elsewhere:

.1 Section 02 81 00.01 Hazardous Materials Abatement – General Provisions

.2 Section 02 87 13.14 Mould Abatement – Level 2 Precautions

.3 Section 02 87 13.15 Mould Abatement – Level 3 Precautions

.4 Supply labour, material, plant, and equipment necessary to safely execute and complete work of this Section while in conjunction with work specified, required or implied under Section 02 81 00.01, Hazardous Materials Abatement - General Provisions.

.5 Comply with the requirements of this Section during the handling, removal, or clean-up of mould present at locations that do not exceed 1 m^2 in size and/or as otherwise specified under this Section.

.6 Where work of this Section will result in the disturbance of an additional hazardous material other than mould, work shall be completed in conjunction with whatever additional requirements are specified under the applicable Section(s) as listed under Section 02 81 00.01, Hazardous Materials Abatement – General Provisions. In the event of any conflict between the requirements specified, work shall be completed in accordance with the more stringent requirements.

.7 Should the extent of mould encountered, at any one location exceeds 1 m^2, stop work at said location and immediate notify the Abatement Consultant. Work at said location shall not resume until further direction is provided by the Abatement Consultant.

1.2 INSPECTIONS

.1 Coordinate the following Milestone Inspection(s) with the Abatement Consultant:

.1 Milestone Inspection – Visual Clearance

.1 Inspection of the Mould Work Area following the completion of required mould abatement but prior to the dismantlement of any barricades, etc.

1.3 WORKER PROTECTION

.1 Provide facilities for washing of hands and face which shall be used by personal leaving the Mould Work Area. The can be a washroom in the vicinity of the Abatement Work Area.

.2 Respirator Protection: Provide personnel with the following respiratory protection:

.1 Half-face negative pressure respirator equipped with P100 high efficiency (HEPA) cartridge filters.

.3 Provide personnel with latex or nitrile gloves and suitable eye protection.

.1 Provide personnel with an additional pair of work gloves to be worn over top of the above noted latex or nitrile gloves during any demolition activities including the clean-up of waste materials.

.2 Provide personnel with a set of chemical resistant gloves wherever the above specified latex or nitrile gloves do not provide suitable protection based on individual cleaning agents, disinfectants, or encapsulants selected for used.

.2 Provide personnel with disposable full body coveralls complete with head covering and fits snugly at the ankles, wrists, and neck.

.4 Mould Work Area Entry & Exit Procedures:

.1 Before entering the Mould Work Area, don respirator with new or tested filters, along with any other specified or required PPE.

.2 Before leaving the Mould Work Area, proceed to the perimeter of the work area (or barricade) before remove any protective coveralls. Dispose of any coveralls worn in the Mould Work Area and any other disposable PPE as mould contaminated waste.

.3 Exit the Mould Work Area before removing respirator then proceed directly to wash area and complete the following:

.1 Wash exposed skin and respirator with soap and water.

.2 Seal inlet side of respirator filters with tape then remove filters for testing or dispose of as mould contaminated waste.

Part 2 Products

2.1 MATERIALS AND EQUIPMENT

.1 Drop Sheets: 0.15 mm thick woven fibre reinforced fabric bonded both sides with fibre reinforced polyethylene sheet.

Part 3 Execution

3.1 STORAGE AREA

.1 Work with the City of Toronto to designate a room/area where cleaned contents/items will be stored.

3.2 CLEAN SITE PREPARATION

.1 Maintain emergency and fire exits from Mould Work Area or establish alternative exits satisfactory to Provincial Fire Marshall and local authorities having jurisdiction. Maintain extra routes from occupied areas.

.2 Isolate the Mould Work Area from adjoining areas by closing any doors leading to the area, through the placement of perimeter barricades, tape, or rope barrier, etc.

.3 Install temporary lighting in all work areas at levels that will provide for a safe and efficient use of the work area.

.4 Isolate or otherwise disable HVAC systems, vents and diffusers located within Mould Work Area. System(s) shall remain disabled until completion of work and final dismantlement of any perimeter barricades.

.5 Protect in place, using polyethylene sheeting, drop cloth, or other suitable means any remaining items that cannot be relocated. These items will be cleaned at completion of work by HEPA vacuuming or wiping with a damp cloth.

.6 Protect floor surfaces within the immediate area of the work using polyethylene sheeting, drop cloth or other suitable means.

.7 Ensure surfaces requiring protection are pre-clean using HEPA vacuum or damp cloth prior to installing protection.

.8 Provide required tools, equipment, vacuums, materials, and waste receptacles within each established work area.

.9 Post signage identifying the area as a Mould Work Area.

.10 Post MLITSD Notice of Project (if required) and corresponding Worker Protection Procedures at each access point to the area.

3.3 MAINTENANCE OF MOULD WORK AREA

.1 Maintain perimeter isolation and ensure the work area in kept in a tidy condition and free of dislodged materials or other debris.

3.4 MOULD ABATEMENT

.1 Prohibit the use of compressed air during any of the following activities.

.2 HEPA vacuums should be kept running and in the immediate vicinity of the work.

.3 Where specified, proceed with the removal of baseboards, wall trimming, any remaining stored, fixed, or non-fixed items scheduled for cleaning, removal, and/or relocation, or as otherwise required to facilitate work of this Section.

.4 Removal of Building Finishes, Materials Impacted by Mould and Water Damage & Install of Fire Rated Hatch:

.1 Mist materials with water prior to removal to prevent the spread of dust.

.2 Where specified, proceed with the removal of building finishes, materials, any content, or debris, scheduled for removal in a controlled fashion to minimize disturbance of mould.

.3 Care must be taken during the above work to preserve the integrity of the underlaying vapour barrier (if present) or damage to any concealed services, etc.

.4 Remove and dispose of batt insulation exposed by the above work by carefully cutting back, then peeling away, the underlying vapour barrier (where present) to allow access to any insulation and the corresponding wall/ceiling cavity. Care

must be taken during this process to maintain the integrity of the underlying vapour barrier adjacent to the lead edge of the opening to allow for the proper repair / reinstatement of the required vapour barrier.

.5 Install a fireproof hatch in the area where the wall finishes were removed.

.5 Removal of Flooring:

.1 Wedge a heavy duty scraper in seam and gradually force edge of section up and away from floor.

.1 Place flooring sections into Waste Container.

.2 Force scraper through tightly adhered areas by striking scraper handle with a hammer.

.2 Scrape up adhesive remaining on floor with a hand scraper until only a thin smooth film remains.

.3 Deposit scrapings into Waste Container.

.3 HEPA vacuum floor on completion of work in area.

.6 Schedule and obtain written approval of any Pre-encapsulant Visual Clearance - Milestone Inspections specified from the Abatement Consultant before proceeding with the application of any encapsulants.

.7 Any waste materials generated during the work shall immediately be placed into specified waste container(s) as work progresses and SHALL NOT be allowed to fall to the floor or accumulate within the work area.

3.5 POST-ABATEMENT CLEAN-UP

.1 After completion of the above gross removal work, perform the following:

.1 Carefully pick-up any polyethylene drop sheet or cloths used by folding them inward onto themselves, then placing them into a specified waste container.

.2 HEPA vacuum and/or wet wipe, using a suitable MCS, surfaces and any remaining furnishes, etc. within the immediate surrounding area (i.e. 3 meters) of the work. Use crevice tools and other attachments as required to ensure a good level of cleanliness.

.3 Bag small hand tools, brushes, mops and brooms which cannot be effectively cleaned.

.4 Pre-clean, using a HEPA vacuums and/or by wet wiping, any equipment used within the area prior to its removal from the area. Seal any vacuum hoses or inlets with tape.

.2 Schedule and obtain written approval of any Visual Clearance – Milestone Inspections specified from the Abatement Consultant before proceeding with the dismantlement of any perimeter barricades, signage, etc.

.3 Level of cleanliness must be acceptable to the Abatement Consultant.

3.6 SITE DISMANTLEMENT

.1 Proceed with site dismantlement by re-opening any doors leading to the area or by removing any signage or perimeter barricades, tape, or rope barrier, etc.

.2 Conduct a final visual review of the area to ensure surfaces are clean and free of any residual debris, etc.

.3 HEPA vacuum and/or wet wipe clean any debris encountered.

3.7 REINSTATEMENT OF FINISHES

.1 The General Contractor, Sub-Contractor, or any other party responsible for any reinstatement work shall first ensure all surfaces, finishes, and materials present at such locations are clearly documented as having been suitable dried.

END OF SECTION

Part 1 General

1.1 GENERAL AND RELATED WORK

.1 It is the intent of the following Section to outline key requirements and work procedures for the safe handling, removal, or clean-up of mould present at locations ranging in size from 1-10 m^2 in size and/or as otherwise specified under this Section.

.2 Refer to the appropriate Section(s) as listed under Article 1.1 General and Related Work of Section 02 81 00.01, Hazardous Materials Abatement – General Provisions for specified requirements and work procedures for areas with greater or lesser amounts of mould.

.3 Related work specified elsewhere:

.1 Section 02 81 00.01 Hazardous Materials Abatement – General Provisions

.1 Section 02 87 13.13 Mould Abatement – Level 1 Precautions

.2 Section 02 87 13.15 Mould Abatement – Level 3 Precautions

.4 Supply labour, material, plant, and equipment necessary to safely execute and complete work of this Section while in conjunction with work specified, required, or implied under Section 02 81 00.01, Hazardous Materials Abatement - General Provisions.

.5 Comply with the requirements of this Section during the handling, removal, or clean-up of mould present at locations ranging in size from 1-10 m^2 in size and/or as otherwise specified under Contract.

.6 Should the extent of mould encountered, at any one location exceeds 10 m^2, stop work at said location and immediate notify the Abatement Consultant. Work at said location shall not resume until further direction is provided by the Abatement Consultant.

1.2 INSPECTIONS

.1 Coordinate the following Milestone Inspection(s) with the Abatement Consultant:

.1 Milestone Inspection – Clean Site Preparations & Set-up

.1 Inspection of the Mould Work Area following the completion of site preparations and set-up but prior to the commencement of any contaminated work.

.2 Milestone Inspection – Bulk Removal

.1 Inspection of the Mould Work Area during active removal or clean-up activities to document the use of proper mould abatement precautions.

.3 Milestone Inspection – Pre-Encapsulant Visual Clearance

.1 Inspection of the Mould Work Area following the completion of bulk removal work but prior to the application of any encapsulants.

.4 Milestone Inspection – Visual Clearance

.1 Inspection of the Mould Work Area following the completion of required mould abatement but prior to commencing any site dismantlement work.

1.3 WORKER PROTECTION

.1 Provide facilities for washing of hands and face which shall be used by personal leaving the Mould Work Area. This can be a washroom in the vicinity of the Abatement Work Area.

.2 Respirator Protection: Provide personnel with the following respiratory protection:

.1 Half-face negative pressure respirator equipped with P100 high efficiency (HEPA) cartridge filters.

.3 Provide personnel with latex or nitrile gloves and suitable eye protection.

.1 Provide personnel with an additional pair of work gloves to be worn over top of the above noted latex or nitrile gloves during any demolition activities including the clean-up of waste materials.

.2 Provide personnel with a set of chemical resistant gloves wherever the above specified latex or nitrile gloves do not provide suitable protection based on individual cleaning agents, disinfectants, or encapsulants selected for used.

.4 Provide personnel with disposable full body coveralls complete with head covering and fits snugly at the ankles, wrists, and neck.

.5 Mould Work Area Entry & Exit Procedures:

.1 Before entering the Mould Work Area, proceed to the enclosure entrance (occupied area side) donning required respirator with new or tested set of filters, disposable coveralls, eye protection, gloves and any other safety gear required by the work at hand. Protective clothing shall cover hair and any reusable clothing.

.2 Before leaving the Mould Work Area, proceed to the enclosure entrance (contaminated side) before removing contaminated coveralls. Place coveralls worn in the Mould Work Area and any other disposable PPE into an approved waste container located adjacent to the enclosure entrance.

.3 Ensure footwear worn in the Mould Work Area have been suitable cleaned prior to egress or place into a sealed bag for transportation to the next work area.

.4 Ensure workers exit the Mould Work Area before removing their respirator.

.5 Proceed to designated wash area and complete the following:

.1 Wash exposed skin and respirator with soap and water.

.2 Seal inlet side of respirator filters with tape then remove filters for testing or dispose of as mould contaminated waste.

Part 2 Products and Facilities

2.1 MATERIALS AND EQUIPMENT

.1 Drop Sheets: 0.15 mm thick woven fibre reinforced fabric bonded both sides with fibre reinforced polyethylene sheet.

2.2 HOARDING WALLS

.1 Walls separating a Level 2 Mould Work Area from adjoining occupied areas shall be constructed as follows:

.1 Polyethylene sheeting installed to fully isolate the Mould Work Area.

.2 Enclosure may be supported by the ceiling grid, wood or metal studs, or zip-poles.

.3 Enclosure shall have polyethylene sheeting as a top at locations where the enclosure does not extend full height to underside of ceiling or structure.

.4 Substitute the above polyethylene sheeting with rip-proof polyethylene in occupied areas.

.5 Install curtained doorways to permit ingress or egress.

.6 Construct curtained doorways as follows:

.1 Place two (2) overlapping sheets of rip-proof polyethylene sheeting in occupied areas over an existing or temporarily framed doorway.

.2 Secure the vertical edge of one (1) sheet along one (1) jamb of the doorway and the vertical edge of the second sheet along the opposite jamb. Then secure both sheets to the head jamb of the framed opening.

.3 Polyethylene shall be reinforced with duct tape and weight bottom edge to ensure automatic closing. Provide directional arrows indicating opening.

Part 3 Execution

3.1 CLEAN SITE PREPARATION

.1 Perform a pre-abatement damage survey and submit to Abatement Consultant.

.2 Isolate or otherwise disable HVAC systems, vents and diffusers located within Mould Work Area. System(s) shall remain disabled until completion of work and final dismantlement of any perimeter barricades.

.3 Isolate the Mould Work Area from adjoining areas through the constructing of temporary hoarding walls at locations where existing walls do not provide required site isolation.

.4 Install curtained doorways.

.5 Maintain emergency and fire exits from Mould Work Area or establish alternative exits satisfactory to Provincial Fire Marshall and local authorities having jurisdiction. Maintain extra routes from occupied areas.

.6 Install temporary lighting in all work areas at levels that will provide for a safe and efficient use of the work area.

.7 Seal all below ceiling openings to work area using polyethylene, tape, caulking, etc., including but not limited to windows, doors, vents, diffusers, etc.

.8 Where specified, isolate existing furnace(s), boiler(s), hot water tank(s) and any other gas-fired equipment or appliances, and in such a manner as to ensure the safe and uninterrupted use of this equipment. Provide sufficient combustion air to overcome the effect of negative pressure within each work enclosure.

.9 Protect in place, using polyethylene sheeting, drop cloth, or other suitable means any remaining items.

.10 Protect floor surfaces using a minimum of one-layer rip-proof polyethylene sheeting.

.11 Notwithstanding the above exclusions, a drop sheet, suitably sized to capture all fallen debris and waste, must be provided below and immediately adjacent to all points of abatement.

.12 Install, minimum one (1) layer 6 mil polyethylene sheeting over wall surfaces scheduled to remain wherever such finishes cannot readily be cleaned upon completion of work.

.13 Ensure surfaces requiring protection are pre-clean using HEPA vacuum or damp cloth prior to installing protection.

.14 Establish negative pressure within each work enclosure as follows:

.1 Provide a minimum of two (2) HEPA vacuums or a suitable sized HEPA filtered negative pressure unit within each work enclosure.

.2 Operate vacuums (or negative pressure unit) continuously from this point until completion of site dismantlement and/or as otherwise directed by the Abatement Consultant.

.3 Provide additional equipment as necessary to maintain specified pressure drop and to ensure, that at all times, air movement at the perimeter of the work enclosure flows inward into the site.

.4 Distribute negative air source evenly throughout the site.

.5 Install and make airtight all negative air discharge ducting.

.6 Leak test in place using DOP test method, negative pressure units and any vacuums, which discharge, directly into any occupied areas. Discharge into occupied areas only with written approval of the Abatement Consultant.

.7 Install weighted flaps as necessary to provide make-up air.

.15 Provide required tools, equipment, vacuums, materials, and waste receptacles within each established work enclosure.

.16 Post signage identifying the area as a Mould Work Area. Wherever possible, such signage shall be located out of public view but at a location, and in sufficient numbers, to adequately warn of any mould hazard.

.17 Post MLITSD Notice of Project (if required) and corresponding Worker Protection Procedures at each access point to the area.

.18 Schedule and obtain written approval of any Clean Site Preparation & Set-up – Milestone Inspections specified from the Abatement Consultant before proceeding.

3.2 MAINTENANCE OF MOULD WORK AREA

.1 Inspect perimeter hoarding walls, decontaminating facility / airlock, and other perimeter seals at the beginning and end of each working period. Inspection must be performed by a Competent Person.

.2 Inspect HEPA filtered vacuums and any negative pressure exhaust cabinets and any exhaust tubing at the beginning and end of each working period to ensure this equipment

is functional properly and is in good condition. Replace any damaged or non-functional equipment upon discovery. Inspection must be performed by Competent Person.

.3 Repair any damaged hoarding walls, seals, and enclosures immediately upon discovery.

.4 Maintain work area in a tidy condition and free of dislodged materials or other debris.

3.3 WASTE & MATERIAL HANDLING

.1 Removal of waste containers, decontaminated equipment and materials from the Mould Work Area shall be performed as follows:

.1 The first worker (fully protected inside the Mould Work Area) shall remove any visible dust and gross debris from item being removed. Waste materials shall be placed inside a sealed and approved waste container prior to removal from the Mould Work Area.

.2 The first worker then passes the item to a second worker located in the Occupied Area. The second worker then inspects the item for any visual trace of dust or debris, wet wiping any item requiring further cleaning. Any waste bags being removed shall be placed and sealed inside a second approved waste container.

3.4 MOULD ABATEMENT

.1 As the work progresses, schedule and obtain written approval of any Bulk Removal - Milestone Inspections specified from the Abatement Consultant.

.2 Prohibit the use of compressed air during any of the following activities.

.3 Provide temporary support for electrical, telephone, computer and other wall mounted jacks or equipment as required due to the following demolition / cleaning activities.

.4 Where specified, proceed with the removal of baseboards, wall trimming, any remaining stored, fixed, or non-fixed items scheduled for cleaning, removal, and/or relocation, or as otherwise required to facilitate work of this Section.

.5 Removal of Building Finishes, Materials Impacted by Mould and Water Damage:

.1 Mist materials with water prior to removal to prevent the spread of dust.

.2 Where specified, proceed with the removal of building finishes, materials, any content, or debris, scheduled for removal in a controlled fashion to minimize disturbance of mould.

.3 Extent line of removal a minimum of one stud width or 300 mm beyond any visible mould growth or staining.

.4 Care must be taken during the above work to preserve the integrity of the underlaying vapour barrier (if present) or damage to any concealed services, etc.

.5 Remove and dispose of batt insulation exposed by the above work by carefully cutting back, then peeling away, the underlying vapour barrier (where present) to allow access to any insulation and the corresponding wall/ceiling cavity. Care must be taken during this process to maintain the integrity of the underlying vapour barrier adjacent to the lead edge of the opening to allow for the proper repair / reinstatement of the required vapour barrier.

.6 At locations where remaining framing members, wood studding or sheathing

materials remain contaminated by mould or are structurally compromised due to dry rot, wood decay or excessive mould growth, such surfaces shall be cleaned to remove any loose debris, materials, etc. Ensure this work proceeds in a manner that maintains the integrity of the existing work enclosure. Provide temporary shoring or bracing as required.

.7 Notwithstanding the above, and at locations where the demolition of any remaining framing members, wood studding or sheathing materials will result in a breach to the existing work enclosure, such work shall be scheduled following the completion of site dismantlement activities, and while adhering to Level 1 Mould Precautions.

.8 Schedule and obtain written approval of any Pre-encapsulant Visual Clearance - Milestone Inspections specified from the Abatement Consultant before proceeding with the application of any encapsulants.

.6 Any waste materials generated during the work shall be placed into specified waste container(s) and removed from the Mould Work Area as the work progresses.

3.5 APPLICATION OF A POST-ABATEMENT ENCAPSULANT

.1 Ensure prior written approval is obtained from the Abatement Consultant wherever a corresponding Pre-encapsulant Visual Clearance – Milestone Inspection has been specified before proceeding with the following work.

.2 Ensure surfaces are clean and dry before applying any post-abatement paints or encapsulants.

.3 At locations where the removal of remaining framing members, wood studding or sheathing materials visibly contaminated by mould cannot be completed without compromising the integrity of the existing work enclosure, or are otherwise scheduled to remain, proceed with the application of an approved microbial encapsulant. Repeat application process as required to ensure a complete and homogeneous coating of affected surfaces.

.4 Include with the above any building finishes, components or materials that continue to exhibit signs of residual staining or mould growth.

3.6 POST-ABATEMENT CLEAN-UP

.1 After completion of the above gross removal work, and the application of any post-abatement encapsulants, perform the following:

.1 Wire brush where needed, then HEPA vacuum and/or wet wipe, using a suitable MCS, surfaces from which any mould was removed, or any other surfaces exposed to view by work of this Section.

.2 Include with the above, the cleaning of all other surfaces present throughout the work area including any hoardings walls, polyethylene sheeting, etc.

.3 Use crevice tools and other attachments as required to ensure a good level of cleanliness.

.4 Pre-clean, using a HEPA vacuums and/or by wet wiping, any equipment used within the area prior to its removal from the work enclosure.

.5 Bag small hand tools, brushes, and any items which cannot be effectively cleaned

prior to their removal from the work enclosure.

.2 Level of cleanliness must be acceptable to the Abatement Consultant.

.3 Schedule and obtain written approval of any Visual Clearance – Milestone Inspections specified from the Abatement Consultant before proceeding with the dismantlement of any perimeter barricades, signage, etc.

3.7 SITE DISMANTLEMNET

.1 Ensure workers engaged in any site dismantlement activities don a minimum of a half-face negative pressure respirator equipped with P100 high efficiency (HEPA) cartridge filters and any other PPE required by the work.

.2 Ensure the use of HEPA vacuums, where applicable, throughout the following work.

.3 Dispose of any polyethylene, tape, cleaning material, etc. scheduled for disposal in approved Mould Waste Containers.

.4 Remove polyethylene sheeting from surfaces.

.5 Remove polyethylene by carefully rolling away from any walls, etc. inward onto itself.

.6 Remove residual dust or debris exposed during the above work using a HEPA vacuum.

.7 Remove signs, hoarding walls, etc. from the work area.

.8 Seal any negative air cabinet intakes with polyethylene sheeting.

.9 Seal vacuum hoses and fittings, flexible ductwork and tools used in contaminated work area in 6 mil polyethylene bags prior to removal from the work area.

3.8 REINSTATEMENT OF FINISHES

.1 The General Contractor, Sub-Contractor, or any other party responsible for any reinstatement work shall first ensure all surfaces, finishes, and materials present at such locations are clearly documented as having been suitable dried.

END OF SECTION

Part 1 General

1.1 GENERAL AND RELATED WORK

.1 It is the intent of the following Section to outline key requirements and work procedures for the safe handling, removal, or clean-up of mould present at locations exceeding10 m^2 in size and/or as otherwise specified under this Section.

.2 Refer to the appropriate Section(s) as listed under Article 1.1 General and Related Work of Section 02 81 00.01, Hazardous Materials Abatement – General Provisions for specified requirements and work procedures for areas with lesser amounts of mould.

.3 Related work specified elsewhere:

.1 Section 02 81 00.01 Hazardous Materials Abatement – General Provisions

.2 Section 02 87 13.13 Mould Abatement – Level 1 Precautions

.3 Section 02 87 13.14 Mould Abatement – Level 2 Precautions

.4 Supply labour, material, plant, and equipment necessary to safely execute and complete work of this Section while in conjunction with work specified, required, or implied under Section 02 81 00.01, Hazardous Materials Abatement - General Provisions.

.5 Comply with the requirements of this Section during the handling, removal, or clean-up of mould present at locations exceeding 10 m^2 in size and/or as otherwise specified under Contract.

.6 Where work of this Section will result in the disturbance of an additional hazardous material other than mould, work shall be completed in conjunction with whatever additional requirements are specified under the applicable Section(s) as listed under Section 02 81 00.01, Hazardous Materials Abatement – General Provisions. In the event of any conflict between the requirements specified, work shall be completed in accordance with the more stringent requirements.

1.2 SCHEDULE

.1 The Contractor shall take note of the fact that it will take upwards of two working days, following the completion of the required Milestone – Visual Clearance, to obtain lab results for any Post-Abatement Air Clearances. During this time all hoarding walls, negative pressure units, etc. shall remain in place and fully operational.

1.3 INSPECTIONS

.1 Coordinate the following Milestone Inspection(s) with the Abatement Consultant:

.1 Milestone Inspection – Clean Site Preparations & Set-up

.1 Inspection of the Mould Work Area following the completion of site preparations and set-up but prior to the commencement of any contaminated work.

.2 Milestone Inspection – Bulk Removal

.1 Inspection of the Mould Work Area during active removal or clean-up activities to document the use of proper mould abatement precautions.

.3 Milestone Inspection – Pre-Encapsulant Visual Clearance

.1 Inspection of the Mould Work Area following the completion of bulk removal work but prior to the application of any encapsulants.

.4 Milestone Inspection – Visual Clearance

.1 Inspection of the Mould Work Area following the completion of required mould abatement but prior to commencing any site dismantlement work.

.5 Milestone Inspection – Post-Abatement Air Clearance

.1 Inspection and air monitoring of the Mould Work Area after a minimum 12 hour settling/flushing period of no work within the enclosure, but prior to any site dismantlement activities.

1.4 WORKER PROTECTION

.1 Provide facilities for washing of hands and face which shall be used by personal leaving the Mould Work Area. This can be a washroom in the vicinity of the Abatement Work Area.

.2 Respirator Protection: Provide personnel with the following respiratory protection:

.1 Personnel shall be provided with and must don a minimum of a full-face powered air purifying respirator (PAPR) equipped with P100 high efficiency (HEPA) cartridge filters during all phases of the work.

.2 Notwithstanding the above, personnel shall be provided with and must don a minimum of a half-face negative pressure respirator equipped with P100 high efficiency (HEPA) cartridge filters during any final dismantlement operations.

.3 Provide personnel with latex or nitrile gloves and suitable eye protection.

.1 Provide personnel with an additional pair of work gloves to be worn over top of the above noted latex or nitrile gloves during any demolition activities including the clean-up of waste materials.

.2 Provide personnel with a set of chemical resistant gloves wherever the above specified latex or nitrile gloves do not provide suitable protection based on individual cleaning agents, disinfectants, or encapsulants selected for used.

.4 Provide personnel with disposable full body coveralls complete with head covering and fits snugly at the ankles, wrists, and neck.

.5 Mould Work Area Entry & Exit Procedures:

.1 Before entering the Mould Work Area, proceed to the first of the attached airlocks (Clean Change Room) where workers shall remove any excess street cloths before donning a new set of disposable coveralls, specified respirator with new or tested filters, gloves and any other safety gear required by the work.

.2 Protective clothing shall cover hair and any remaining clothing.

.3 Each worker shall then proceed to the second of the attached airlocks (Equipment and Access Room) where they are to don any reusable clothing, footwear, or additional PPE left in the room before entering the Mould Work Area.

.4 Before leaving the Mould Work Area, remove visible contamination from

protective clothing and equipment using a HEPA vacuum or damp cloth before stepping into the first of the attached airlocks (Equipment and Access Room).

.5 Each worker shall then remove any reusable clothing, footwear, or any additional PPE (excluding respirator) scheduled for reused within the Mould Work Area.

.6 Ensure footwear and any reusable PPE worn in the Mould Work Area have been suitable cleaned prior to removal or place into a sealed bag for transportation to the next work area.

.7 Items scheduled for reuse shall be hung up on hooks provided or otherwise stored in an orderly fashion.

.8 Workers shall then remove any disposable coveralls, gloves, etc. worn within the work area and place them into an approved waste container as provided.

.9 Ensure workers enter the attached airlock (Clean Room) before removing their respirator.

.10 Workers shall then don their clothing and any required PPE (i.e. hardhats, safety glasses, etc.) before proceeding to designated wash area to complete the following:

.1 Wash exposed skin and respirator with soap and water.

.2 Seal inlet side of respirator filters with tape then remove filters for testing or dispose of as mould contaminated waste.

Part 2 Products and Facilities

2.1 MATERIALS AND EQUIPMENT

.1 Drop Sheets: 0.15 mm thick woven fibre reinforced fabric bonded both sides with fibre reinforced polyethylene sheet.

2.2 HOARDING WALLS

.1 Walls separating a Level 3 Mould Work Area from adjoining occupied areas shall be constructed as follows:

.1 Polyethylene sheeting installed to fully isolate the Mould Work Area.

.2 Enclosure may be supported by the ceiling grid, wood or metal studs, or zip-poles.

.3 Enclosure shall have polyethylene sheeting as a top at locations where the enclosure does not extend full height to underside of ceiling or structure.

.4 Substitute the above polyethylene sheeting with rip-proof polyethylene in occupied areas.

2.3 DECONTAMINATION FACILITIES

.1 Ideally, construct separate worker and waste decontamination facilities as described below. Where space is an issue, the worker decontamination facility can serve as the waste decontamination facility.

.2 Worker Decontamination Facility: A decontamination facility comprised of two (2)

linked rooms; an Equipment and Access Room and a Clean Change Room. Rooms, Occupied Area, and the Mould Work Area, shall be separated by curtained doorways at each door.

.1 Equipment and Access Room: Room between Clean Change Room and the Mould Work Area. Minimum requirements as follows:

.1 Waste receptor for contaminated clothing or equipment not to be reused.

.2 Hooks for hanging of any equipment or reusable clothing.

.3 Sized to accommodate crew size but must be a minimum of 1.5 m^2.

.2 Change Room: Room between the Equipment and Access Room and the Occupied Areas. Minimum requirements as follows:

.1 Provide lockers or hangers for worker street clothes and personal belongings.

.2 Sized to accommodate crew size but must be a minimum of 1.5 m^2.

.3 Waste and Equipment Decontamination Facility: A waste and equipment decontamination facility comprised of two (2) linked rooms; a Container Cleaning Room and a Transfer Room. Purpose of this system is to provide a means to decontaminate waste containers, tools, equipment and materials required in the work area. Rooms, Occupied Area, and the Mould Work Area, shall be separated by curtained doorways at each door.

.1 Container Cleaning Room: Room between the Mould Work Area and Transfer Room. Minimum requirements as follows:

.1 Suitable size to allow proper washing of equipment and waste containers but must be a minimum of 1.5 m^2.

.2 Transfer Room: Room between the Container Clean Room and Occupied Area. Minimum requirements as follows:

.1 Suitable sized to act as an air lock for the double bagging and transfer of waste and equipment. Minimum size of 1.5 m^2.

.4 Construction of Decontamination Facilities:

.1 Floor:

.1 Lay one (1) sheet of rip-proof polyethylene over floor area that will be covered by decontamination facility prior to erecting wall framing.

.2 Turn 300 mm of rip-proof polyethylene up the outside of the decontamination facility and overlap with the polyethylene sheeting covering the exterior perimeter wall.

.2 Perimeter Walls:

.1 38 mm x 89 mm wood or metal stud framing at 400 mm o/c with continuous top and sill plates.

.2 Cover each side of framing with one (1) layer of polyethylene sheeting.

.3 Use rip-proof polyethylene at locations exposed to non-construction areas.

.3 Interior Walls:

.1 Construct walls to separate the rooms of the decontamination facilities using 38 mm x 89 mm wood or metal framing at 400 mm o/c with continuous top and sill plates.

.2 Cover walls with one (1) layer of polyethylene sheeting on each side.

.4 Roof:

.1 Size of joists is to be determined by span. For spans up to 3.3 meters use a minimum 38 mm x 152 mm wood joist at 400 mm o/c with continuous 38 mm x 152 mm headers.

.2 Where roof is exposed to the work area, cover joists with 20 mm plywood sheeting. Cover plywood with one (1) layer rip-proof polyethylene.

.3 Where roof is exposed to the occupied area, install a layer of polyethylene directly over joists. Use rip-proof polyethylene at locations exposed to non-construction areas.

.4 At underside of joist install one (1) layer of polyethylene.

.5 Minimum interior clear height 2.0 m to underside of joists.

.5 Construct curtained doorways as follows:

.1 Place two (2) overlapping sheets of polyethylene (use rip-proof polyethylene sheeting in occupied areas) over an existing or temporarily framed doorway.

.2 Secure the vertical edge of one (1) sheet along one (1) jamb of the doorway and the vertical edge of the second sheet along the opposite jamb. Then secure both sheets to the head jamb of the framed opening.

.3 Polyethylene shall be reinforced with duct tape and weight bottom edge to ensure automatic closing. Provide directional arrows indicating opening.

Part 3 Execution

3.1 CLEAN SITE PREPARATION

.1 Perform a pre-abatement damage survey and submit to Abatement Consultant.

.2 Isolate or otherwise disable HVAC systems, vents and diffusers located within Mould Work Area. System(s) shall remain disabled until completion of work and final dismantlement of any perimeter barricades.

.3 Isolate the Mould Work Area from adjoining areas through the constructing of temporary hoarding walls at locations where existing walls do not provide required site isolation.

.4 Maintain emergency and fire exits from Mould Work Area or establish alternative exits satisfactory to Provincial Fire Marshall and local authorities having jurisdiction. Maintain extra routes from occupied areas.

.5 Provide separate Worker and Waste Facilities adjacent to each Mould Work Area.

.6 Provide specified ground fault panel(s) within each Mould Work Area.

.7 Install temporary lighting in all work areas at levels that will provide for a safe and

efficient use of the work area.

.8 Seal all below ceiling openings to work area using polyethylene, tape, caulking, etc., including but not limited to windows, doors, vents, diffusers, etc.

.9 Where applicable, provide specified Equipment Enclosures at locations identified.

.10 Where specified, isolate existing furnace(s), boiler(s), hot water tank(s) and any other gas-fired equipment or appliances, and in such a manner as to ensure the safe and uninterrupted use of this equipment. Provide sufficient combustion air to overcome the effect of negative pressure within each work enclosure.

.11 Protect in place, using polyethylene sheeting, drop cloth, or other suitable means any remaining items.

.12 Protect floor surfaces using a minimum of one-layer rip-proof polyethylene sheeting.

.13 Install an additional layer of rip-proof polyethylene sheeting over any carpeted areas.

.14 Excluded from the above, any crawlspace areas or floor surfaces scheduled for removal as part of work completed under this Section.

.15 Notwithstanding the above exclusions, a drop sheet, suitably sized to capture all fallen debris and waste, must be provided below and immediately adjacent to all points of abatement at locations not protected by a layer of rip-proof polyethylene sheeting.

.16 Install, minimum one (1) layer 6 mil polyethylene sheeting over wall surfaces scheduled to remain wherever such finishes cannot readily be cleaned upon completion of work.

.17 Ensure surfaces requiring protection are pre-clean using HEPA vacuum or damp cloth prior to installing protection.

.18 Establish negative pressure within each work enclosure as follows:

.1 Provide specified HEPA filtered negative pressure unit(s) within each work enclosure.

.2 Operate negative pressure unit(s) continuously from this point until completion of site dismantlement and/or as otherwise directed by the Abatement Consultant.

.3 Install a minimum of two (2) differential pressure monitor at the perimeter of each work enclosure at locations approved by the Abatement Consultant.

.4 Provide additional equipment as necessary to maintain specified pressure drop and to ensure, that at all times, air movement at the perimeter of the work enclosure flows inward into the site.

.5 Distribute negative air source evenly throughout the site.

.6 Install fans, as required, to ensure effective air movement and specified air exchange is provided at all locations.

.7 Install and make airtight all negative air discharge ducting.

.8 Leak test in place using DOP test method, negative pressure units and any vacuums, which discharge, directly into any occupied areas. Discharge into occupied areas only with written approval of the Abatement Consultant.

.9 Install weighted flaps as necessary to provide make-up air.

.19 Provide required tools, equipment, vacuums, materials, and waste receptacles within each

established work enclosure.

.20 Post signage identifying the area as a Mould Work Area. Wherever possible, such signage shall be located out of public view but at a location, and in sufficient numbers, to adequately warn of any mould hazard.

.21 Post MLITSD Notice of Project (if required) and corresponding Worker Protection Procedures at each access point to the area.

.22 Schedule and obtain written approval of any Clean Site Preparation & Set-up – Milestone Inspections specified from the Abatement Consultant before proceeding.

3.2 CONTAMINATED SITE PREPARATION

.1 Where site preparations, as outlined in Article 3.1 above, may result in the disturbance of mould, or surfaces contaminated by mould, complete this work (Contaminated Site Preparation) during quiet hours after shutting down HVAC systems affected by the work.

.2 Proceed with required work while utilizing full personal protective procedures and equipment.

.3 Provide additional negative air units as required to ensure proper airflow.

.4 Wherever work will extend above existing ceiling finishes, remove ceiling tiles, grids or other obstructions as required to access ducts, shafts, and perimeter decking, to complete required isolation, seals and installation of upper perimeter hoarding walls.

.5 Remove ceilings in sections equal to the work that can be completed during each shift.

.6 Seal holes in existing perimeter walls, columns, deck, etc. exposed by removal of ceiling.

.7 Temporarily support existing electrical, communication and mechanical services, temporary lighting and items previously supported by the ceiling systems.

.8 Remove or protect remaining equipment or surface mounted fixtures scheduled to be reused or turned over to the City of Toronto which could not be completed previously without the disturbance of mould.

.9 Schedule and obtain written approval of any Contaminated Site Preparation – Milestone Inspections specified from the Abatement Consultant before proceeding.

3.3 MAINTENANCE OF MOULD WORK AREA

.1 Inspect perimeter hoarding walls and other perimeter seals at the beginning and end of each working period. Inspection must be performed by a Competent Person.

.2 Inspect HEPA filtered vacuums and any negative pressure exhaust cabinets and any exhaust tubing at the beginning and end of each working period to ensure this equipment is functional properly and is in good condition. Replace any damaged or non-functional equipment upon discovery. Inspection must be performed by a Competent Person.

.3 Repair any damaged hoarding walls, seals, and enclosures immediately upon discovery.

.4 Maintain work area in a tidy condition and free of dislodged materials or other debris.

3.4 MAINTENANCE OF DECONTAMINATION FACILITIES

.1 Maintain and clean decontamination facilities at the following frequency:

.1 Thoroughly clean Worker Decontamination Facility at beginning and end of each shift change.

.2 Clean Equipment and Waste Facility on a frequent basis during waste or equipment removal and at the completion of each shift change.

.2 Visually inspect decontamination facilities at beginning and end of each working shift. Inspection must be performed by a Competent Person.

3.5 MOULD ABATEMENT

.1 As the work progresses, schedule and obtain written approval of any Bulk Removal - Milestone Inspections specified from the Abatement Consultant.

.2 Prohibit the use of compressed air during any of the following activities.

.3 Provide temporary support for electrical, telephone, and other wall mounted jacks or equipment as required due to the following demolition / cleaning activities.

.4 Where specified, proceed with the removal of baseboards, wall trimming, any remaining stored, fixed, or non-fixed items scheduled for cleaning, removal, and/or relocation, or as otherwise required to facilitate work of this Section.

.5 Removal of Building Finishes, Materials or Equipment Impacted by Mould and Water Damage:

.1 As work progressing, and throughout the removal process, mist materials with amended water to keep dust levels to a minimum.

.2 Proceed with the removal of building finishes, materials, any content, or debris, scheduled for removal in a controlled fashion to minimize disturbance of mould.

.3 Extend line of removal a minimum of one stud width or 300 mm beyond any visible mould growth or staining.

.4 Care must be taken during the above work to preserve the integrity of the underlaying vapour barrier (if present) or damage to any concealed services, etc.

.5 Remove and dispose of batt insulation exposed by the above work by carefully cutting back, then peeling away, the underlying vapour barrier (where present) to allow access to any insulation and the corresponding wall/ceiling cavity. Care must be taken during this process to maintain the integrity of the underlying vapour barrier adjacent to the lead edge of the opening to allow for the proper repair / reinstatement of the required vapour barrier.

.6 At locations where remaining framing members, wood studding or sheathing materials remain contaminated by mould or are structurally compromised due to dry rot, wood decay or excessive mould growth, such surfaces shall be cleaned to remove any loose debris, materials, etc. Ensure this work proceeds in a manner that maintains the integrity of the existing work enclosure. Provide temporary shoring or bracing as required.

.7 Notwithstanding the above, and at locations where the demolition of any remaining framing members, wood studding or sheathing materials will result in

a breach to the existing work enclosure, such work shall be scheduled following the completion of site dismantlement activities, and while adhering to Level 1 Mould Precautions.

.8 Schedule and obtain written approval of any Pre-encapsulant Visual Clearance - Milestone Inspections specified from the Abatement Consultant before proceeding with the application of any encapsulants.

.6 Any waste materials generated during the work shall be placed into specified waste container(s) and removed from the Mould Work Area as the work progresses.

3.6 APPLICATION OF A POST-ABATEMENT ENCAPSULANT

.1 Ensure prior written approval is obtained from the Abatement Consultant wherever a corresponding Pre-encapsulant Visual Clearance – Milestone Inspection has been specified before proceeding with the following work.

.2 Ensure surfaces are clean and dry before applying any post-abatement paints or encapsulants.

.3 At locations where the removal of remaining framing members, wood studding or sheathing materials visibly contaminated by mould cannot be completed without compromising the integrity of the existing work enclosure, or are otherwise scheduled to remain, proceed with the application of an approved microbial encapsulant. Repeat application process as required to ensure a complete and homogeneous coating of affected surfaces.

.4 Include with the above any building finishes, components or materials that continue to exhibit signs of residual staining or mould growth.

3.7 POST-ABATEMENT CLEAN-UP

.1 After completion of the above gross removal work, and the application of any post-abatement encapsulants, perform the following:

.1 Wire brush where needed, then HEPA vacuum and/or wet wipe, using a suitable MCS, surfaces from which any mould was removed, or any other surfaces exposed to view by work of this Section.

.2 Include with the above, the cleaning of all other surfaces present throughout the work area including any hoardings walls, polyethylene sheeting, etc.

.3 Use crevice tools and other attachments as required to ensure a good level of cleanliness.

.4 Pre-clean, using a HEPA vacuums and/or by wet wiping, any equipment used within the area prior to its removal from the work enclosure.

.5 Bag small hand tools, brushes, and any items which cannot be effectively cleaned prior to their removal from the work enclosure.

.2 Level of cleanliness must be acceptable to the Abatement Consultant.

.3 Schedule and obtain written approval of any Visual Clearance – Milestone Inspections specified from the Abatement Consultant before proceeding with the dismantlement of any perimeter barricades, signage, etc.

3.8 WASTE & MATERIAL HANDLING

.1 Removal of waste, decontaminated equipment and materials from the Mould Work Area shall be performed using the attached Waste Decontamination Facility as follows:

.1 Prior to entering the Waste Decontamination Facility, the first worker, positioned inside the Mould Work Area, shall remove any visible dust and gross debris from any item being removed.

.2 Waste materials shall be placed inside a sealed and approved waste container prior to removal from the Mould Work Area.

.3 The first worker then passes the item to a second worker located inside the Container Clean Room.

.4 The second worker then inspects the item for any visual trace of dust or debris, wet wiping any item requiring further cleaning.

.5 Any waste bags being removed shall be placed and sealed inside a second approved waste container prior to being passed through to the Transfer Room.

.6 Both the first and second workers shall be fully protected with specified PPE and must only exit the Mould Work Area via the designated Worker Decontamination Facility.

.7 A third worker then removes the item from the Transfer Room and transports it to the disposal bin and/or storage area. The third worker must never enter the Container Clean Room.

3.9 SITE DISMANTLEMNET

.1 Ensure workers engaged in any site dismantlement activities don a minimum of a half-face negative pressure respirator equipped with P100 high efficiency (HEPA) cartridge filters and any other PPE required by the work.

.2 Ensure the use of HEPA vacuums, where applicable, throughout the following work.

.3 Dispose of any polyethylene, tape, cleaning material, etc. scheduled for disposal in approved Mould Waste Containers.

.4 Remove polyethylene sheeting from surfaces.

.5 Remove polyethylene by carefully rolling away from any walls, etc. inward onto itself.

.6 Remove residual dust or debris exposed during the above work using a HEPA vacuum.

.7 Remove signs, hoarding walls, decontamination facilities / airlock, etc. from the work area.

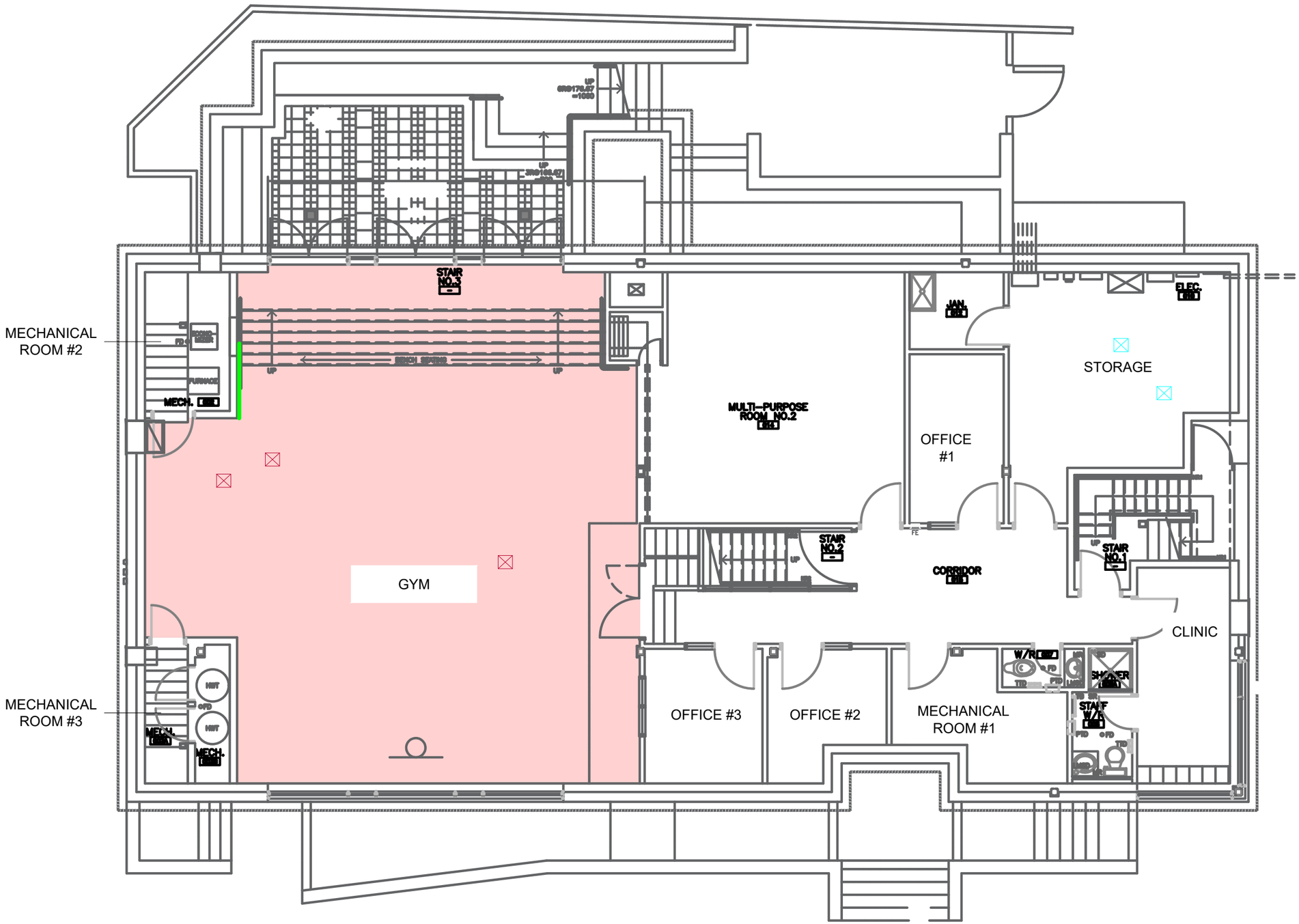
.8 Seal any negative air cabinet intakes with polyethylene sheeting.

.9 Seal vacuum hoses and fittings, flexible ductwork and tools used in contaminated work area in 6 mil polyethylene bags prior to removal from the work area.

3.10 REINSTATEMENT OF FINISHES

.1 The General Contractor, Sub-Contractor, or any other party responsible for any reinstatement work shall first ensure all surfaces, finishes, and materials present at such locations are clearly documented as having been suitable dried.

END OF SECTION



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LEGEND

- INTRUSIVE INSPECTION CUT
- INTRUSIVE INSPECTION CUT AND FIRE RATED HATCH
- REMOVE WALL FINISHES TO 4 FEET IN HEIGHT
- REMOVE WATER DAMAGED FLOOR FINISHES
- REMOVE DRYWALL CEILING/ BULKHEAD FINISHES
- NO ACCESS

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

BASE PLAN PROVIDED BY CLIENT.

PINCHIN

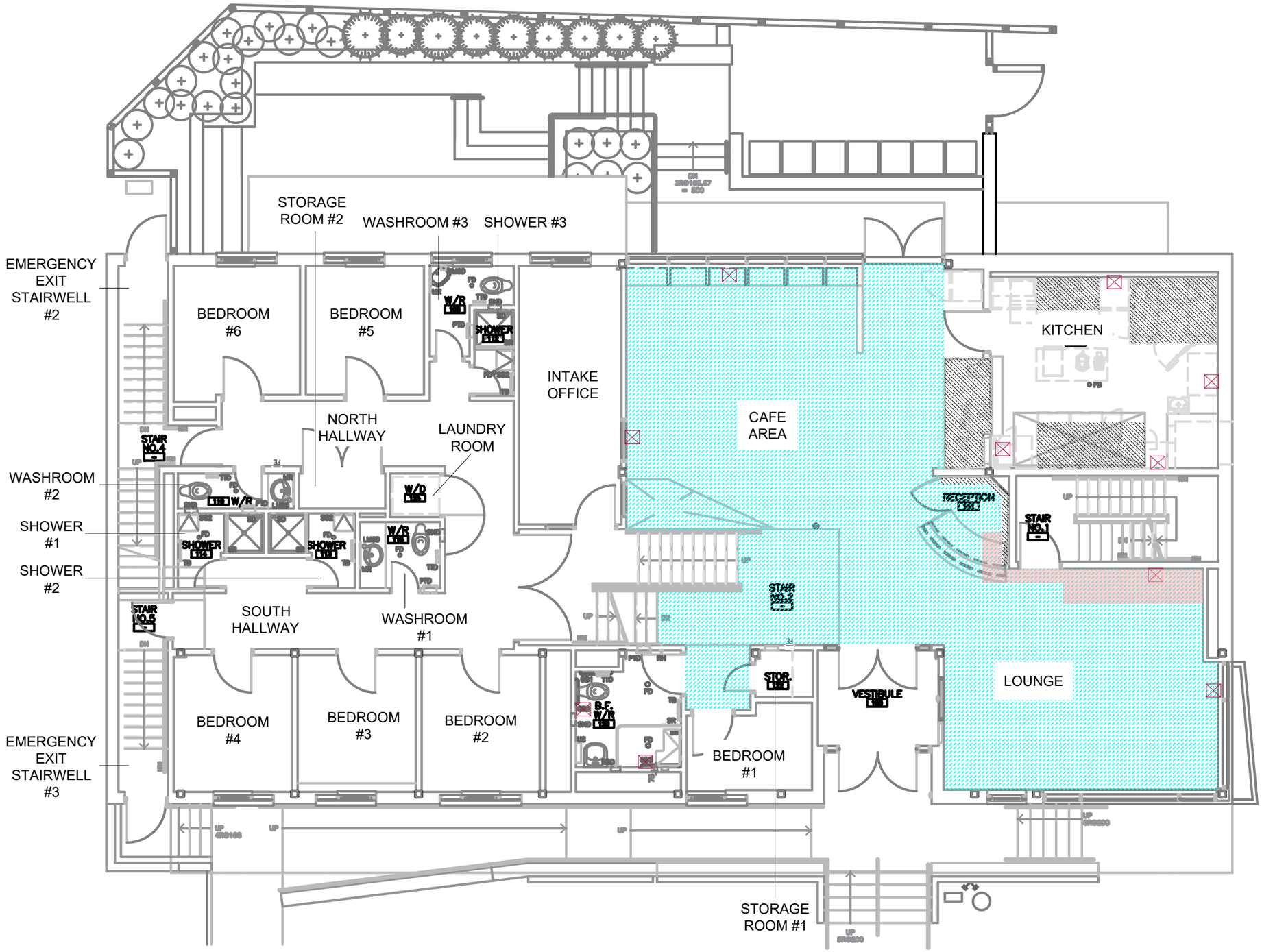
PROJECT NAME:
MOULD REMEDIATION

CLIENT NAME:
CITY OF TORONTO

PROJECT LOCATION:
25 CANTERBURY PLACE
TORONTO, ONTARIO

FIGURE NAME:
BASEMENT

PROJECT NUMBER:	SCALE:
316954.003	NOT TO SCALE
DRAWN BY:	REVIEWED BY:
JH	SW
DATE:	FIGURE NUMBER:
JULY 2023	MR-01R2



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LEGEND

- INTRUSIVE INSPECTION CUT
- INTRUSIVE INSPECTION CUT AND FIRE RATED HATCH
- REMOVE WALL FINISHES TO 4 FEET IN HEIGHT
- REMOVE WATER DAMAGED FLOOR FINISHES
- REMOVE DRYWALL CEILING/ BULKHEAD FINISHES
- NO ACCESS

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

BASE PLAN PROVIDED BY CLIENT.

PINCHIN

PROJECT NAME: MOULD REMEDIATION

CLIENT NAME: CITY OF TORONTO

PROJECT LOCATION: 25 CANTERBURY PLACE TORONTO, ONTARIO

FIGURE NAME: GROUND FLOOR

PROJECT NUMBER:	SCALE:
316954.003	NOT TO SCALE
DRAWN BY: JH	REVIEWED BY: SW
DATE: JULY 2023	FIGURE NUMBER: MR-02R2

APPENDIX III

Site Review Reports

Site Review Report

Project Information

Date: September 22, 2023	Pinchin Representatives: Nayomi Attapattu; Gokul Chandra; Brandon Cassidy	Report Number: 01 Pinchin File: 316954.004
Project Name: Mould Remediation	Site Address: 25 Canterbury Place, Toronto, Ontario	
Client: City of Toronto		Client File Number: N/A
Contractor: Inflector Environmental Services		Arrival on Site: 10:00am Number of Workers: 1+6

Distribution:

cc:	Sara Reid	City of Toronto	Sara.reid@toronto.ca
	Inder Bhamra	City of Toronto	Inder.bhambra@toronto.ca
	Kacey Taylor	Inflector	ktaylor@inflector.ca
	Brandon Cassidy	Pinchin Ltd.	bcassidy@pinchin.com

Description of Work in Progress

Material	Work Area	Work in Progress	Type of Review	Status
Mould	Work Area 1: Basement Gym	Environmental Abatement Council of Canada (EACC) level 3 mould procedures	Clean Site Preparation	Acceptable
Mould	Work Area 2: Ground Floor	Environmental Abatement Council of Canada (EACC) level 2 mould procedures	Clean Site Preparation	Acceptable

Discussion Points and Action Items	Both Work Areas 1 and 2 passed pre-contamination inspections at 10:45am.

Observations – Work Area 1: Basement Gym

Site Isolation & Facilities/Equipment	Acceptable	EACC level 3 site isolation has been properly constructed using 6mil rip-stop polyethylene sheeting. All enclosure seals are secure and in good condition. Mould hazard work signs have been posted at the entrance way to the work area. Wall cavities and pipe chases were sealed using tape and polyethylene. All necessary equipment needed for abatement work is present on site and in good working order.
Negative Pressure	Acceptable	Two negative air units are present and in operation. The units have been HEPA integrity tested (D.O.P. tested) onsite on September 20, 2023 and are venting indoors. The units are providing adequate negative air

Observations – Work Area 1: Basement Gym

		pressure to the work area.
Personal Protective Equipment	Acceptable	All workers have been equipped with proper personal protective equipment to perform EACC level 3 abatement work including Tyvek suits and full face respirators.
Dust Suppression	Acceptable	HEPA vacuums are present on site to reduce airborne dust levels within the work area.
Other	Acceptable	The work area passed pre-contamination inspection.

Enclosure entrance with the mould spore hazard sign.

Two negative air pressure units located in the basement gym area.

Negative air units HEPA integrity tested onsite on September 20, 2023

All seals are secure

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Observations – Work Area 2: Ground Floor

Site Isolation & Facilities/Equipment	Acceptable	EACC level 2 site isolation has been properly constructed using 6mil rip-stop polyethylene sheeting. All enclosure seals are secure and in good condition. Mould hazard work signs have been posted at the entrance way to the work area. Wall cavities and pipe chases been sealed using tape and polyethylene. All necessary equipment to perform abatement work is present on site and in good working order.
Negative Pressure	Acceptable	One negative air unit is present and operational. The unit has been HEPA Integrity Tested (D.O.P. tested) onsite on September 20, 2023, and is venting indoors. The unit is providing adequate negative air pressure to the work area.
Personal Protective Equipment	Acceptable	All workers have been equipped with proper personal protective equipment to perform EACC level 2 abatement work including Tyvek suits and half face respirators.
Dust Suppression	Acceptable	HEPA vacuums are present on site to reduce airborne dust levels within the work area.
Other	Acceptable	The work area passed pre-contamination inspection.

Enclosure entrance with the mould spore hazard sign

All seals are secure

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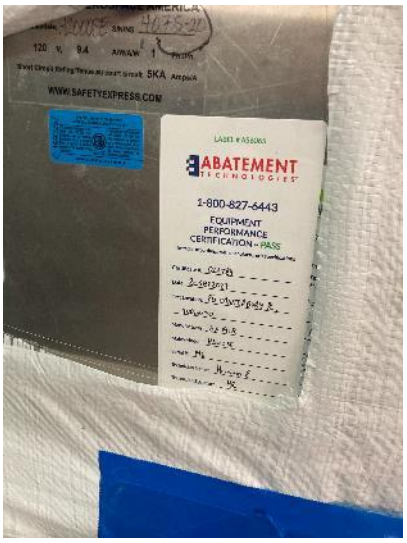
Observations – Work Area 2: Ground Floor

Negative air unit



Negative air unit HEPA integrity tested onsite on September 20, 2023

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Site Review Report

Project Information

Date: September 26, 2023	Pinchin Representative: Dzuy Dang; Gokul Chandra	Report Number: 02 Pinchin File: 316954.004
Project Name: Mould Remediation	Site Address: 25 Canterbury Place, Toronto, Ontario	
Client: City of Toronto		Client File Number: N/A
Contractor: Inflector Environmental Services		Arrival on Site: 10:00am Number of Workers: 1+4

Distribution:

cc:	Sara Reid	City of Toronto	Sara.reid@toronto.ca
	Inder Bhamra	City of Toronto	Inder.Bhamra@toronto.ca
	Kacey Taylor	Inflector	ktaylor@inflector.ca
	Brandon Cassidy	Pinchin Ltd.	bcassidy@pinchin.com

Description of Work in Progress

Material	Work Area	Work in Progress	Type of Review	Status
Mould	Work Area 1: Basement Gym	Environmental Abatement Council of Canada (EACC) level 3 mould procedures	Progress	Unacceptable
Mould	Work Area 2: Ground Floor	Environmental Abatement Council of Canada (EACC) level 2 mould procedures	Progress	Acceptable

Discussion Points and Action Items	Both Work Areas 1 and 2 have impacted finishes remaining. Enclosures remain intact with the proper negative pressures for remaining work to be completed. At the direction of the contractor, Pinchin will return to complete the final visual site review once all remediation is done.

Observations – Work Area 1: Basement Gym

Site Isolation & Facilities/Equipment	Acceptable	EACC level 3 site isolation remains erected. All enclosure seals are secure and in good condition. Mould hazard work signs remains posted at the entrance way to the work area. All necessary equipment needed for abatement work is present on site and in good working order.
Negative Pressure	Acceptable	Two negative air units remain present and operational. The units have been HEPA integrity tested (D.O.P. tested) onsite on September 20, 2023, and are venting indoors to the adjacent space. The units are providing adequate negative air pressure to the work area.
Personal Protective Equipment	Unacceptable	Workers within the EACC level 3 enclosure were observed wearing Tyvek suits, steel toe boots, hardhats, cut-proof gloves, and half-face respirators. The contractor was advised that full-face respirators should

Observations – Work Area 1: Basement Gym

		be worn when entering the EACC level 3 enclosure.
Dust Suppression	Acceptable	Levels of airborne dust were acceptable inside the work area at the time of the site review.
Waste Handling	Acceptable	All waste generated during abatement was observed to be in bags prior to removal from the work areas.
Other	Pending	Concealed and affected upper drywall ceiling/insulation **still to be removed** from Basement Gym. Pinchin will return to site upon removal for a final visual site review.

Entrance to enclosure with appropriate mould spore hazard signage.

Two negative air pressure units located in the basement gym area.

Negative air units HEPA integrity tested onsite, September 20, 2023.

Drywall in northeast corner of gym removed to 4 feet in height and waste placed in bags prior to removal from enclosure.

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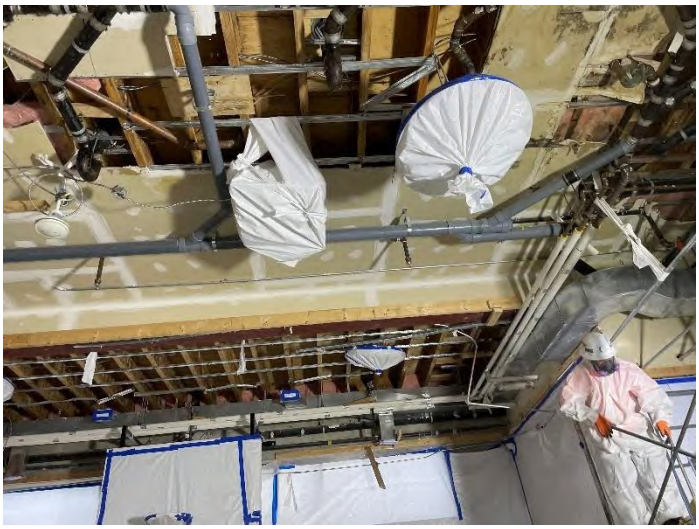
Observations – Work Area 1: Basement Gym

Drywall ceiling and Bulkhead finishes removed from Basement Gym.



Concealed and affected upper drywall ceiling/insulation **still to be removed** from Basement Gym.

Observations – Work Area 2: Ground Floor

Site Isolation & Facilities/Equipment	Acceptable	EACC level 2 site isolation remains erected. All enclosure seals are secure and in good condition. A mould hazard work sign remains posted at the entrance way to the work area. All necessary equipment needed for abatement work is present on site and in good working order.
Negative Pressure	Acceptable	One negative air unit remains present and operational. The unit has been HEPA Integrity Tested (D.O.P. tested) onsite on September 20, 2023, and is venting indoors to the adjacent space. The unit is providing adequate negative air pressure to the work area.
Personal Protective Equipment	Acceptable	All workers have been equipped with proper personal protective equipment to perform EACC level 2 abatement work including Tyvek suits, steel toe boots, hardhats, cut-proof gloves, and half-face respirators.
Dust Suppression	Acceptable	Levels of airborne dust were acceptable inside the work area at the time of the site review.
Other	Pending	Affected drywall ceiling and concealed upper ceiling **still to be removed** from Ground Floor Lounge. Pinchin will return to site upon removal for a final visual site review at the direction of the contractor.

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Observations – Work Area 2: Ground Floor

Entrance to enclosure with appropriate mould spore hazard signage.

All seals are intact and secured.

Negative air unit HEPA integrity tested onsite on September 20, 2023.

Water damaged floor finishes removed from the Ground Floor Café Area.

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Observations – Work Area 2: Ground Floor

Water damaged floor finishes removed from the Ground Floor Café Area.

Water damaged floor finishes removed from the Ground Floor Café Area.

Portions of water damaged floor finishes **still to be removed** from the Ground Floor Lounge.

Affected drywall ceiling and concealed upper ceiling **still to be removed** from Ground Floor Lounge.

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Site Review Report

Project Information

Date: September 29, 2023	Pinchin Representative: Brandon Cassidy; Nayomi Attapattu	Report Number: 03 Pinchin File: 316954.004
Project Name: Mould Remediation	Site Address: 25 Canterbury Place, Toronto, Ontario	
Client: City of Toronto		Client File Number: N/A
Contractor: Inflector Environmental Services		Arrival on Site: 10:00am Number of Workers: 1+4

Distribution:

cc:	Sara Reid	City of Toronto	Sara.reid@toronto.ca
	Inder Bhamra	City of Toronto	Inder.Bhamra@toronto.ca
	Kacey Taylor	Inflector	ktaylor@inflector.ca
	Brandon Cassidy	Pinchin Ltd.	bcassidy@pinchin.com

Description of Work in Progress

Material	Work Area	Work in Progress	Type of Review	Status
Mould	Work Area 1: Basement Gym	Environmental Abatement Council of Canada (EACC) Level 3 mould procedures	Visual Clearance	Acceptable
Mould	Work Area 2: Ground Floor	Environmental Abatement Council of Canada (EACC) Level 2 & 1 mould procedures	Visual Clearance	Acceptable

Discussion Points and Action Items	The final visual for both areas passed at 11:30am. The contractor may disassemble the enclosures. However, some vinyl floor tile remains underneath the enclosure in work area 2 on the ground floor. The contractor will send Pinchin photos once the enclosure and the remaining floor tiles are removed.

Observations – Work Area 1: Basement Gym

Site Isolation & Facilities/Equipment	Acceptable	EACC level 3 site isolation remains erected. All enclosure seals are secure and in good condition. Mould hazard work signs remains posted at the entrance way to the work area. All necessary equipment needed for abatement work is present on site and in good working order.
Negative Pressure	Acceptable	Two negative air units remain present and operational. The units have been HEPA integrity tested (D.O.P. tested) onsite on September 20, 2023, and are venting indoors to the adjacent space. The units are providing adequate negative air pressure to the work area.
Dust Suppression	Acceptable	Levels of airborne dust were minimal inside the work area at the time of the site review.

Observations – Work Area 1: Basement Gym

Waste Handling	Acceptable	All waste generated during abatement was removed from site.
Cleaning	Acceptable	Cleaning within the work area was adequate.
Other	Acceptable	The contractor achieved the scope of work within the basement gym and has been advised to tear down the enclosure.

Entrance to enclosure with appropriate mould spore hazard signage.

Two negative air pressure units located in the basement gym area.

View of the removed Basement Gym ceiling.

Drywall in northeast corner of gym removed to 4 feet in height.

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Observations – Work Area 1: Basement Gym

Drywall ceiling and Bulkhead finishes removed from Basement Gym.

Observations – Work Area 2: Ground Floor

Site Isolation & Facilities/Equipment	Acceptable	EACC level 2 site isolation remains erected. All enclosure seals are secure and in good condition. Mould hazard work signs remains posted at the entrance way to the work area. All necessary equipment needed for abatement work is present on site and in good working order.
Negative Pressure	Acceptable	One negative air unit remain present and operational. The unit was HEPA integrity tested (D.O.P. tested) onsite on September 20, 2023, and is venting indoors to the adjacent space. The unit is providing adequate negative air pressure to the work area.
Dust Suppression	Acceptable	Levels of airborne dust were minimal inside the work area at the time of the site review.
Waste Handling	Acceptable	All waste generated during abatement was removed from site.
Cleaning	Acceptable	Cleaning within the work area was adequate.
Other	Pending	The contractor achieved the scope of removal of the impacted ceiling and bulkhead within the Lounge and has been advised to tear down the enclosure. The majority of the impacted flooring was removed on the ground floor. However, a small section remains directly underneath the enclosure area. The contractor will send Pinchin photos once the enclosure and the remaining floor tiles are removed.

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Observations – Work Area 2: Ground Floor

Entrance to enclosure with appropriate mould spore hazard signage.

Negative air unit HEPA integrity tested onsite on September 20, 2023.

View of removed ceiling and bulkhead within the Lounge.

Water damaged floor finishes removed from the Ground Floor Lounge.

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Observations – Work Area 2: Ground Floor

Water damaged floor finishes removed from the Ground Floor Café Area.

Water damaged floor finishes removed from the Ground Floor Café Area.

Portions of water damaged floor finishes removed from the Ground Floor Café Area.

View of the small section of vinyl floor tile to be removed underneath the enclosure.

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