



**REGION OF PEEL
EMIL V. KOLB CENTRE
PEEL REGIONAL POLICE FACILITY
INTERIOR RENOVATION PROJECT**

180 Derry Road East, Mississauga ON L5T 2Y5



Tender

**PROJECT
SPECIFICATIONS
VOLUME 1 OF 2**

ISSUED FOR:

1) Issued for Construction

August 2026

Section Number	Title	# of Pages
VOLUME 1 OF 2		
Division 00	Introductory Information	
00 00 10	Cover Page	1
00 01 00	Table of Contents	5
Division 1	General Requirements	
01 00 00	General Instructions	17
01 02 00	Cash Allowances	1
01 05 00	Field Engineering	1
01 06 00	Regulatory Requirements	1
01 11 00	Summary of Work	10
01 14 00	Site Safety Protocol for Occupied Buildings	6
01 20 00	Site Administration	2
01 33 00	Submittals	8
01 35 16	Alterations and Additions	4
01 40 00	Quality Control	4
01 42 00	Abbreviations	2
01 50 00	Construction Facilities and Temporary Controls	5
01 60 00	Product and Workmanship	2
01 63 00	Substitutions	2
01 74 00	Cleaning	2
01 78 00	Contract Closeout	5
01 91 00	General Commissioning Requirement	11
Division 2	Existing Conditions	
02 40 00	Selective Demolition	5
Division 4	Masonry	
04 20 00	Unit Masonry	15
Division 5	Metals	
05 99 90	Miscellaneous Metals	7

Division 6	Wood and Plastic	
06 10 00	Rough Carpentry	7
06 20 00	Finish Carpentry and Millwork	13
Division 7	Thermal and Moisture Protection	
07 21 00	Building Insulation	8
07 84 00	Fire Stopping And Smoke Seals	21
07 90 00	Caulking And Sealants	6
Division 8	Doors and Windows	
08 11 00	Hollow Metal Doors and Frames	10
08 14 00	Wood Doors	7
08 31 00	Access Doors and Panel	6
08 71 00	Finishing Hardware and Schedule	57
08 80 00	Glass and Glazing	7
Division 9	Finishes	
09 29 00	Gypsum and Cement Board	16
09 30 00	Porcelain and Ceramic Tile	10
09 34 00	Waterproofing Membrane Tiling Materials and accessories	6
09 51 00	Acoustical Ceilings	9
09 65 00	Resilient Flooring and Accessories	6
09 68 00	Carpet Tile	6
09 84 13	Acoustical Wall and Ceiling Panels	4
09 90 00	Painting	10
Division 10	Specialties	
10 21 13	HDPE Toilet/Shower Partitions	5
10 22 19	Demountable Partitions	5
10 26 41	Bullet Resistant Panels	3
10 28 00	Washroom Accessories	8
Division 12	Furnishings	
12 36 51	Quartz Countertops	5
12 36 61	Solid Surface Countertops	5

Appendices

Appendix A	Asbestos Report by Maple Environment Inc. dated October 9, 2025
Appendix B	Peel Regional Police Network Cabling Specifications Dated February 12, 2019

VOLUME 2 OF 2

Division 25	Mechanical (Under Separate Cover)
Division 26	Electrical (Under Separate Cover)
Division 27	Communications (Under Separate Cover)
Division 28	Electronic Safety and Security (Under Separate Cover)

END OF TABLE OF CONTENTS

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Work of this Contract comprises an interior fit-up for Peel Regional Police Facility at 180 Derry Rd.
- 1.1.2 Perform Work under one Contract; the Contract will be in the form of the Agreement between Owner and Contractor, Canadian Standard Construction Document, CCDC 2, 2020, Stipulated Price Contract as amended by the Supplementary Conditions.

1.2 RELATIONS OF TRADES

- 1.2.1 The Contract Specifications included in the drawing have been generally divided into trade sections for the purpose of ready reference.
- 1.2.2 The Contractor is responsible for coordinating all trades. The Contractor is solely responsible for determining the lines of demarcation between Contractor and/or trades. Neither the Consultant nor the Owner, assume any responsibility for any such determination or for any dispute arising concerning it. No extras will be considered due to any such dispute concerning either labour or materials.
- 1.2.3 Specifications and drawings form an integral part of the Contract Documents. Any subject or item omitted from one, but which is mentioned or reasonably implied in the other, shall be considered as properly and sufficiently specified and will be part of the Work.

1.3 ADDITIONAL DRAWINGS

- 1.3.1 Consultant may furnish additional drawings to assist proper execution of the Work. These drawings will be issued for clarification only. Such drawings, however, shall have the same meaning and intent as if they were included with plans referred to in the Contract Documents.

1.4 EXISTING SITE CONDITIONS

- 1.4.1 There are no unusual or remarkable existing site conditions beyond those shown or indicated on the drawings and/or specifications.
- 1.4.2 The Contractor shall assume the work site based on the existing conditions as shown on the drawings and visible on the job site at the time of the closing of the tender. All excavation, stockpiling, removal, importing and/or grading of soils is to be included in the work of this Contract. Refer to site plan drawings and soils investigation records.
- 1.4.3 Minor adjustments (not to exceed 150 mm) to the level of sodded areas, berms, etc., will be permitted, to the approval of the Landscape Architect, to suit the quantity of fill and top soil on site.

1.5 BYLAWS, PERMITS AND APPROVALS

- 1.5.1 Nothing indicated on the Drawings or Specifications is intended to be in conflict with any law, by-law or regulation of Municipal, Provincial, or similar Authority Having Jurisdiction.
- 1.5.2 Work of this Contract must conform with such laws, by-laws and/or regulations. Any required variation to, or deviation from, the drawings and specifications, shall be performed in accordance with the City of Brantford's Stipulated Price Contract, CCDC 2 - 2020, Changes in the Work,

conditional to the amendments referred to in Section 00 90 00 – Supplementary Conditions to CCDC 2 – 2020.

- 1.5.3 Furnish inspection certificates and/or permits as may be applicable as evidence that the installed Work conforms with laws, by-laws and regulations of Authorities Having Jurisdiction.
- 1.5.4 Each subtrade shall obtain and pay for all permits and licenses required by Municipal, Provincial, or other Authorities Having Jurisdiction, particular to their trade.
- 1.5.5 It is the final responsibility of the General Contractor to obtain all the required approvals and permits and include in his Total Stipulated Price, the cost of such approvals, permits and fees. The only exception is the Building Permit, which will be applied for by the Consultant and paid for by the Owner.
- 1.5.6 Any revisions or deviations required by any Authorities Having Jurisdiction must be reviewed by the Consultants before implementation.
- 1.6 ORGANIZATION
 - 1.6.1 Organize the Work of each section as required for satisfactory and expeditious completion of the Work. Take field dimensions required for the Work. Fabricate and install work to suit field dimensions and conditions.
 - 1.6.2 If applicable, take into account existing work to ensure best arrangements of components in available space. Contact the Consultant prior to commencing Work in critical locations and interface with other Contractors' Work.
 - 1.6.3 Provide all forms, templates, anchors, sleeves, inserts and accessories required to be installed in the Work. Set in place, or instruct the applicable subtrade as to their location. Pay costs of extra work, if required, as a result of a failure to comply with these requirements at the proper time.
 - 1.6.4 Before starting his work and from time to time as the work progresses, each Subcontractor shall examine the work and materials installed by the other Subcontractors insofar as it effects his own work, and the General Contractor shall promptly notify the Consultant IN WRITING, if any condition exists that will prevent any Subcontractor from giving a satisfactory result in his own work.
 - 1.6.5 Should any Subcontractor start his own work without such notification, it shall be construed as an acceptance by him of all preceding work and as a waiver of all claims or questions as to its suitability for receiving his work.
- 1.7 CANADIAN PRODUCTS AND LOCAL LABOUR
 - 1.7.1 To the extent that the same are available and consistent with the proper economy and expeditious completion of the Contract, Canadian equipment, materials, products and other such applicable items are preferred by the Owner to be used in the Work, wherever possible and practical.

PART 2 - PRODUCTS

2.1 MATERIALS AND WORKMANSHIP

- 2.1.1 All materials shall be new and the best of their respective kinds. Pre-packaged materials shall be delivered and stored in unopened containers.
- 2.1.2 All work performed under this Contract shall be done by mechanics skilled in their respective trades. They shall make use of such templates, jigs or special tools as may be required for the operation involved.
- 2.1.3 The acceptance of any materials or workmanship shall not be a bar to their subsequent rejection, if found defective.
- 2.1.4 Adequate, dry storage facilities shall be provided and all stored materials shall be protected from damage and theft.
- 2.1.5 All Contractors will do Work in accordance with the best industry practice of the type of work specified, unless the Contract Documents stipulate more precise requirements, in which case, the more precise requirements shall govern.
- 2.1.6 Do Work in a neat, plumb & square manner. Ensure that various work components are properly installed, forming tight joints and appropriately aligned junctions, edges and surfaces, free of warps, twists, waves, or other such irregularities.
- 2.1.7 Wherever indicated on the drawings or specifications, or in the manufacturers' / suppliers' written instructions, arrange to have manufacturers' / installer's representatives inspect the Work which incorporates their materials, products or items.
- 2.1.8 Do not permit materials to come in contact with other materials such conditions may result in corrosion, staining, discolouration or deterioration of the completed Work. Provide compatible, durable separators where such contact is unavoidable.
- 2.1.9 The design of the Work is based on the full interaction of its component parts. No provisions have been made for conditions occurring during construction. Ensure that no part of the Work is subjected to a load which will endanger its safety or which might cause permanent deformation.
- 2.1.10 Conceal pipes, ducts, conduit, wiring and other such items requiring concealment preferably in wall or ceiling construction of all finished areas. If in doubt as to method of concealment, or intent of the Contract Documents in this regard, request clarification from the Consultant before proceeding with the Work.
- 2.1.11 Lay out mechanical and electrical work well in advance of concrete placement and furring installation to allow for proper concealment. Test and inspect Work before applying pipe covering and before it is concealed.
- 2.1.12 Provide and maintain control lines and levels required for the Work. Lay out the Work in accordance with these lines and levels and dimensions indicated on the drawings.
- 2.1.13 Verify lines, levels and dimensions and report any errors or inconsistencies on the drawings to the Consultants.
- 2.1.14 Final responsibility of satisfactory completion of all the Work, however, lies with the General Contractor.

PART 3 - EXECUTION

3.1 QUALITY CONTROL

- 3.1.1 The Consultants and authorized Owner staff shall have access to all areas of the Work, including any off site construction facilities.
- 3.1.2 The General Contractor shall give timely notice requesting inspection if Work is designated for special tests, inspections, or approvals by the Consultants, or any other authorized Owner staff, or testing and inspection company.
- 3.1.3 If the General Contract covers, or permits to be covered Work that has been designated as outlined above, he shall uncover such work, have the inspections and tests satisfactorily completed and make good such work at no additional cost to the Owner.
- 3.1.4 The Consultants or the Owner may order any part of the Work to be examined, if such Work is suspected not to be according to the Contract Documents. If, upon examination, such work is found not to be in accordance with the Contract Documents, then the General Contractor shall correct such Work and pay for cost of examinations and correction. If such Work is found to be in full accordance with the Contract Documents, the Owner shall pay for the cost of examination and making good.
- 3.1.5 If defects are revealed during inspection and/or testing, the appointed agency may request additional inspection and/or testing to ascertain the full degree of defects. The General Contractor shall correct the defects and irregularities as reported by the inspection and/or testing agency, at no additional cost to the Owner and the General Contractor shall pay all associated costs for retesting and reinspection.
- 3.1.6 The General Contractor shall provide any tools, materials or equipment that may be required by the inspection and/or testing agencies in retesting the Work. (i.e. Video camera rental to reinspect incorrectly installed sewer lines.)
- 3.1.7 The employment of inspection and/or testing agencies does not, in any way, affect the General Contractor's responsibility to perform the Work in strict accordance with the Contract Documents.
- 3.1.8 The General Contractor shall remove all defective work, whether the result of poor workmanship by him or his subtrades, use of defective or damaged products, whether or not incorporated into the Work and any Work that has been rejected by the Consultants or the Owner's representative as failing to conform to the Contract Documents. Replacement and execution of the affected Work shall be done in full accordance with the Contract Documents, making good other trades' work damaged by such removals or replacements at no additional charge to the Owner.
- 3.1.9 If, in the opinion of the Consultant and/or the Owner, it is not expedient to correct the defective Work, or Work not performed in accordance with the Contract Documents, the Owner, may, at its sole discretion, deduct from the Contract Price, the difference in value between the work performed and that required by the Contract Documents, the amounts of which shall be determined by the Owner.
 - .1 The notable exception to the above item is a faulty installation of base and asphalt paving. If, the inspection agency, after performing random test holes to determine compaction and thickness of sub base, base and asphalt, determines that either one or both, are not according to what was specified in the Contract Documents, the Owner will not accept credits for such inconsistencies but rather, demand that any such installation

be removed and redone in its entirety, at the pleasure and convenience of the Owner, but within the first year of the warranty period.

3.2 OVERTIME

3.2.1 The General Contractor must include in his Total Stipulated Tender Price, all costs for overtime work and weekend work which may be necessary to complete the various portions of the Work, in accordance with the Completion Dates specified in the Form of Tender.

3.2.2 The Owner shall not entertain requests for any payments in connection with overtime work that may be required by the General Contractor, or any of his subtrades, in order to comply with the above referenced dates.

3.3 SCAFFOLDING

3.3.1 All necessary scaffolding shall be provided and constructed according to all by-laws and safety regulations. It shall be removed promptly and completely when no longer required.

3.4 WINTER CONSTRUCTION - WINTER ENCLOSURE & TEMPORARY HEATING

3.4.1 Provide weather-tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs. Close off floor areas where walls are not finished; seal off other openings; enclose building interior work area for temporary heat.

3.4.2 Provide temporary weather-tight heated enclosures over and around portions of the work to facilitate construction of concrete and masonry elements during winter weather conditions.

3.4.3 If the work is undertake during winter conditions, the Contractor is to employ comprehensive measures to ensure that structural and/or cosmetic damage due to freezing/thawing or frost does not affect the work. Open trenches, footings, foundations, and underground services in particular are to be kept frost-free at all times until full earth ground cover is restored.

3.4.4 Frozen fill or earth is not to be used for backfilling purposes. Under conditions where on-site materials are frozen, backfill with Type 3 fill "Crushed Run Limestone".

3.4.5 Winter Enclosure, Winter Heating, Defrosting, Frost Removal requirements shall be the responsibility of the Contractor. The Owner will not consider additional payments for such work except related conditions which are documented to exceed "Ten Year Storm" or "Ten Year" cold and frost depth conditions as verified by Environment Canada data.

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

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

3.4.8 Maintain temperatures of minimum 10 degrees Celsius in area where construction is in progress unless otherwise indicated in the contract documents. Protect exposure and adjacent services from freezing. Repair at no cost to the Owner any such services, buildings or other utilities disrupted by freezing.

3.4.9 Ventilated heated areas and keep structures free from exhaust combustion gases.

- 3.4.10 The permanent heating system of the building or portions thereof may be used when available only upon written permission by consultant.

3.5 PROTECTION OF OTHER WORK

- 3.5.1 Each trade shall avoid damage to other trades and shall take all measures necessary and provide all masking and materials necessary, to provide adequate protection.
- 3.5.2 Each Subcontractor shall be held responsible for all damage to work installed by others that is caused by this work or by anyone employed by him.
- 3.5.3 Patching and repairing of damaged work shall be done by the Contractor who installed the work, as directed by the Consultant, but the cost of same, shall be paid for by the Contractor who is responsible for the damage.

3.6 FASTENINGS

- 3.6.1 All fastenings must be permanent, of same metal, or compatible with any metals with which they are in contact, of adequate size and spacing, to ensure permanent anchorage against load or shear.
- 3.6.2 Exposed fastenings must be evenly spaced, neatly laid out and must not mar surfaces of prefinished materials.
- 3.6.3 No ram setting or similar techniques will be permitted, without prior written approval of the Consultant.

3.7 SUPPLY AND INSTALL

- 3.7.1 Unless specifically noted, "supply only", any reference to supply intends the **supply and installation** of material or item so noted.

3.8 OCCUPATION BEFORE COMPLETION

- 3.8.1 If the General Contractor, for any reason, does not have the Project completed by even the specified completion date and the Owner, of necessity, is forced to occupy any part of the building before the whole of the Work is completed, the Contractor will not be entitled to any indemnity for interference with their operation **and** a renegotiated Per Diem Liquidated Damages will continue to be calculated, even though the Owner has occupied the building.

3.9 GENERAL REQUIREMENTS

- 3.9.1 All Contractors shall examine carefully all drawings and specifications to inform themselves fully of all conditions and limitations pertaining to the work of the contract.
- 3.9.2 All Contractors shall co-operate and co-ordinate their work for the proper completion of the work, including co-ordination of delivery dates and commencement of subtrades work.
- 3.9.3 The responsibility for all work, including temporary structures, shoring and erection shall at all times rest with the General Contractor and his Subcontractors. The Consultant will review construction methods and shop drawings for general arrangements only. The method of obtaining the results contemplated by the Contract Documents shall be determined by the General Contractor.

- 3.9.4 The undertaking of period site review by the Consultant or Owner's Representative shall not be construed as supervision of actual construction, nor make them responsible for providing a safe place for work, visit, use, access, travel, or occupancy of the Consultant's or Owner's Representative.
- 3.9.5 The General Contractor shall be fully responsible for coordinating and expediting the work of all Subcontractors and shall employ the necessary and qualified personnel to provide the required quality of labour and materials and to prevent delays in the progress of the project. Each trade shall be afforded all reasonable opportunities for the installation of its work and for the storage and handling of its materials.
- 3.10 COORDINATION
- 3.10.1 The General Contractor shall coordinate all work and preparation on which subsequent work depends to facilitate mutual progress, and to prevent any conflict.
- 3.10.2 The General Contractor shall ensure that each trade makes known, for the information of the General Contractor and other trades, the environmental and surface conditions required for the execution of its work; and that each trade makes known the sequence of others' work required for installation of its work.
- 3.10.3 The General Contractor shall ensure that each trade, before commencing work, knows the requirements for subsequent work and that each trade is assisted in the execution of its preparatory work by trades whose work depends upon it.
- 3.10.4 The General Contractor shall ensure that shop and layout drawings, templates, and all information necessary for the location and installation of materials, openings, inserts, anchors, accessories, fastenings, connections and access panels are provided by each trade whose work requires cooperative location and installation by other trades and that such information is communicated to the applicable installer.
- 3.10.5 The General Contractor shall ensure that delivery of materials supplied by one trade to be installed by another, is well before the installation begins.
- 3.10.6 The General Contractor shall inform all trades that giving installation information in error, or too late to incorporate in the work, shall be responsible for any extra work caused thereby.
- 3.11 ACCESS TO THE PROJECT
- 3.11.1 The General Contractor for this Work shall, at all times allow the Owner, or any other Owner commissioned contractor or their employees, access into the building or around the premises, undisturbed, whether union or non-union, as may be required in the execution of other portions of the building work and installation of equipment, etc.
- 3.11.2 The General Contractor shall cooperate fully with any and all Owner commissioned Contractors.
- 3.12 SUBTRADE AWARDS
- 3.12.1 The Contractor shall, on notice of award of the contract, obtain the Consultants approval of a complete list of all persons or firms to which he proposes to sublet any part of the work, the trades or divisions of work which are to be sublet to each, and the amount of each trade. The General Contractor shall provide to the Consultant a financial breakdown showing all divisions of the work amounting to the full sum of the contract. Mechanical and Electrical trades shall be further broken down as specified in Divisions 21 and 26.

3.13 SAFETY DATA SHEETS

3.13.1 The General Contractor shall ensure that the following material and safety data sheets are submitted prior to commencing installation and application of at least the following:

lead-free solder	sealants and caulking
resilient flooring	paints and coatings
fertilizers	glues and adhesives
pesticides	herbicides

any other product which may give off air borne particles after installation.

3.13.2 The General Contractor and all of his Subcontractors must note that specifically, asbestos and asbestos containing materials, solder for piping containing lead, and paints & coatings containing lead and/or mercury must be excluded from any part of the Work.

3.13.3 The General Contractor must submit Certificates of Compliance, prior to the application for Substantial performance, for each of the following items:

- .1 An affidavit relative to the use of Lead-free solder for all domestic water lines, regardless of location.
- .2 Products for which Material Safety Data Sheets have been submitted and accepted.
- .3 Other Work/Products identified in the Contract Documents as requiring a Certificate of Compliance.
- .4 Each Certificate of Compliance must indicate names and addresses of the project, the Owner, the date of Issue, produce description including name, number, manufacturer, with a statement verifying that the Work/Product installed meets specified requirements and, if applicable, complies with the submitted and accepted Material Safety Data Sheets.

3.13.4 Each Certificate of Compliance must be issued on the trade's letterhead, properly executed, under whose work the respective Work/Product has been provided.

3.13.5 Each Certificate of Compliance must be endorsed by the General Contractor with his authorized stamp/signature.

3.13.6 The Completion Security Holdback will not be paid to the Contractor without submission of all required affidavits and requested material and safety data sheets.

3.14 REGULATING DOCUMENTS

3.14.1 The General Contractor and all of his Subcontractors, Suppliers/Installers etc., must conform to the latest editions of the Ontario Building Code (Ontario Reg. 413/90), the Canadian Electrical Code (CEC), CSA B44 and CSA W59, The Occupational Health and Safety Act, Ontario, 1990 (Bill 208), the National Fire Code, the local Municipal Fire Code, and all other applicable Codes and Building By-Laws. All must also conform to the requirements of the Authorities Having Jurisdiction, such as Public Utilities. Where required under the Occupational Health and Safety Act, engage a Professional Engineer to design formwork and falsework for concrete.

3.14.2 Contract forms, codes, standards and manuals referred to in these specifications are the latest published editions at the date of close of tenders. The General Contractor and all of his Subcontractors, Suppliers/Installers must meet or exceed the requirements of specified standards.

- 3.14.3 Provide, on site, copies of documents referred to in the Specification for joint use of Contractor and Consultant.

3.15 GENERAL CONTRACTOR'S RESPONSIBILITIES

The list of General Contractor's responsibilities identified below is by no means comprehensive, nor is it in any priority or critical order. It is here, merely to identify the most often forgotten or ignored responsibilities of the General Contractor and is reproduced only as a reminder. The Consultants and the Owner advise the General Contractor that it is they who are responsible for all aspects and facets of the Project, from start to completion, from compliance with Occupational Health and Safety regulations to compliance with all codes and statutes.

- 3.15.1 The General Contractor will be responsible to take all necessary steps to protect personnel (workers, visitors, general public, etc.) and property from any harm during the course of the contract.
- 3.15.2 All equipment shall be in safe operating condition and appropriate to the task.
- 3.15.3 Only competent personnel will be permitted on site. During the site introduction, only the Consultant will determine who is competent. The General Contractor will cause to remove from the site any persons not observing or complying with safety requirements.
- 3.15.4 The General Contractor shall comply with, and shall ensure that all of his Subcontractors, Suppliers, Installers etc., comply with all Federal, Provincial and Municipal Safety Codes and Regulations and the Occupational Health and Safety Act.
- 3.15.5 The General Contractor shall supply competent personnel to implement his safety program and ensure that all Subcontractors comply with the Owner's standards, and those of the Occupational Health and Safety Act.
- 3.15.6 The Owner will provide periodic monitoring to ensure that safety requirements are met, and that safety records are properly kept and maintained. Continued disregard for safety standards can cause the Contract to be cancelled and the General Contractor removed from the site.
- 3.15.7 The Owner may hire Commissioners to perform inspections of building systems at the closing stages of the work of this contract. If so contracted and identified in the Instructions to Bidders, the General Contractor shall cooperate with and coordinate the work of the Owner's Commissioners on site.
- 3.15.8 The General Contractor will report to the Owner and Jurisdictional Authorities any accident or incident involving personnel and/or property of the Contractor, Owner, or Public, arising from the General Contractor's or any of his Subcontractors' execution of the work.
- 3.15.9 The General Contractor will include all provisions of this contract in any agreement with Subcontractors, and hold them equally responsible for safe work performance.
- 3.15.10 If the General Contractor is responsible for a delay in the progress of the work due to an infraction of legislation or Owner's Health and Safety requirements, the Contractor will, without additional cost to the Owner, work such overtime, and acquire and use for the execution of the work such additional labour and equipment as to be necessary in the sole opinion of the Owner's Representative and Consultant, to avoid delay in the final completion of the work or any operations thereof.

3.16 MANUFACTURERS' INSTRUCTIONS

- 3.16.1 Unless otherwise specified, the General Contractor and all his Subcontractors shall comply with manufacturer's latest printed instructions for materials and installation methods.
- 3.16.2 The General Contractor shall notify the Consultant in writing of any conflict between the Specifications and Manufacturer's Instructions and have same clarified.

3.17 FIRE SAFETY

- 3.17.1 The General Contractor and all of his Subcontractors must comply with requirements of standard for Building Construction Operations DFC No. 301-1975, issued by Dominion Fire Commissioner.
- 3.17.2 The appropriate clauses of the Ontario Building Code relating to fire protection shall be strictly followed.
- 3.17.3 The General Contractor shall provide and maintain free access to temporary or permanent fire hydrants acceptable to local fire department.

3.18 CONSTRUCTION SAFETY

The General Contractor and all his trades must observe and enforce construction safety measures required by Canadian Construction Safety Code, Workplace Safety & Insurance Board, (formerly known as Workers' Compensation Board), and Municipal statutes. In particular, the Ontario Construction Safety Act, the regulations of the Ontario Department of Labour and Ontario Hydro Safety Requirements shall be strictly enforced. In event of conflict between any provisions of above authorities the most stringent provisions will apply.

The General Contractor is reminded, once again, that it is they who are responsible for Occupational Health and Safety on this Project. The items listed below are only guidelines of the Owner's expectations in this regard and not to be construed to be comprehensive or total in nature.

- 3.18.1 The Owner will take every reasonable precaution to prevent injury or illness to students, employees and the public, participating in activities, or performing their duties. This shall be accomplished by providing and maintaining a safe, health working environment by providing the education necessary to perform these activities or duties safely.
- 3.18.2 The Owner is vitally interested in the health and safety of all Contractors and their workers performing work for the Owner. Cooperation and support of the General Contractor in the protection of workers from injury or occupational disease is a major, continuing objective of the Owner. To achieve these goals, the Owner, in concert with the Contractors, will endeavour to make every effort to ensure that the Contractors provide a work site which is a safe and healthy work environment. The Owner insists that all Contractors and their workers are dedicated to the continuing objective of reducing risk and injury.
- 3.18.3 The General Contractor covenants and agrees to comply with all statutory and other obligations, including, without limitation, the provisions of the Occupational Health and Safety Act (Ontario) and all Regulations thereto, and all amending and successor legislation, including without limitation, Bill 208 (the "Act") in connection with all work performed by either the Contractor, Subcontractors, or any Other Contractor on, or in connection with, the Project.

- 3.18.4 Without limiting the foregoing, for the purposes of this Contract, the General Contractor agrees that they shall be the “constructor” of the Project within the meaning of the Act, and as such, shall assume all the obligations and responsibilities, and observe all construction safety requirements and procedures, and duties of inspection imposed by the Act on the “constructor”, as therein defined, for all work and services performed by the General Contractor, Subcontractors and Other Contractors on or in connection with the Project.
- 3.18.5 The General Contractor further covenants and agrees that the Owner and its existing and former officers, trustees, employees and agents, and their respective heirs, executors, administrators, successors and assigns (hereinafter collectively referred to as the “Owner”) shall be released from any obligations or liabilities otherwise imposed on the Owner, or on any of them, pursuant to the Act in connection with the Project, and that the General Contractor shall assume all liability and responsibility in connection with same.
- 3.18.6 The General Contractor agrees to save harmless and indemnify the Owner from any losses, damages, costs and expenses of any kind, or nature whatsoever, including all legal expenses, and all defense costs and related expert or consulting fees, incurred by the Owner, or any of them, arising in connection with the failure, default, or inability of the General Contractor of the Owner, or any of them, to comply with any of the aforementioned statutory, or other legal requirements, or arising in connection with any breach by the General Contractor of any of its covenants, agreements and obligations under this Contract.
- 3.18.7 The General Contractor shall inform and instruct Other Contractors that they, while performing work on this project, are under the authority of the General Contractor. Other Contractors are to discuss and co-ordinate with, and follow instructions from, the General Contractor on all matters of site access, vehicles, deliveries, storage, temporary facilities, coordination with the work of other subcontractors, work methods, scheduling, labour conditions, construction safety, environmental protection, security and all other matters which relate to the safe and proper execution of construction work.
- 3.18.8 The General Contractor shall ensure that all supervisory personnel on job site are fully aware of the procedures and requirements outlined above and comply with all requirements specified.
- 3.18.9 All Contractors are responsible to ensure that all machinery and/or equipment are/is safe and that the workers perform their tasks in compliance with established safe work practices or procedures. Workers must receive adequate training in their specific work tasks to protect their health and safety.
- 3.18.10 The General Contractor shall be responsible for all persons and companies performing work, including Other Contractors, on this project, at all times, up to and including, the date of Substantial Performance of the Work. Authority for coordination and instructions relating to all matters which relate to the safe and proper execution of construction work shall rest with the General Contractor. The Contract Price must include the General Contractor’s fees for the coordination and supervision of the work of all Other Contractors.
- 3.18.11 In addition to the responsibility of all contractors as outlined above, Subcontractors will be held accountable for the health and safety of workers under their supervision.
- 3.18.12 Every worker must protect his/her own health and safety by working in compliance with the law and with safe work practices and procedures established by the authorities having jurisdiction.
- 3.18.13 All sections of the Occupational Health and Safety Act for Industrial Establishments, latest edition, and the Occupational Health and Safety Act for Construction projects, latest edition, shall be

enforced, by the General Contractor, in their entirety, throughout the duration of the construction project.

3.18.14 The General Contractor shall provide the Consultant with the telephone number where the General Contractor or his representative can be reached at any time, day or night, for the duration of the contract.

3.18.15 Where an accident, explosion, or fire causes a person injury at the work place, and the worker is disabled from performing the usual task, the General Contractor shall prepare a written notice and shall forward same to the Ministry of Labour within four days of the occurrence with a copy to the Owner's Representative, who shall copy and inform the Owner's Supervisor of Health and Safety and/or the Owner's Joint Health and Safety Committee, containing such information and particulars as may be described.

3.18.16 Where a person is killed or critically injured from any cause at the work place, the General Contractor shall immediately call the Ministry of Labour. A written notice from the General Contractor shall be given to the Ministry of Labour within forty-eight hours after the occurrence, containing such information and particulars as may be prescribed, with copies to the Architect and the Owner's Representative.

3.18.17 The General Contractor is advised that the accident scene is under the jurisdiction of the Ministry of Labour and no wreckage, articles, etc., shall be interfered with, disturbed, destroyed, altered or carried away at the scene, or connected with the occurrence, until the Ministry of Labour has given permission.

3.19 INDEPENDENT TESTS AND INSPECTIONS

3.19.1 The Contractor shall appoint inspection firms as directed by the Consultant and make payments from the cash allowances specified in Division noted, except for the following, which shall be included in the contract:

- .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
- .2 Inspection and testing performed exclusively for Contractor's convenience.
- .3 Testing, adjustment and balancing of mechanical and electrical equipment and systems.
- .4 Mill tests and certificates of compliance.
- .5 Re-testing as already described in Quality Control of this Section.

3.19.2 The Consultant will authorize payment of inspection services from specified cash allowances.

3.19.3 The General Contractor shall furnish labour and facilities to:

- .1 Provide access to work to be inspected and tested.
- .2 Facilitate inspections and tests.
- .3 Make good work disturbed by inspection and test.
- .4 Pour concrete test cylinders and store as directed by Inspection Firm.

3.19.4 The General Contractor shall notify Inspection Firms sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

3.19.5 Where materials are specified to be tested, the General Contractor shall deliver representative samples in required quantity to testing laboratory.

3.20 PERIODIC CLEANING

- 3.20.1 As part of the Tender, the General Contractor shall provide all necessary garbage bins through the duration of the project. The General Contractor shall ensure that the following is accomplished:
- .1 Keep all areas of the Work clean and orderly, free from accumulation of dirt, debris, garbage, oily rags, excess material, or such other trash items. Remove such items for all areas of the Work on a daily basis.
 - .2 Vacuum and/or broom interior building areas when ready to receive painting and other finishes. Continue cleaning on an "as needed" basis until the building is ready for inspection and takeover.
 - .3 Schedule cleaning operations so that resulting dust and other contaminants do not affect wet, newly painted surfaces.
 - .4 First, conduct inspections of all exposed interior and exterior surfaces.
 - .5 Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from all exposed interior and exterior finishes, including glass and other polished surfaces.
 - .6 Remove all protective film from switchplates and hardware, particular kickplates.
 - .7 Clean lighting reflectors, lenses and other lighting surfaces.
 - .8 Broom clean paved surfaces and rake clean other disturbed surfaces in the area of the Work, to remove site debris caused by the Work of this Contract. Inspect for damages and make good.
 - .9 Remove debris and surplus materials from the roof areas and accessible concealed spaces.
 - .10 Replace heating, ventilation and/or air conditioning filters whether or not, the units were operated during construction operations.
 - .11 Refer to "clean-up" sections of the specifications for additional specific periodic and final clean up requirements.
- 3.20.2 The Owner requires that tiled (VCT) and sheet good floors (vinyl or linoleum) be broom swept, wet mopped, and waxed/polished.
- 3.20.3 Do not provide sealants and waxes on terrazzo, ceramic and other hard surfaced floors without reviewing products and methods of application with the Owner's Caretaking Staff. Failure to comply with this requirement will result in the contractor stripping these floors in their entirety.
- 3.21 DUST CONTROL
- 3.21.1 Provide dust tight screens or barriers to localize dust generating activities for the protection of tenants, employees, equipment, adjacent and finished areas of Work, and the public. Maintain and relocate protection until Work is complete. Respond immediately to complaints of dust received from the public, authorities having jurisdiction, Owner and Consultant.
- 3.21.2 Obtain Consultant's approval of installed dustproof screens and protection methods before proceeding with construction/alteration work.
- 3.21.3 Painted gypsum wallboard and metal stud dustproof screens, shall extend to underside of structure, and shall be erected to protect adjoining areas and rooms. Apply bead of sealant or other acceptable seal continuously around periphery of each face of partitioning to seal gypsum board/structure junction where dustproof screens abut fixed building components. Seal perimeter of cutouts, around fixtures and fittings and other penetrations. Tape or seal between adjacent boards. Separate construction areas from occupied areas.
- 3.21.4 Provide protection for existing equipment sensitive to dust and noise. Co-ordinate location of dust barriers and dust tight doors with Consultant.

- 3.21.5 Install temporary packing at bottom of doors to areas where demolition/construction shall be performed to prevent dust seepage into existing spaces. Do not permit dust and dirt to escape beyond area being constructed/altered.
- 3.21.6 Provide daily vacuuming of construction dust from existing areas as work progresses; this shall be considered a minimum requirement, increase vacuuming as necessary. The Owner may have vacuuming work done by others and cost deducted from Contractor's progress payments if this requirement is not fulfilled.
- 3.21.7 Provide locked doors in barriers to permit access by Consultant, Owner and Owner's security personnel to construction areas and to areas under Contractor's custody. Supply padlocks and construction cores.
- 3.21.8 Remove dustproof screens at completion of work in areas and make good damaged or blemished areas. Patch and make good to access, altered and damaged areas caused by work and screens. Maintain integrity of fire or sound separation.
- 3.21.9 Prevent nuisance to adjacent areas near the work from dust by taking additional appropriate anti-dust measures at such times as found necessary, and at other times complaints of dust are received from the Owner's representative and others.

3.22 TEMPORARY PROTECTION

- 3.22.1 The General Contractor must provide temporary barricades, screens and 6 ft. high construction fence as shown and directed by the Consultant and/or authorized Owner Representative, for the safety of persons, or for dividing the Work from portion or portions of the building or site that may be required for use by the building, or others.
- 3.22.2 Properly protect the Work from any damage by the elements. In cold weather cover all exterior openings in the work areas likely to cause water damage.
- 3.22.3 During off hours and/or stages of suspended operations for whatever reasons, the General Contractor must assume all responsibility for protection against the elements, theft and/or vandalism. This applies not only to the work in progress, but also to any materials, products, tools, equipment, or other such items left at the work site.
- 3.22.4 Properly protect floors and roofs from any damage. Take special precautions when moving heavy loads or equipment over floors and roofs.
- 3.22.5 The General Contractor must keep floors free of oils, grease or other such materials likely to discolour them and/or affect bonding of applied surfaces.
- 3.22.6 The General Contractor must ensure that no part of the Work is loaded greater than it was designed for, when completed. Make any temporary support as strong as the permanent support. Place no load on concrete structure until it has sufficient strength to safely bear such load.
- 3.22.7 Protect glass and other finishes against heat, slab and weld splatters, using appropriate protective shields and covers.
- 3.22.8 The General Contractor must provide and maintain, in good working order, appropriately labelled ULC fire extinguishers, to the approval of Authorities Having Jurisdiction.

- 3.22.9 The General Contractor must provide a minimum of two safety helmets on site at all times for the use of the Consultant and any other Owner authorized visitors to the site. It is the General Contractor's responsibility to make certain that any such visitors wear the protective headgear and any other safety gear which may be necessary at that particular time of construction.

3.23 COMPLETION

- 3.23.1 Upon completion of the Work, all protection erected shall be removed, all damage to the Work and adjoining Work due to the lack or failure of such protection shall be made good and all debris, surplus materials tools equipment shall be removed from the work areas and the site, and the Project shall be left clean and tidy to the full and complete satisfaction of the Consultant and the Owner Staff. The General Contractor shall give written notice to the Consultant, requesting final inspection of the completed Project.
- 3.23.2 Refer to the pertinent sections of the Specifications for requirements with respect to submission of Record Documents, Maintenance Materials, Special Tools and Spare Parts.

3.24 GUARANTEES

- 3.24.1 The following is a summary of the guarantees (in number of years) required by the contract:

Entire Building, General Contract	2
Miscellaneous Metals	2
Finish Carpentry and Millwork	2
4 ply membrane roofing	2
Joint sealants	2
Caulking	2
Hollow Metal Door and Screen	2
Aluminum Entrances and Screens	5
Glass and Glazing	2
Doors	3
Finish Hardware	3
Panic Devices and Door Closers	5
Acoustic Ceilings	2
Resilient Flooring and Accessories	5
Vinyl Composite Flooring	2
Porcelain and Ceramic Tile	3
Paint and Finishing	2
Toilet Partitions	2
Washroom Accessories	2
Countertops	10
Other Disciplines	As specified under respective Sections

- 3.24.2 The guarantee period shall start on the date of issue of the Certificate of Substantial Performance of the Contract by the Consultant.

3.25 DEMOLITION, RECONSTRUCTION, ALTERATIONS AND MAKING GOOD

- 3.25.1 Where the new additions and alterations interface with existing and where existing Work is altered execute all necessary cutting and fitting required to make satisfactory connections with

existing Work under this Contract. Leave the entire Work in a finished workmanlike condition acceptable to Consultant.

- 3.25.2 Make good all exterior finish system masonry, waterproofing, and other materials and finishes which are damaged or disturbed during execution of Work. Warranties specified for materials and workmanship shall apply.
- 3.25.3 Disconnect and relocate, where necessary, existing services and reconnect as required to complete the Work. This work shall include, without being limited to, plumbing, drainage, electrical and gas required for accommodation of new work. Abandon all services not required in conformance with ordinances and laws.
- 3.25.4 Co-ordinate work of the various trades, taking into account existing installations to assure best arrangements of pipes, conduit, ducts mechanical, electrical and other equipment, in the available space.
- 3.25.5 If required, in critical locations prepare interference or installation drawings, or both, showing the work of various trades as well as existing installations. Submit to Consultant for written permission before commencement of work.
- 3.25.6 Drilling and cutting of existing work shall be carefully done, leaving a clean hole no larger than required. All patching shall be done to Consultant's approval.
- 3.25.7 Make good all areas disturbed to adjoining buildings due to the Work of this Contract.
- 3.25.8 Effectively seal off work area from the rest of the building to permit the continuation of Owner's operations during new construction.
- 3.25.9 Provide dust and weather tight temporary enclosures complete with hinged doors, fastenings and locksets to provide egress from existing building to new additions.
- 3.25.10 Dust-tight enclosures shall be of adequate construction, sufficient to obviate dispersion of dust and dirt into existing building.
- 3.26 NO SMOKING POLICY
 - 3.26.1 Cooperate, respect and comply with Smoke-Free Workplace policy requirements established by Provincial Government throughout this facilities. Smoking is not permitted within the site boundary.
 - 3.26.2 Smoke-Free workplace policy applies to all areas including cafeterias and washrooms.
 - 3.26.3 Smoke-Free workplace policy applies to everyone who works on the site and to all visitors.
 - 3.26.4 Ensure that Contractor's employees, sub-contractors and suppliers, performing work on Site on Contractor's behalf, are instructed to comply with Smoke-Free Workplace policy requirements.

END OF SECTION

1 GENERAL

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

2 CASH ALLOWANCES

- 2.1 Include in the Contract Price, a stipulated sum Cash Allowance in the amount of **\$3,010,000.00 (Three Million, Ten Thousand Dollars)**.
- 2.2 Cash Allowances, unless otherwise specified, cover the net cost to the General Contractor of services, products, construction, machinery and equipment, freight, handling, unloading, storage installation and other authorized expenses incurred in performing the Work.
- 2.3 The Contract Price, *and not the Cash Allowance*, includes the General Contractor's profit in connection with such cash allowance.
- 2.4 The Contract Price will be adjusted by written order by the Consultant to provide for an excess or deficit to each Cash Allowance. Any unused portions of these allowances shall be returned to the Board on the conclusion of the Contract.
- 2.5 Expend Cash Allowances as directed by the Consultant in writing. Allowances will be adjusted to actual cost with no adjustment to Contractor's charges. Cash expenditure must identify the H.S.T. separately.
- 2.6 The following is a summary of the cash allowances to be included in the contract.

Cash Allowance Description	Total Cash Allowance Price
Asbestos Removal	\$ 100,000.00
Testing and Inspections	\$ 50,000.00
Existing Furniture Removal	\$ 100,000.00
Client Furniture System / Appliances	\$ 1,840,000.00
Security System (except conduit and pathway which is part of base contract) / Cabling / Gun Lockers	\$ 600,000.00
Signage	\$ 80,000.00
Appliances and Miscellaneous Equipment	\$ 180,000.00
Supply & Install Feature Wall Art	\$ 60,000.00
Total Cash Allowances	\$ 3,010,000.00

Addendum-02

Addendum-03

Addendum-03

END OF SECTION

PART 1 – GENERAL

1.1 SETTING OUT THE WORK

- 1.1.1 The Contractor shall be responsible for the construction layout.
- 1.1.2 Verify all elevations, lines, levels, and dimensions and report any errors, discrepancies or conflicts to the Consultant.
- 1.1.3 Establish and maintain benchmarks, location stakes and batter boards as required.
- 1.1.4 Verify and record proposed location and finished elevations relative to existing grades.
- 1.1.5 Determine actual location and elevation of existing underground utilities where connections are required.
- 1.1.6 Call in relevant utility companies where required to locate utilities.
- 1.1.7 Undertake test digging where required.
- 1.1.8 Verify and coordinate finished elevations and dimensions of the work of one Section with respect to a related Section of the Work.
- 1.1.9 Prepare interference drawings of system and equipment components to ensure that all elements can be accommodated within the spaces provided.
- 1.1.10 Ensure that all clearances required by authorities having jurisdiction are maintained in the installed work.

1.2 SURVEYOR'S CERTIFICATE

- 1.2.1 Provide an Ontario Land Surveyor's Certificate with a Surveyor's Plan to verify the location of the building in relation to the existing property lines.
- 1.2.2 Submit to the Consultant four (4) copies of the Surveyor's Certificate and the Surveyor's Plan within seven days of completion of the exterior foundations.
- 1.2.3 On completion of the work submit to the Consultant the same Survey to show the outline of paved areas, final finished grades throughout the site and the location of buried services. Note any deviations from the approved working drawings.

END OF SECTION

PART 1 - GENERAL

1.1 PERMITS, LICENSES AND FEES

- 1.1.1 The Owner shall obtain and pay for, in a timely manner in order to avoid delays to the construction, the Building Permit and Occupancy Permit.

1.2 BUILDING CODE BY-LAWS AND REGULATIONS

- 1.2.1 Carry out all work in accordance with the regulations of the Ontario Building Code, latest issue, including all amendments and revisions.
- 1.2.2 Comply with all requirements, regulations and ordinances of all jurisdictional authorities.
- 1.2.3 Comply with and pay for requirements of local authorities regarding any necessary work outside the property lines such as curbs and sidewalks.
- 1.2.4 Inform the Consultant of any known variance of the Contract Documents from the requirements of the Building Code and authorities having jurisdiction and assume responsibility for work known to be contrary to such requirements and performed without notifying the Consultant.

1.3 FIRE PROTECTION

- 1.3.1 Materials and components required to construct fire rated assemblies and materials requiring fire hazard classification shall be listed and labelled.
- 1.3.2 Fire rated assemblies shall be constructed in accordance with applicable fire test report information issued by the fire rating authority. Deviation from fire test report will not be allowed.
- 1.3.3 Construct fire rated assemblies as continuous, uninterrupted elements except for permitted openings. Extend fire rated walls and partitions from top of floor assembly to underside of the fire rated assembly above.

1.4 HAZARDOUS MATERIALS

- 1.4.1 Comply with requirements of the Occupational Health and Safety Act, as amended to include WHMIS (Workplace Hazardous Materials Information System).
- 1.4.2 Ensure that a current Material Safety Data Sheets (MSDS) arrives before or with the first delivery of every controlled product.
- 1.4.3 Check the date to ensure that the MSDS is up-to-date (MSDS are valid for three years from date of production).
- 1.4.4 Ensure that worksite copies of the MSDS are available to workers wishing to consult them and to the health and safety representative and/or joint health and safety committee.
- 1.4.5 Ensure that workers are instructed in the purpose and content of MSDS.

END OF SECTION

PART 1 - GENERAL

1.1 CONTRACT REFERENCE

1.1.1 The General Conditions and all Sections of Division 1 shall be part and govern all Sections of these Specifications.

1.1.2 All Subcontractors and suppliers shall carefully read and study the General Conditions and Division 1 before commencing their respective work. Delay and/or extra expense will not be accepted by reason of non-compliance with this requirement.

1.2 SCOPE AND DIVISION OF WORK

1.2.1 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 conditions stated for each operation prescribed; and provide all labour, materials, products, equipment and services to complete the Work.

1.2.2 The Specifications have generally been divided into trade division and the trade divisions into Sections for the purpose of ready reference, but a Section may consist of the work of more than one subcontractor or supplier. The responsibility for determining which subcontractor or supplier shall provide labour, material, products, equipment and services to complete the Work rests solely with the Contractor.

1.3 WORK PROVIDED BY OWNER OR PERFORMED UNDER SEPARATE CONTRACTS

1.3.1 The term "NIC" shall be construed to mean that work of this Project which is not being performed or provided by the Contract; the term shall mean "Not in This Contract" or "Not a Part of the Work to be Performed or Provided by the Contractor".

1.3.2 "NIC" work is indicated on the Drawings and specified herein as an aid to the Contractor in scheduling the amount of time and materials necessary for the completion of the Contract.

1.4 DISCREPANCIES/OMISSIONS

1.4.1 Notify the Consultant of any discrepancies in, or omissions from the Drawings, Specifications or other Contract Documents or any doubt as to the meaning or intent of any part thereof. The Consultant will send written instructions, clarifications or explanations. Neither the Owner nor the Consultant will be responsible for oral instructions.

1.5 DEFECTS

1.5.1 Defective material or workmanship whenever found at any time prior to the final acceptance of the work will be rejected regardless of previous inspection. Inspection by the Consultant will not relieve the Contractor from responsibility, but it is a precaution against oversight or error.

1.5.2 Remove and replace defective materials at no extra cost to the Owner. Be responsible for all unnecessary delays and expenses caused by the rejection.

1.6 DIMENSIONS

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

- 1.6.2 Where dimensions are not available before fabrication commences the dimensions required shall be agreed upon between the Sections concerned.
- 1.6.3 Wall thicknesses shown on the Drawings are nominal only, and actual sizes shall be in all cases ascertained at the building.
- 1.6.4 Verify dimensions of shop fabricated portions of the Work on the site before shop drawings and fabrications are commenced. The Owner will not accept claims for extra cost on the part of the Contractor by reason of non-compliance with this requirement.
- 1.6.5 In areas where equipment will be installed, check dimensional data on equipment to ensure that the area and equipment dimensions are compatible with the necessary access and clearance provided. All equipment supplied shall be dimensionally suitable for space provided.
- 1.6.6 The mechanical and electrical drawings are intended to show approximate locations of mechanical and electrical apparatus, mechanical fixtures, mechanical equipment, piping and duct runs, electrical fixtures, electrical outlets, electrical equipment, electrical units, and conduit in diagrammatic form and are not dimensioned, their locations shall be considered approximate. Check the Architectural drawings and consult with the Consultant to settle the actual locations of these items as may be required to suit aesthetic and job conditions. Such relocation shall be done without charge to the Owner.
- 1.6.7 Leave areas clear when space is reserved for future equipment, including access to such future equipment.
- 1.6.8 Whether shown on the drawings or not, leave adequate space for and provision for servicing of equipment and removal and reinstallation of replaceable items such as motors, coils, and tubes.
- 1.6.9 Furr in all exposed pipes located not more than 12" from the wall (exception storage rooms, janitor, service, mechanical and electrical, telephone and garage) and/or ceiling surfaces and finish similar to the respective wall and/or ceiling surfaces.
- 1.6.10 Conceal pipes, service lines and ducts, in chases, behind furring, or above ceiling except where such items are noted as being exposed, and except to where no ceiling is provided.
- 1.6.11 Install equipment, materials and products to present a neat appearance. Run piping, ducts, and conduit parallel to or perpendicular to building planes.
- 1.6.12 Install all ceiling mounted components including but not limited to air terminals, sprinkler heads, and lighting fixtures in strict accordance with ceiling plans.
- 1.7 CO-OPERATION AND CO ORDINATION
 - 1.7.1 All Sections shall co-operate with each other, to ensure that the work will be carried out expeditiously and will be satisfactory in all respects at completion.
 - 1.7.2 All Sections shall examine the Drawings and Specifications covering the work of all other Sections which may affect the performance of his own work. Examine the work of other Sections at the building, and report to the Consultant any defects or deficiencies which may adversely affect the work. In the absence of such a report the Contractor shall be held to have waived all claims for damage to or defects in such work.
 - 1.7.3 All trades and Sections shall co-operate with other Sections whose work attaches to or is affected

by their own work, and ensure that minor adjustments are made to make adjustable work fit fixed work.

1.7.4 Trades and Sections requiring foundations, supports or openings to be left for the installation of their work shall furnish the necessary information to the sections concerned in ample time so that proper provision can be made for such items. Failure to comply with this requirement will not relieve the Section at fault of the cost of cutting, drilling, etc., at a later period, and the subsequent patching of other work required.

1.7.5 Supply all items to be built-in (including anchors, ties, dovetail slots, nailing strips, blocks, bolts, sleeves, etc.) foundations and openings, when required by the trades concerned, together with templates, measurements and shop drawings. The responsible Section shall pay for any necessary cutting, fixing, and make good to the work of other Sections for failure to comply with this requirement.

1.7.6 Where the Work of this Contract involves changes, revisions or connections to the Base Building, mechanical, electrical, sprinkler or structural, and the changes, revisions, or connections hereto would adversely affect the Owner's guarantees or warranties, the Owner will specify the method in which such item of work shall be done so as not to void the guarantee or warranty, or he may insist on doing such items of work, the cost chargeable to this Contract. The Contractor shall strictly follow such method or be responsible for any loss or damage suffered by the Owner.

1.8 SERVICES PRIORITY

1.8.1 In the event of interference occurring between equipment shown in a concealed area, the following order of priority shall be observed:

- .1 Structural Elements
- .2 Plumbing Drains
- .3 Sprinkler Piping
- .4 Duct Work
- .5 Heating Piping
- .6 Plumbing Piping
- .7 Electrical Conduit

1.9 WORKMANSHIP

1.9.1 The work of all Sections shall be fabricated and installed in accordance with the best practice by craftsmen skilled in the work of the respective Section. Unless otherwise specified, the manufacturer's latest printed instructions shall be rigidly complied with in the methods and materials to be used in the installation of the work.

1.9.2 Notify the Consultant in writing if these Specifications and/or Drawings conflict in any way with manufacturer's instructions. The Consultant will then rule which specifications shall be followed. If applicable, a copy of those instructions shall be made available at job site.

1.10 PROTECTION

1.10.1 Adequately protect the work at all stages of the operations and maintain the protection until work is completed. Remove and replace any work and materials damaged that cannot be repaired or restored to the Consultant's approval.

1.10.2 The Owner assumes no responsibility for the safeguarding of tools or equipment from theft.

- 1.10.3 Be responsible for the protection of existing curbs, roads, sidewalks, lawns, trees, landscaping, utility lines, existing uncompleted work of other contracts, services and similar items located on job site and adjoining properties. Replace and make good any of the damaged existing work without extra cost to the Owner and to the approval of the Consultant.
- 1.10.4 Provide proper guard devices, and lights for the prevention of accidents. Provide and maintain temporary sidewalks, fences, barricades, etc., as necessary to ensure the safety of the public and other persons on or adjacent to the project site, and maintain sufficient and noticeable warning lights at night to prevent accidents and injuries to persons or property.
- 1.10.5 Protected at all times all public areas that are affected by construction under this Contract. Repair immediately any damages.
- 1.11 OVERLOADING
 - 1.11.1 Do not overload any part of the structure during the construction with a load greater than it is calculated to bear safely when complete. Be solely responsible and liable for any damage resulting from violation of this requirement. Provide temporary support as strong as the permanent support. Do not load concrete floors until they have obtained their design strength.
 - 1.11.2 Do not cut, bore or sleeve load bearing members without approval of the Consultant.
- 1.12 CONSTRUCTION SAFETY
 - 1.12.1 Observe and enforce all construction safety measures, as contained in the requirements of Provincial Government and local Municipal Statutes and Authorities.
 - 1.12.2 Comply with the Occupational Health and Safety Act and Bill 208 an Act to amend the Occupational Health and Safety Act and the Workers' Compensation Act.
 - 1.12.3 Comply with WHMIS Regulation, Ont. Reg. 644/88.
 - 1.12.4 In the event of conflict between any of the provisions of Municipal By-laws, the Provincial Acts and the Canadian Construction Safety Code, the most stringent provision shall apply.
 - 1.12.5 Manufacturers and suppliers providing materials that fall under WHMIS Regulation Ont. Reg.644/88, shall submit material safety data as required by the above legislation.
 - 1.12.6 Ensure that "controlled products" brought on site are labelled as required.
 - 1.12.7 Maintain and make available to workers and Consultant, MSDSs for "controlled products" brought on site.
 - 1.12.8 Ensure that workers are familiar with WHMIS and are trained in the use of "controlled products".
 - 1.12.9 Resolve any WHMIS-related conflicts between trade sections.
 - 1.12.10 Provide and maintain adequate First Aid facilities during the construction period.
- 1.13 SETTING OUT
 - 1.13.1 Verify on the site, all lines, levels and dimensions shown on the Drawings and report any discrepancies in levels or dimensions to the Consultant before commencing work. Work done prior to the receipt of the Consultant's directions shall be at the risk of the Contractor.

1.13.2 Lay out the location of all walls on the floor as a guide to the various Sections.

1.14 FASTENINGS

1.14.1 Supply fastenings, anchors and accessories as required for the fabrication and erection of the Work.

1.14.2 Use exposed metal fastenings and accessories of the same texture, colour and finish as the base metal on which they occur.

1.14.3 Provide metal fastenings of the same material as the metal component they are anchoring or of a metal which will not set up an electrolytic action, which would cause damage to the fastening of metal component under moist conditions.

1.14.4 In general, exterior anchors for windows, waterproofing, roofing, sheet metal, and anchors occurring on or in an exterior wall or slab shall be non-corrosive or hot dip galvanized steel. Prime paint will not be accepted as suitable protection against corrosion.

1.14.5 Use fastenings of a type and size to provide positive permanent anchorage of the unit to be anchored in position. Install fastenings in a manner and at spacing required to provide load bearing capacity.

1.14.6 Keep exposed fastenings to a minimum, evenly spaced and neatly laid out, unless otherwise specified.

1.14.7 Provide adequate instructions and/or templates and, if necessary supervise, installation where fastenings or accessories are required to be built into work of other Sections.

1.14.8 Wood plugs will not be permitted.

1.14.9 Fastenings which cause spalling or cracking of material to which anchorage is being made will not be permitted.

1.14.10 Do not use powder-activated fastenings on any portion of the Work unless written approval for a specific use is obtained from the Consultant. Only tools of low velocity, double guidance type are acceptable.

1.14.11 Powder actuated tools, low velocity type, meeting CSA Z-166 latest edition may be used for drywall partitions.

1.14.12 No drilling of holes into window members, T-bars, or induction unit covers is permitted.

1.15 WELDING

1.15.1 No open flames for welding, cutting or other purposes are permitted without prior approval of the Owner. If pressurized gas cylinders are used, the Contractor shall ensure that such use is in accordance with requisite safety provisions and requirements. All welding shall be accompanied with fire extinguisher.

1.16 OWNER'S RIGHT TO RELOCATE DOORS AND/OR PARTITIONS

1.16.1 The Owner reserves the right to relocate doors and frames and/or partitions at a later date, but prior to installation, without cost, assuming that there will be no increase in the number of doors and/or frames, or greater lengths or heights of partition, or no increase in number of corners.

- 1.16.2 Should there be an increase or decrease in doors, frames or lengths of partition after such relocation adjustments in costs shall be made.

1.17 OWNER'S RIGHT TO RELOCATE MECHANICAL/ELECTRICAL ITEMS

- 1.17.1 The Owner reserves the right to relocate electrical outlets at a later date, but prior to installation, without cost, assuming that the relocation per outlet does not exceed 10'-0" from the original location. No credits shall be anticipated where relocation per outlet of up to 10'-0" reduces materials, products, and labour.
- 1.17.2 Should relocations per outlet exceed 10'-0" from the original location, the contract price will be adjusted accordingly.
- 1.17.3 Make necessary changes, due to lack of co-ordination, and as required when approved, at no additional cost, to accommodate structural and building conditions. The location of pipes and other and other equipment shall be altered without charge to the owner, if approved, provided the change is made before installation.

1.18 CODES AND STANDARDS

- 1.18.1 All contract forms, codes, specifications, standards, manuals, and installation, application and maintenance instructions, referred to in the Contract Documents shall be of the latest published editions at the date of submission of the Bid unless otherwise stated in the Contract Documents or acceptable to the authorities having jurisdiction.
- 1.18.2 The purpose of specifying standard reference specifications is to establish minimum acceptable standards of materials and workmanship. Materials and workmanship shall meet or exceed requirements of the reference standards specified.
- 1.18.3 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 acceptable material or product of another approved manufacturer which does meet the standard, at no additional cost to the Owner.
- 1.18.4 Where no standard is referred to, materials or workmanship shall meet requirements of the applicable standards of the Canadian Standards Association, Canadian General Specifications Board or the Ontario Building Code.
- 1.18.5 Where a material or product is required to conform to a standard such as CSA, ASTM, ULC, ULI, CGSB, OBC, etc., supply to the Consultant, on request, satisfactory evidence that the material or product complies with the standard specification or test requirements.

1.19 EMERGENCY CONTACT

- 1.19.1 The Contractor shall post at the site at least two names and telephone numbers for emergency contact.

1.20 TESTING AND TIE-INS

- 1.20.1 Obtain the Owner's permission prior to installing of any tie-ins to mechanical, fire protection, life safety, or electrical systems, or tests of such tie-ins.
- 1.20.2 The Contractor shall be held fully responsible for any damages which result from tie-ins to such

systems or any tests thereof.

1.21 FIRE RATINGS

1.21.1 Where specifications require a material, component or assembly to be fire rated, the fire rating shall be as determined or listed by one of the following testing authorities if approved by Authorities having jurisdiction:

- .1 Underwriters' Laboratories of Canada
- .2 Underwriters' Laboratories Inc. (U.S.A.)
- .3 Factory Mutual Laboratories
- .4 The National Building Code of Canada
- .5 The National Board of Fire Underwriters
- .6 Warnock Hersey International

1.21.2 Where reference is made to only one testing authority, an equivalent fire rating as determined or listed by another of the aforementioned authorities is acceptable if approved by authorities having jurisdiction.

1.22 DOCUMENTS

1.22.1 Maintain one copy of each of the following on the job site;

- .1 Contract Drawings
- .2 Specifications
- .3 Addenda
- .4 Reviewed shop drawings
- .5 Change Orders
- .6 Test reports
- .7 Approved work schedule
- .8 Manufacturer's installation and application instructions.

1.23 BY LAWS AND REGULATIONS

1.23.1 Comply with codes and references as indicated in General Notes on Drawings and in these Specifications.

1.23.2 Nothing contained in the Contract Documents shall be so construed as to be in conflict with any law, by law or regulation of the municipal, provincial or other authorities having jurisdiction. Perform work in conformity with all such laws, by laws and regulations.

1.24 FAIR WAGES

1.24.1 Rates of wages, hours and conditions of work of persons employed on the work shall be in accordance with provincial codes and as generally accepted and recognized in the locality.

1.25 LOCAL SUPPLIERS AND TRADES

1.25.1 Where appropriate the General Contractor is encouraged to use local suppliers and trades where possible.

1.26 TRADEMARKS AND LABELS

- 1.26.1 Trademarks and labels, including applied labels shall not be visible in the finished work. Remove such trademarks or labels by grinding if necessary, or paint where the particular material has been painted.
- 1.26.2 The exception of this requirement shall be those essential to obtain identification of mechanical and electrical equipment and those required to be visible by authorities having jurisdiction.
- 1.27 CLEAN UP
 - 1.27.1 Maintain the Work in a tidy condition and free from the accumulation of waste products and debris, other than that caused by the Owner, other Contractors or their employees.
 - 1.27.2 Clean and make good, to the Consultant's approval, surfaces soiled or otherwise damaged. Pay cost of replacing fixtures or materials that cannot be satisfactorily cleaned.
 - 1.27.3 Remove all debris, equipment and excess material resulting from the site.
 - 1.27.4 All rubbish must be segregated for, and kept in recycling containers and removed from the site on a regular basis.
 - 1.27.5 Do not burn rubbish on the site.
 - 1.27.6 Do not bury rubbish or waste material on the site.
 - 1.27.7 Do not dispose of waste or volatile materials such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.
- 1.28 ACCESS
 - 1.28.1 Maintain, without interruption, unrestricted circulation by the public on City Sidewalks and access by the public to bus stops and waiting areas.
 - 1.28.2 Arrange for delivery of materials, products and equipment to arrive when needed, and at times to prevent interference with vehicular traffic on the streets, at Owner's Service area, and with pedestrian traffic on sidewalks.
- 1.29 ACCESS PANELS
 - 1.29.1 Provide access panels in walls and/or ceilings, as required by codes and as directed by the Owner's representative to permit necessary access to equipment and/or services.
- 1.30 SECURITY
 - 1.30.1 Comply with Owner's security requirements.
 - 1.30.2 Watch the site at all times including weekends and holidays. No compensation will be paid by the Owner for materials of work stolen, lost damaged, or destroyed.
- 1.31 PUBLIC UTILITIES
 - 1.31.1 Before commencement of the Work, ensure that the area occupied by the public utilities; including but not limited to Electricity, Gas, Water, and Telephone, meet the correct requirements of the respective utility company.
 - 1.31.2 Notify the Consultant immediately in writing if the requirements of the utility companies are not

met.

1.32 EXISTING PUBLIC SERVICE LINES

- 1.32.1 Where existing public service lines are indicated to be removed and/or relocated, do such work in compliance with all authorities having jurisdiction.
- 1.32.2 Make good to the requirements of authorities having jurisdiction all soiled or damaged public roads, walkways, sidewalks, curbs, public utilities, hydro and telephone lines, and supports.

1.33 NOISE CONTROL

- 1.33.1 Comply with the requirements of Authorities having jurisdiction and noise control by laws to ensure noise generated by the work is not excessive and not disturbing to the Public and the Owner's and users of adjacent buildings.

1.34 TESTING AND MIX DESIGNS

- 1.34.1 Arrange for tests as required to establish design parameters, to verify the characteristics or quality of products and materials, and any other tests which the Consultant may reasonably require. Such tests will be paid by the Owner unless specifically stated in the Contract Documents to be at the Contractor's expense. The Consultant will appoint the independent testing agencies or facilities which may be required to effectively carry-out such tests.
- 1.34.2 Co-operate with independent testing agencies while latter are performing above tests.

1.35 SCHEDULING

- 1.35.1 Schedule segments of construction and demolition according to staging indicated on Drawings.
- 1.35.2 Construction, demolition, and renovation shall be carried out with a minimum of disturbance to the Owner's use of the premises.

1.36 IMPERIAL/INTERNATIONAL SYSTEM OF UNITS

- 1.36.1 Where measurements are indicated in both Imperial and International System of Units (SI), the Imperial System of Units will apply.

1.37 EXPANSION AND CONTRACTION

- 1.37.1 Make provisions for expansion and contraction due to temperature changes, within components, products and assemblies and between adjacent components, products, or assemblies. Provisions for expansion and contraction shall ensure no damages occur to and within components, products, and assemblies.

1.38 AIR AND FLUID MOVEMENTS

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

1.39 BUILDING VOLTAGES

- 1.39.1 All motors with 1/2 hp or above shall be 208 volt 3 phase unless otherwise specified in Divisions 23 and 26.
- 1.39.2 All motors under 1/2 hp shall be 120 volt single phase unless otherwise specified in Divisions 23 and 26.
- 1.39.3 Verify available voltages to be utilized for equipment and co-ordinate with Division 23 and 26.
- 1.40 SPIRITUOUS LIQUORS
 - 1.40.1 The Contractor shall neither permit nor allow the introduction or use of spirituous liquors upon or about the Works embraced in this Contract, or upon any of the grounds occupied by him.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

- 1.1.1 This Section outlines the mandatory minimum Health and Safety protocol for all renovation, addition and new construction Project where all or a portion of the existing building remains occupied and in use.
- 1.1.2 These Health and Safety protocols are mandatory minimum requirements, procedures and standards that the Owner insists are fully complied with by all parties involved with the Projects.

1.2 RELATED SECTIONS

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

1.3 REFERENCES

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

1.4 COMPLIANCE SPECIFICATION

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

1.5 BEYOND COMPLIANCE SPECIFICATION

- 1.5.1 These specifications apply in addition to all applicable health, safety and environmental compliance regulations. They are incorporated here to reflect the Owner's intention to develop a specification which provides the safest practical procedures and policies for construction project sites that are occupied and in use by staff, students, and visitors during the execution of the Construction Contract.

- 1.5.2 Beyond compliance specifications recognize that performance well beyond the minimum regulatory standard is often desirable, possible and affordable, often with no cost or low cost options. It also recognizes that application methods or protocols may be as important as the material specified. Therefore, these specifications cover both material and methods.
- 1.5.3 These provisions apply to both indoor and outdoor applications equally.

PART 2 - EXECUTION AND COMPLIANCE REQUIREMENTS

2.1 APPLICATION OF COMPLIANCE REQUIREMENTS

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

2.2 SITE SUPERVISOR (SITE SUPERINTENDENT)

- 2.2.1 A full-time Site Supervisor (Site Superintendent) is required for each site at any site, regardless of the number of active workers on site.
- 2.2.2 Site Superintendent shall have as a minimum:
 - .1 Recent, previous experience with renovation or addition projects involving occupied buildings including (but not limited to) government and office building construction, sites with tenants, employees, retail customers, pedestrian and vehicular traffic.
 - .2 Successful completion of a multi-session Supervisor's training course conducted by a recognized Construction Association in Ontario.
- 2.2.3 Site Superintendent must carry a cell phone at all times during construction with the ability to be reached directly during all work hours and the ability to have voicemail recorded during all non-work hours including weekends and holidays.
- 2.2.4 Site Superintendent must have means of live phone or walkie-talkie communication with the site Flagman during all work hours.
- 2.2.5 Site Superintendent shall not be charged throughout projects unless confirmed and approved by the Owner Project Manager.
- 2.3 **ONTARIO OCCUPATION HEALTH & SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS**
 - 2.3.1 General Contractor to comply with the Ontario Occupational Health & Safety Act and Regulations for Construction Projects, latest edition – including all amendments.
 - 2.3.2 Beyond compliance in item .1 above, regardless of the number of labourers active on the Project, the General Contractor shall form a contractor's Health and Safety Committee at the outset of construction. This Committee shall then follow the standard requirements for such a Committee as set out in the *Occupational Health & Safety Act and Regulations for Construction Projects*.

2.4 ON-SITE COMMUNICATIONS

2.5 The building will remain occupied during the course of construction.

2.5.1 At the outset of the project the General Contractors shall provide to the Owner Project Manager all relevant contract information for the Site Superintendent, General Contractor Project Manager and key sub-contractors including names and cell phone numbers.

2.5.2 The General Contractor shall provide at least one 'emergency contact' telephone number at which the Contractor' representative can be reached directly during all work hours and have the ability to have voicemail recorded during all non-work hours including weekends and holidays. As outlined below, this may be designated to the Site Superintendent's cell phone number.

2.5.3 Regardless of compliance method for the emergency contact telephone number stated above, Site Superintendent must carry a cell phone at all times during construction with the ability to be reached directly during all work hours and the ability to have voicemail recorded during all non-work hours including weekends and holidays.

2.5.4 Site Superintendent must have means of live phone or walkie-talkie communication with the site Flagman during all work hours.

2.5.5 The Contractor is to ensure that the Owner Project Manager is immediately apprised of any safety issues as each arise and related request and/or resolution. The Owner Project Manager is responsible for any decisions that have an effect on the contract execution.

2.5.6 Notwithstanding the reporting to the Owner Project Manager noted above the Site Superintendent shall liaise with Facility Manager or designated on all safety related matters as required on a daily basis.

2.5.7 In the event of a safety issue requiring contractual clarification or action (i.e. Change Notice, etc.), the contractor shall ensure that, where applicable, the action is followed up with appropriate documentation.

2.6 FULL-TIME ON-SITE FLAGMAN

2.6.1 A full-time, designated Flagman is required at all vehicular construction entrances.

2.6.2 In the event there is more than one entrance to the hoarded/fenced construction area, there must be a separate Flagman for each entrance.

2.6.3 Flagman shall not be same person as Site Superintendent or other construction worker.

2.6.4 Flagman shall not be changed throughout the Project unless confirmed and approved by the Owner Project Manager.

2.6.5 Flagman must have means of phone communications with Site Superintendent (phone or walkie-talkie).

2.6.6 The Flagman shall not be designated for any other duties than to act as a Flagman for safety purposes as described herein.

2.6.7 The Flagman shall meet and escort any construction traffic from the site entrance into and out of the hoarded/fenced construction area (including through open site areas until entrances to hoarding).

- 2.6.8 The Flagman shall only open hoarded areas when construction traffic moves through and immediately re-close gates.
- 2.6.9 The Flagman shall control construction parking at the site (including vehicles parking or traveling in unauthorized areas).
- 2.6.10 The location of the Flagman shall be set to ensure the safe guarding of staff, student, and pedestrian traffic.
- 2.6.11 If not designated on the Contract Documents, the location of the Flagman shall be confirmed with the Owner Project Manager and Consultant at the outset of the project and before the replacement of hoarding and fencing.
- 2.6.12 Where the Contractor deems it necessary, in order for the Flagman to carry out the required full-time duties, the cost of a temporary shelter shall be included in the Tender Price.
- 2.6.13 The Flagman shall be properly attired to carry out his duties, including the use of safety equipment(e.g. wear reflective vest, have appropriate traffic hand-held "Stop" sign and have a visible identification tag).

2.7 SITE SAFETY SIGNAGE

- 2.7.1 Standardized Safety Signage is required at all construction entrances. Refer to detail drawings for types and requirements.
- 2.7.2 If not designated on the Contract Documents, the location of the Safety Signage shall be confirmed with the Owner Project Manager and Consultant at the outset of the Project and before the placement of hoarding and fencing.
- 2.7.3 Safety Signage is to be posted at all street entrances to site and at each entrance to hoarded/fenced construction area.
- 2.7.4 Total surface area of signage is to avoid exceeding municipal standards that would require a separate signage permit.
- 2.7.5 Access signage texts shall include cell phone contact number for Site Superintendent.

2.8 ACCESS / EGRESS CONTROLS

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

2.9 CONTRACTOR PARKING

2.9.1 Contractor parking shall be restricted to hoarded areas or designated parking areas only where pre-approved by the Owner.

2.9.2 Contractor parking is restricted from all off-site street areas that interfere with the site specific parent drop-off and parking areas.

2.10 REQUIRED PRECONSTRUCTION MEETINGS

2.10.1 Meeting 1: Contractor shall receive approval from the Architect and the Owner Project Manager for parking, vehicular movements, access/egress strategies at a Pre-construction meeting taking place in advance of mobilizing on site.

2.10.2 Meeting 2: Once hoarding and fencing is erected BEFORE site construction is fully active and vehicles or equipment is mobilized on site, an initial site meeting shall take place at which time the layout of trailers and staging, deliveries, storage of materials, parking areas and vehicular movement to be reviewed and approved by the Owner Project Manager.

2.10.3 See article 2.12- '*Site Meetings*' following.

2.11 CONSTRUCTION FENCING AND HOARDING

2.11.1 construction hoarding requirements shall be a site based decision to be determined by the Architect and Owner Project Manager at the design stage and shown on the Contract Documents.

2.11.2 No fencing or hoarding shall be less than a continuous 1800mm high.

2.11.3 In portions of the site where chain link is approved, it shall be continuous 1800mm high chain link fencing, wire-tied staked iron 'tees' at 1800mm on centre – OR – leased, modular 'quick fencing' if staked down and wire tied together.

2.11.4 All fenced and hoarded areas to be gated with lockable vehicular and man gates- minimum construction to be steel rail and chain link construction.

2.11.5 Plastic snow fencing is NOT permitted.

2.11.6 All hoarding and fencing shall be maintained in a stable condition, for the duration of construction period as part of the base contract price and to include Superintendent's inspection at the beginning and end of each work day.

2.11.7 All Fire Routes to be outside all fenced and hoarded areas and maintained clear at all times.

2.11.8 'Covered Way' protection shall be provided when accesses or pathway are proximity to construction, in accordance with Ministry of Labour *Occupational Health & Safety Act* Regulations.

2.12 OWNER'S HEALTH, WELLNESS & SAFETY DEPARTMENT REPRESENTATIVE

2.12.1 A representative of the Owner's Health, Wellness & Safety Dept, ('Environment, Health and Safety Officer') may visit site at any time throughout the duration of the Contract to review the site, as it relates to the safety of the occupied areas of the site. Such sites review shall neither constitute an inspection or approval for the Contractor.

2.12.2 Concerns or issues identified by the representative from the Owner's Health, Wellness & Safety Dept. shall be communicated through the Owner or Owner's Project Manager for corrective action.

2.12.3 Contractor shall ensure full access to all site areas, at all times, for the Owner's Health, Wellness & Safety Department Representative.

2.13 SITE MEETINGS

2.13.1 Initial site meeting to take place after erecting fencing and hoarding but prior to the mobilization of any vehicles, equipment or start of Work.

2.13.2 Contractor shall ensure that the Owner, Owner's Project Manager and a representative of the Owner's Health, Wellness & Safety Department attend the initial site meeting.

2.13.3 The initial meeting shall review and approve a standardized agenda for all site meetings and thorough review of the Site Safety Protocol.

2.13.4 The standardized agenda shall include a Checklist and Report of Health and Safety items at the beginning of the agenda. This Checklist shall be included and each item reviewed at all site meetings for the duration of the project.

2.13.5 The Checklist of Site Safety items shall include but not limited to:

- .1 Contractor's report of site safety record and report of recent site activities, precautions or actions.
- .2 Review any visits to the site and actions required by Ministry of Labour or Owner's Health, Wellness & Safety representatives or other Authorities Having Jurisdiction.
- .3 Contractor's Health & Safety policy manual posted in site trailer.
- .4 Copy of Ministry of Labour *Occupational Health & Safety Act and Regulations for Construction Projects* in site trailer.
- .5 Name of General Contractor H&S representative.
- .6 Continuing compliance with Safety Signage.
- .7 Hoarding and fencing layout and condition.
- .8 Access and egress measures and any breaches of requirements.
- .9 Confirmation of communications link between Site Superintendent & Flagman.
- .11 Work that may produce any noxious odours and the containment measures, (i.e.: schedule, type, approvals required therefore).
- .12 Copies of Material Safety Data sheets in site trailer.
- .13 Complete meeting minutes including details of Safety Checklist shall be copied to Architect, the Owner and Owner's Project Manager.

2.13.6 Contractor to produce record of written Memorandum to all sub trades and suppliers detailing but not limited to: hours of delivery; site access procedures and restrictions; use of existing facilities.

2.13.7 Contractor to prepare detailed and accurate written record of all meetings to be kept and issued to all parties.

2.14 CONTRACTOR'S HEALTH AND SAFETY COMMITTEE MEETINGS

2.14.1 As required in item 2.1.2, the Contractor shall form a Health and Safety Committee, hold meetings and record minutes of meetings for the duration of the Contract.

2.14.2 Contractor to maintain a copy of Health and Safety Committee minutes on site for review by Ministry of Labour or Owner representative(s).

END OF SECTION

PART 1 - GENERAL

1.1 PRE-CONSTRUCTION MEETING

1.1.1 Immediately prior to construction, upon notification attend at location of Owner's choice, a pre construction meeting, along with authoritative representatives of key subcontractors, project superintendent, inspection and testing company representatives, and the consultants.

1.1.2 Purpose of meeting is as follows:

- .1 Review project communications procedures.
- .2 Review Contract administration requirements including submittals, payment and change order procedures.
- .3 Identify all critical points on Construction Schedule for positive action.
- .4 Review Consultant's inspection requirements.
- .5 Review any points which require clarification.

1.2 SITE MEETINGS

1.2.1 Hold regular site meetings every two weeks. Ensure that persons, whose presence is required, Are present and that relative information is available to allow meetings to be conducted efficiently. The Consultant will attend these meetings. The Owner may also choose to attend these meetings, at his discretion.

1.2.2 Schedule additional meetings, if required.

1.2.3 Prepare an agenda for each meeting and distribute a copy to all required participants prior to the meeting.

1.3 SUPERVISION

1.3.1 Employ an experienced and qualified superintendent for the project who shall devote his time exclusively to the work of this Contract and who shall be in complete charge of the work from commencement to completion. A working foreman will not be acceptable. The superintendent shall not be changed after commencement of work without the Consultant's approval. The Superintendent shall possess a C.C.S. and/or Gold Seal Certificate designation and be acceptable to the Owner.

1.3.2 Supervise, direct, manage and control the work of all forces carrying out the work, including subcontractors and suppliers. Carry out daily inspections to ensure compliance with the working drawings and detailed specifications and the maintenance of quality standards. Ensure that the inspection staff includes personnel competent in supervising the mechanical and electrical trades.

1.4 PROGRESS RECORD

1.4.1 The Contractor shall maintain on site, permanent written record of progress of work. Record shall be open to inspection by Owner at all times and copy shall be furnished to Consultants upon the Consultant's request.

1.4.2 This record shall show weather conditions, dates of commencement, progress and completion of

various trades and items of work. Particulars pertaining to erection and removal of forms, pouring of concrete, installation of roofing and other critical or major components as well as number of employees of various trades and type and quantity of equipment employed daily, shall be noted.

- 1.4.3 Display a copy of the construction schedule in the site office from start of construction to completion. Superimpose actual progress of work on schedule at least once each week.

1.5 AS-BUILT DRAWINGS

- 1.5.1 Maintain an accurate set of As-Built Drawings showing progress of the work and all changes, revisions and additions to the work and deviations from the Contract Documents in red ink.
- 1.5.2 Include accurate location, depth, position, size and type of concealed and underground services, both inside and outside shall be as part of these As-Built Drawings.
- 1.5.3 As-Built Drawings shall be available for review at each site meeting by the Consultant.

1.6 DOCUMENTS ON SITE

- 1.6.1 The Contractor's field office shall at all times contain a complete set of Contract Documents (Schematic Drawings and Performance Specifications) with all addenda, site instructions, change orders, reviewed shop drawings and samples, colour schedule, paint materials schedules, hardware list, progress reports and meeting minutes.
- 1.6.2 The Contractor's field office shall at all times contain a complete set of all construction documents, as issued for building permit and bearing the stamp of the appropriate municipal authority.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

1.1.1 No work requiring a sample or shop drawing submission shall be commenced until the submission has received the Consultant's final review. All such work shall be in accordance with reviewed samples and shop drawings.

1.1.2 Provide submittals as requested by the Contract Documents, as specified herein, and in accordance with the conditions of the Contract.

1.1.3 In addition to submittals specifically requested by the Contract Documents, provide other submittals as may be reasonably requested by the Consultant, or as are required to coordinate the Work and to provide the Owner with choices available, within the scope of Contract Documents.

1.1.4 Contractor's review of submittals:

- .1 Review submittals for conformity to Contract Documents before submitting to Consultant. Submittals shall bear stamp of Contractor and signature of a responsible official in Contractor's organization indicating in writing that such submittals have been checked and coordinated by Contractor. Contractor's review shall be performed by qualified personnel who have detailed understanding of those elements being reviewed and of the conditions at the Place of the Work proposed for installation.
- .2 Check and sign each submittal and make notations considered necessary before submitting to Consultant for review. Where submittal is substantially and obviously in conflict with requirements of Contract Documents, reject submittal without submitting to Consultant and request resubmission. Note limited number of reviews of each submittal covered under Consultant's services as specified below.
- .3 Contractor shall assume sole responsibility for any conflicts occurring in the Work that result from lack of comparison and coordination of submittals required for the Work.
- .4 Submittals that have not been reviewed, checked, and coordinated by Contractor prior to submission to Consultant, will be rejected.
- .5 Notify Consultant in writing of changes made on submittals from Contract Documents. Consultant's review of submittals shall not relieve Contractor of responsibility for changes made from Contract Documents not covered by written notification to Consultant.

1.1.5 Consultant's review of submittals:

- .1 Review of submittals by Consultant is for the sole purpose of ascertaining conformance with the general design concepts and the general intent of the Contract Documents. This review shall not mean that Consultant approves the detail design inherent in the submittals, responsibility for which shall remain with the Contractor. Such review shall not relieve the Contractor of responsibility for errors or omissions in the submittals, or responsibility for meeting requirements of Contract Documents.
- .2 Contractor shall be responsible for dimensions to be confirmed and correlated at the Place of the Work for information that pertains solely to fabrication processes or to techniques of construction and installation, and for coordination of the Work.
- .3 As part of their scope of work, Consultant shall review shop drawings no more than twice. Should three or more reviews be required due to reasons of Contractor omissions causing resubmission requests, then Contractor shall reimburse the Consultant for time expended in these extra reviews. Time shall be invoiced to the Owner (to be deducted from monies due to the Contractor and paid to Consultant by Owner) at rates recommended by Consultant's professional association and disbursements shall be

- invoiced at Consultant's cost. The Contractor shall cover directly costs and administration associated with courier services and the like for these extra shop drawing reviews.
4. Consultant's review and markings on submittals do not authorize changes in the Work or the Contract Time.
 - .5 Submittals received but not required by the Contract Documents or requested by the Consultant will not be reviewed by the Consultant and will be marked 'NOT REVIEWED' by the Consultant and returned to the Contractor.
- 1.1.6 Make submittals with reasonable promptness and in an orderly sequence so as to cause no delay in the Work. Be responsible for delays, make up time lost and pay added costs, at no additional cost to the Owner, incurred because of not making submittals in due time to permit proper review by Consultant.
- 1.1.7 Do not proceed with work affected by a submittal, including ordering of Products, until relevant submittal has been reviewed by Consultant.
- 1.1.8 Contractor's responsibility for errors and omissions in submittals is not relieved by Consultant's review of submittals.
- 1.1.9 Contractor's responsibility for deviations in submittal from requirements of Contract Documents is not relieved by Consultant's review of submittal, unless Consultant gives written acceptance of specific deviations.
- 1.1.10 Engineered submittals:
- .1 Submittals for items required to be sealed by professional engineer (or as otherwise indicated as engineered), shall be prepared under the direct control and supervision of a qualified professional engineer registered in the Place of the Work, and having minimum professional liability insurance required in accordance with the General Conditions, as amended.
 - .2 Design includes life safety, sizing of supports, anchors, framing, connections, spans, and as additionally required to meet or exceed requirements of applicable codes, standards, regulations, and authorities having jurisdiction.
 - .3 Engineered submittals shall include design calculations, complete with references to codes and standards used in such calculations, supporting the proposed design represented by the submittal. Prepare calculations in a clear and comprehensive manner so that they can be easily reviewed. Incomplete or haphazard calculations will be rejected.
 - .4 The professional engineer responsible for the preparation of engineered submittals shall undertake periodic field review, including review of associated mock-ups, at locations wherever the work as described by the engineered submittal is in progress, during fabrication and installation of such work, and shall submit a field review report after each visit. Field review reports shall be submitted to the Consultant, to authorities having jurisdiction as required, and in accordance with the building code.
 - .5 Field reviews shall be at intervals as necessary and appropriate to the progress of the work described by the submittal to allow the engineer to be familiar with the progress and quality of such work and to determine if the work is proceeding in general conformity with the Contract Documents, including reviewed shop drawings and design calculations.
 - .6 Upon completion of the parts of the Work covered by the engineered submittal, the professional engineer responsible for the preparation of the engineered submittal and for undertaking the periodic field reviews described above, shall prepare and submit to the Consultant and authorities having jurisdiction, as required, a letter of general conformity for those parts of the Work, certifying that they have been Provided in accordance with

the requirements both of the Contract Documents and of the authorities having jurisdiction over the Place of the Work.

- .7 Costs for such field reviews and field review reports and letters of general conformity are included in the Contract Price.
- 1.1.11 Keep copies of reviewed submittals at the Place of the Work in a neat, orderly condition. Only submittals that have been reviewed by the Consultant's and are marked with Consultant's review stamp, as applicable, are permitted at the Place of the Work.
- 1.1.12 The Work shall conform to reviewed submittals subject to the requirements of this section. Remove and replace materials or assemblies not matching reviewed submittals at no increase in the Contract Time and at no additional cost to the Owner.

PART 2 - PRODUCTS

- 2.1 MATERIAL LIST
 - 2.1.1 Within 15 days of award of Contract, submit a complete list of manufactured materials to Consultant.
 - 2.1.2 List is required to enable Consultant to verify that materials meet Specifications prior to submission of shop drawings or installation, and to select colours and/or patterns.
 - 2.1.3 Should materials not meeting requirements be included, the Consultant will require re-submission.
 - 2.1.4 Only the listed materials shall be used, unless otherwise approved by the Consultant.

PART 3 - EXECUTION

- 3.1 PROJECT MEETING
 - 3.1.1 Prior to commencement of the work, the Contractor together with the Owner shall mutually agree to a sequence for holding regular "on-site meetings".
 - 3.1.2 Organize all necessary site meetings. Ensure that persons, whose presence are required, are in attendance and that relevant information is available, to allow meetings to be conducted efficiently.
 - 3.1.3 Record minutes of each meeting and distribute copies to all participants, and all others requiring information of recorded minutes, within one week of date meeting.
- 3.2 SHOP DRAWINGS
 - 3.2.1 The term shop drawings means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data which are to be provided by the Contractor to illustrate details of a portion of the work.
 - 3.2.2 Contractor shall arrange for the preparation of clearly identified shop drawings called for by the Contract Documents or as the Consultant may reasonably request.
 - 3.2.3 Submitted shop drawings must indicate the name of the project and specific information as to location within the project including reference to the drawing or specification section to which it

relates.

3.2.4 The shop drawings shall show, but not necessarily be limited to the following:

- .1 Clear and obvious notes of any proposed changes from Drawings and Specifications.
- .2 Fabrication and erection dimensions.
- .3 Provisions for allowable construction tolerances and deflections provided for live loading.
- .4 Details to indicate construction arrangements of the parts and their connections, and interconnections with other work.
- .5 Location and type of anchors, and exposed fastenings.
- .6 Materials 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 interconnected work.
- .10 Assumed design loadings, and dimensions and material specifications for load bearing members.
- .11 Dimensions and dimensioned locations of proposed chases, sleeves, cuts and holes in structural members.

3.2.5 Prior to submission to the Consultant the Contractor shall review all shop drawings. By this review the Contractor represents that he has determined and verified all field measurements, field construction criteria, materials, catalogue numbers, and similar data, or will do so, and that he has checked and coordinated each shop drawing with the requirements of the work and of the Contract Documents. The Contractor's review of each shop drawing shall be indicated by stamp, date, and signature of a responsible person.

3.2.6 Contractor shall submit drawings to the Consultant for his review with reasonable promptness and in orderly sequence so as to cause no delay in the work or the work of other Contractors. If either the Contractor or the Consultant so requests they shall jointly prepare a schedule fixing the dates for the submission and return of shop drawings. Shop drawings shall be submitted in the form of one reproducible transparency and one white print. Where the subject of the shop drawings involves the structural, mechanical, or electrical Engineers, in addition to the one reproducible transparency, submit two white prints. At time of submission the Contractor shall notify the Consultant in writing of any deviation in the shop drawings from the requirements of the Contract Drawings.

3.2.7 Contractor shall make any changes in the shop drawings which the Consultant may require consistent with the Contract Documents and resubmit unless otherwise directed by the Consultant. When resubmitting, Contractor shall notify the Consultant in writing of any revision other than those requested by the Consultant.

3.2.8 Shop drawings shall define the division of responsibility between the trades and items shown on shop drawings. Shop drawings shall show materials, methods of construction, and attachment or anchorage, erection, connections and other details necessary to complete the work. Shop drawings shall show cross references to Drawings and specifications.

3.2.9 Review by the Consultant is for the sole purpose of ascertaining conformance with the general design concept. Review shall not mean that the Consultant approves the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same and such review does not relieve Contractor of his responsibility for errors or omissions in the shop drawings, or his responsibility for meeting all requirements of the Contract Documents. Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or technique of construction and installation, and for

coordination of the work of all its subtrades and work of other Contractors.

- 3.2.10 Any adjustments made on the shop drawings by the Consultant are not intended to change the Contract Sum. If the Contractor deems that such adjustments affect the value of the work, he shall so state in writing before proceeding with the fabrication and installation of the work.
- 3.2.11 After final review, the Consultant will return reviewed copies to the Contractor, who shall reproduce, at his expense the number of prints required.
- 3.2.12 Submit 6 copies of standard pre-printed shop drawings. Assemble submittals of more than 2 pages in individual booklet form, after final review. Consultant will return at least 3 copies of shop drawings to the Contractor.
- 3.2.13 Shop drawings which require the approval of a legally constituted authority having jurisdiction shall be submitted by the Contractor to such authority for approval. Such shop drawings shall receive final approval of authority having jurisdiction before being submitted to the Consultant.
- 3.2.14 No work requiring a sample or shop drawing submission shall be commenced until the submission has received the Consultant's final review. All such work shall be in accordance with reviewed samples and shop drawings.

3.3 SAMPLES

- 3.3.1 For the purpose of this Article samples means: samples, models and templates.
- 3.3.2 Samples shall be submitted to the Consultant in a number as specified in the respective Section in sufficient time to permit review process before the item is needed to be installed or as directed otherwise.
- 3.3.3 If either the Contractor or the Consultant so requests, they shall jointly prepare a schedule fixing the dates for submission and return of samples, including time allowances for re-submissions.
- 3.3.4 Samples shall be submitted by the Contractor only.
- 3.3.5 Samples which are "rejected" shall be removed by the Contractor.
- 3.3.6 Samples will receive consideration only when hand delivered or mailed accompanied with a covering letter signed by the Contractor. Letter shall be sent via First Class mail and shall contain a list of samples being submitted, name of project, Contractor, Subcontractor, manufacturer, brand, also the project number, specification article and paragraph numbers to which the samples refer, and such additional information as may be required by the specification for the particular item being furnished. A copy of the letter shall be enclosed with the samples and any sample received without identification letter will be considered "unclaimed goods" and will be held for a limited time only.
- 3.3.7 Each sample shall be labelled to indicate name of project, Contractor, Subcontractor, manufacturer, brand, job number, as required.
- 3.3.8 Where samples are rejected by the Consultant, new samples shall be submitted as soon as possible after notification of the rejection and shall be marked "Second submissions" or subsequent submissions in addition to the other information required on the label.
- 3.3.9 Review by the Consultant is for the sole purpose of ascertaining conformance with general design concept. This review shall not mean that the Consultant approves the detail design inherent in

the samples, responsibility for which shall remain with the Contractor submitting same and such review shall not relieve the Contractor of his responsibility for errors or omissions or of his responsibility for meeting all requirements of the Contract Documents.

- 3.3.10 Cost of all samples shall be paid by the Contractor including all carrying charges, which shall be prepaid.
- 3.3.11 Where colour, pattern, or texture is a criterion, submit the full range of samples.
- 3.3.12 Field samples and mock-ups may form part of the Work if so agreed to by the Consultant.
- 3.3.13 Construct each sample or mock-up complete, including the work of all trades.
- 3.3.14 Reviewed samples or mock-ups will become standards of workmanship and material against which installed work shall be checked.

3.4 ACCESS PANELS AND ACCESS DOORS

- 3.4.1 Before commencing the installation of mechanical and electrical work, the Contractor with his mechanical and electrical Subcontractors shall prepare on a set of Drawings provided for that purpose, a complete lay out of all access panels and access doors which will be required. These lay outs shall be submitted for review as specified for shop drawings, and shall show exact sizes and locations of access panels and doors. Revisions may be required to the lay out before final review.
- 3.4.2 Items requiring access panels shall be located behind removable materials wherever possible. Location of access panels may be relocated by the Consultant to more unobtrusive locations.
- 3.4.3 Access panels and doors shall be finished to match adjacent wall and/or ceiling finish unless otherwise specified or indicated.

3.5 PROGRESS SCHEDULE

- 3.5.1 Contractor shall prepare and deliver to the Consultant for submitting to the Owner, within fourteen (14) days after the award of the contract, a progress schedule, indicating the dates for:
 - .1 Submission of shop drawings for the various Sections of the Work; shop drawings schedule for mechanical and electrical work shall contain a list identifying the contents of each shop drawing by subject matter, item, manufacturer's name and supplier's name.
 - .2 Commencement and completion of each major division of work, including the work to be done by the Subcontractors.
 - .3 Final completion date.
- 3.5.2 Furnish monthly progress reviews as related to the work schedule. Reviews shall include comments on both, the parts of the Work and general progress of the project. Correlate reviews to progress payment applications.
- 3.5.3 Update and re-issue the progress schedule as required to conform to monthly progress reviews.
- 3.5.4 Maintain progress schedule, as the work progresses.
- 3.5.5 Progress review shall show weather conditions, dates of commencement, progress and completion of various trades and items of work. Particulars pertaining to erection and removal of forms, pouring of concrete and type and quantity of equipment employed daily, shall be noted.

- 3.5.6 Completely update schedule and cash flow chart whenever changes occur to scheduling, in a manner and at times satisfactory to the Owner.
- 3.5.7 Provide competent and experienced staff familiar with scheduling work of this type to prepare, maintain, revise, direct and check implementation of schedule.
- 3.6 Metric
 - 3.6.1 Contractor's submittals containing measurements of any kind shall be in the Metric system of measurement.
- 3.7 PROGRESS PHOTOGRAPHS
 - 3.7.1 Before starting work, photograph interiors and site to record existing conditions. File two prints of each with the Consultant for examination and safekeeping.
 - .1 The number of photographs, close up or otherwise, must be sufficient to ensure that existing conditions are adequately recorded to minimize the possibility of unjustified claims against the Contractor and Owner.
 - .2 Where parts of existing buildings are concealed pending demolition work of this Contract, take photographs immediately on exposure.
 - 3.7.2 Upon commencement of the Work, and thereafter at monthly intervals until Completion of the Contract, the Contractor shall supply the Consultant with three copies of photographs with sufficient views, 4 locations, of the progress on all parts of the Work.
 - 3.7.3 Contractor shall include for the total number of photographs stated herein, but the Consultant shall have the right to request that fewer photographs be taken at certain intervals, so that more photographs may be taken at other times, providing the total number of photographs taken remains the same.
 - 3.7.4 Photographs shall be taken from exterior locations as determined by the Consultant.
 - 3.7.5 Monthly digital photographs by email is acceptable.
- 3.8 AS-BUILT DRAWINGS
 - 3.8.1 Upon completion of Work, provide three sets of as-built drawings, and prints of photographs. Where possible, provide electronic as-built drawings in CAD format.
- 3.9 MOCK-UPS
 - 3.9.1 Where required by the Contract Documents or as may reasonably be requested by the Consultant during the course of the Work, Provide field or shop erected example of work complete with specified materials and workmanship.
 - 3.9.2 Erect mock-ups at locations as specified and as acceptable to Consultant. Do not proceed with work for which mock-ups are required prior to Consultant's review of mock-ups.
 - 3.9.3 Modify or remove and replace mock-ups as many times as required to secure written acceptance of the Consultant. Such removal and replacement shall be done at no increase in either the Contract Price or the Contract Time.

3.9.4 Protect and maintain mock-ups until directed to be removed. Commence work demonstrated in mock-up only after review and acceptance of workmanship. If possible, mock-up may become part of finished work, at sole discretion, and with prior written acceptance, of Consultant.

3.9.5 Reviewed and accepted mock-ups will become standards of workmanship and material against which installed work will be compared.

3.9.6 Remove and replace materials or assemblies not matching reviewed mock-ups.

3.10 EXTRA MATERIALS

3.10.1 Supply extra materials at completion of Project as specified in Trade Sections of this Specification.

3.10.2 Deliver extra materials to location designated by the Owners representative.

3.11 WASTE MANAGEMENT

3.11.1 Contractor shall prepare and submit waste audit and reduction plan in compliance with the requirements of Ontario Regulations 102/94, Waste Audits and Waste Reduction Workplans and 103/94, Industrial, Commercial and Institutional Source Separation Programs under the Environmental Protection Act of Ontario. For definitions refer to Ontario Regulation 105/94, Definitions.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

1.1.1 For the purposes of this Section, independent inspection and testing agencies are referred to as "Inspector(s)".

1.1.2 The Owner, or the Consultant on his behalf, may obtain the services of Inspectors for the purpose of maintaining quality assurance and compliance with the Contract Documents. Reports by Inspectors shall in no way relieve the Contractor of his obligation to perform the work in accordance with the Contract Documents, or to maintain his own quality control.

1.1.3 The cost of supplying materials, products, and labour for testing purposes, and erection of entire mock ups, prototypes, and sample installations where specified, shall be borne by the Contractor and constitutes a part of the Work

1.2 REFERENCES

1.2.1 ASTM E329-14a Standard Specification for Agencies Engaged in Construction Inspection, Testing or Special Inspection.

1.3 QUALIFICATION OF INSPECTORS

1.3.1 Inspectors shall be authorized to operate in the Province in which the Project is located.

1.3.2 Inspectors required to provide laboratory services shall meet "Recommended Requirements for Independent Laboratory Qualification", published by the American Council of Independent Laboratories.

1.3.3 Where applicable, Inspector shall meet basic requirements of ASTM E329.

1.4 APPOINTMENT AND PAYMENT

1.4.1 Cost of inspection and testing shall be paid out of cash allowances listed in Section 01 21 00 Allowances, where so specified. Additional inspection and testing required for Owner's quality control will be paid by the Owner, except as otherwise stipulated in the Contract Documents.

1.4.2 The Consultant will appoint Inspectors to perform services specified in respective Specification Sections, except for the following:

- .1 Inspection and testing required by laws, ordinances, rules, regulations, or orders of public authorities.
- .2 Inspection and testing performed exclusively for Contractor's convenience or their own quality control.
- .3 Testing, adjustment, and balancing of conveying systems, mechanical and electrical equipment and systems.
- .4 Mill tests and certificates of compliance.
- .5 Tests specified to be carried out by Contractor under the supervision of the Consultant.

1.5 INSPECTOR'S RESPONSIBILITIES

1.5.1 Co-operate with the Consultant and the Contractor; provide qualified personnel after due notice.

1.5.2 Perform specified inspections, sampling, and testing of materials and methods of construction:

- .1 Comply with specified standards, requirements of authorities having jurisdiction and as specified.
 - .2 Ascertain compliance of materials with requirements of Contract Documents.
- 1.5.3 Promptly notify Consultant, Owner, and Contractor of observed irregularities or deficiencies of work and products.
- 1.5.4 Submit within 4 days of inspection and testing 5 copies of reports of such inspection and tests to:
- .1 Owner: 1 copy
 - .2 Consultant: 1 copy
 - .3 Contractor: 3 copies
- 1.5.5 Submit additional copies as directed or as specified under respective Sections.
- 1.5.6 Include in each report:
- .1 Date issued.
 - .2 Project title and number.
 - .3 Testing and inspection agency name, address and telephone number.
 - .4 Name and signature of individual responsible for test or inspection.
 - .5 Date and time of sampling or inspection.
 - .6 Record of temperature and weather conditions.
 - .7 Date of Test.
 - .8 Identification of produce and reference to Specification Section.
 - .9 Location of sample or test in Project.
 - .10 Type of inspection or test.
 - .11 Results of tests and compliance with Contract Documents.
 - .12 Interpretation of test results, when requested by the Consultant.
- 1.5.7 Perform additional services as required by Owner.
- 1.5.8 Inspector is not authorized to:
- .1 Revoke, alter, enlarge on, or release requirements of Contract Documents.
 - .2 Approve or accept any portion of the Work.
 - .3 Perform any duties of the Contractor's.

PART 2 - EXECUTION

- 2.1 CONTRACTOR'S RESPONSIBILITIES
- 2.1.1 Contractor shall maintain his own quality control to ensure that the requirements of the Contract Documents are attained.
- 2.1.2 Co-operate with Inspector's personnel. Provide access to work, and to manufacturer's operations to facilitate execution of required services.
- 2.1.3 Secure and deliver to Inspector adequate quantities of representative samples of materials proposed to be used which require testing.

2.1.4 Furnish mix designs proposed to be used for concrete, mortar, grout, and other material mixes with certification by an independent inspection and testing company that such mix designs meet the requirements of the Contract Documents.

2.1.5 Furnish copies of product tests, or mill test reports of steel products, as required.

2.1.6 Furnish labour and facilities to:

- .1 Provide access to work to be inspected.
- .2 Facilitate inspections and tests, including obtaining and handling samples at Project site or at source of product to be tested.
- .3 Make good any work disturbed by inspection and test.

2.1.7 Provide storage on site for Inspector's exclusive use to store equipment and cure test samples.

2.1.8 Notify Inspector and Consultant sufficiently in advance of operations to allow assignment of personnel and scheduling of tests. When tests or inspections cannot be performed after such notice, reimburse Owner for Inspector's personnel and travel expenses incurred due to Contractor's negligence.

2.1.9 Pay costs for uncovering and make good work that has been covered before the required inspection or testing is completed and approved by the Consultant.

2.2 RESPONSIBILITIES OF THE CONSULTANT

2.2.1 The Contractor will submit a list of Inspection and Testing companies to the Consultant for his review.

2.2.2 The Consultant and Contractor will direct inspection and testing companies in the type and extent of inspection and testing to be undertaken.

2.2.3 The Consultant will receive submitted reports of inspections and tests for evaluation and will decide upon any actions that may be required.

2.2.4 The Consultant will provide Drawings and Specifications required by inspection and testing companies.

2.3 FAULTY WORK

2.3.1 Where tests or inspections reveal work not in accordance with Contract requirements, the Contractor shall bear costs for such additional tests or inspections as the Consultant deems necessary to verify the acceptability of corrected work.

2.3.2 All testing shall be conducted in accordance with the requirements of the Consultant.

2.3.3 Defective work discovered before expiration of the warranty period specified in the General Conditions of the Contract, as may be extended in this Specification, will be rejected, whether or not it has been previously inspected. If rejected, defective materials or work incorporating defective materials or workmanship shall be promptly removed and replaced or repaired to the satisfaction of the Consultant, at no expense to the Owner.

2.4 TOLERANCES FOR INSTALLATION OF WORK

2.4.1 Unless acceptable tolerances are otherwise specified in a Section or a reference standard 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 3mm in 3048mm (1/8" in 10').
- .2 "square" shall mean not in excess of 10 seconds lesser or greater than 90 degrees.
- .3 "straight" shall mean within 3mm (1/8") under a 3048mm (10') long straight edge.

END OF SECTION

PART 1 - GENERAL

1.1 ABBREVIATIONS OF SPECIFYING AUTHORITIES

- 1.1.1 The following abbreviations used in the Contract Documents, shall have the meanings listed and the applicable standards shall apply.

AA	Aluminum Association (USA)
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APEG BC	Guidelines for Structural Engineering Services for Building Projects
ASHRAE	American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc.
ASTM	American Society for Testing and Materials
AWMAC	Architectural Woodwork Manufacturer's Association of Canada Materials
AWI	Architectural Woodwork Institute
BCLMA	British Columbia Lumber Manufacturer's Association
BHMA	Builders Hardware Manufacturers Association
CAN	Canadian Standards Association
CCA	Canadian Construction Association
CCDC	Canadian Construction Documents Committee
CEC	Canadian Electrical Code (published by CSA)
CEMA	Canadian Electrical Manufacturers' Association
CGSB	Canadian General Standards Board
CISC	Canadian Institute of Steel Construction
CLA	Canadian Lumberman's Association
COFI	Council of Forest Industries of British Columbia
CPCA	Canadian Painting Contractors' Association
CPCI	Canadian Prestressed Concrete Institute
CPMA	Canadian Paint Manufacturers Association
CRCA	Canadian Roofing Contractor's Association
CSA	Canadian Standards Association
CSC	Construction Specifications Canada
CSDFMA	Canadian Steel Door and Frame Manufacturers' Association
CSI	Construction Specifications Institute (USA)
CSSBI	Canadian Sheet Steel Building Institute
FM	Factory Mutual
ISO	International Organization for Standardization
LEED	Leadership in Energy and Environmental Design
MFMA	Maple Flooring Manufacturers Association (USA)
MCCR	Ministry of Consumer and Commercial Relations
MSDS	Material Safety Data Sheet
MTC	Ministry of Transportation and Communications (Ontario)
NAAMM	National Association of Architectural Metal Manufacturers

NBC	National Building Code of Canada
NBFU	National Board of Fire Underwriters (USA)
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Prevention Bureau
NHLA	National Hardwood Lumber Association (USA)
NLGA	National Lumber Grades Authority
NRC	National Research Council
NSC	National Standards of Canada
OAA	Ontario Association of Architects
OBC	Ontario Building Code
OGCA	Ontario General Contractors Association
OHSA	Occupational Health and Safety Act
OIRCA	Ontario Industrial Roofing Contractor's Association
OFM	Ontario Fire Marshal
OPSS	Ontario Provincial Standard Specifications
PEI	Porcelain Enamel Institute (USA)
RAIC	Royal Architectural Institute of Canada
SCAQMD	South Coast Air Quality Management District
SSPC	Steel Structures Painting Council
TTMAC	Terrazzo, Tile and Marble Association of Canada
ULC	Underwriters Laboratories of Canada
UL or ULI	Underwriters Laboratories Incorporated
USSL	United States Sports Surfacing Laboratories (USA)
WCB	Workers' Compensation Board
WDMA	Window and Door Manufacturers Association
WHMIS	Workplace Hazardous Materials Information System

END OF SECTION

PART 1 - GENERAL

1.1 TEMPORARY OFFICES AND SHEDS

1.1.1 Provide an adequate site office for own use with space for the use of the Consultant. The office space for the Consultant shall have a separate bench or table for drawings and a drawer beneath the bench.

- .1 Temporary field offices shall be designated on site until such time where an area located inside the constructed building, can be designated by the Owner. No other location shall be used for temporary field office. Temporary site office shall not exceed 3048mm (10') x 15240mm (50').
- .2 Facilities shall consist of: an office desk and chair, a two drawer filing cabinet, two chairs, use of a telephone, use of facsimile machine, and a layout table for drawings located so that when drawings are spread out their orientation is same as that of building under construction.
- .3 Heat, cool and light offices to minimum code requirements for office buildings.
- .4 Keep temporary field office clean and remove all rubbish at the end of each work day.
- .5 Include construction and operating hardware, with security locks, as required by the Owner.

1.1.2 Site Storage:

- .1 Until such time where an area can be located inside the constructed building, designated by the Owner as a temporary site storage, provide storage trailers or construct weather-tight storage sheds for storage of materials that may be damaged or defaced by weather, in locations indicated by the Owner.
- .2 Include security locks, as required.
- .3 Install lighting in storage areas and heat in those storage areas containing materials damaged by low temperature.
- .4 Provide separate shed located where directed in writing by Consultant for storage of volatile materials.
- .5 Owner is not responsible for securing Products or materials at the Place of the Work.
- .6 Handle and store materials so as to prevent damage or defacement to the Work and surrounding property.

1.2 TEMPORARY SERVICES

1.2.1 Power, light, water and heat are available on the site. Make arrangements with the Owner for use of these services.

1.2.2 Be responsible for the distribution of temporary power during construction. Exposed extension cords are not permitted outside the work areas.

1.2.3 Provide an adequate pure fresh water supply for the use of all Sections. Run supply pipe or pipes from the nearest available sources and maintain in good condition until the permanent system is installed and ready for use.

1.2.4 Provide temporary lighting to requirements of authorities having jurisdiction and at a level for the proper execution of the Work.

1.2.5 Provide and maintain sanitary temporary toilets of a chemical type for the use of the workmen engaged in the work in compliance with local by laws.

- 1.2.6 Provide a temporary telephone and fax machine on the site for own use and that of the Consultant. All long distance charges shall be paid for by the party making the call.
- 1.3 REMOVALS
 - 1.3.1 Provide temporary and/or permanent supports and bracing as indicated, before demolition of walls, floors, roofs or other structural members that would endanger portion of building to remain.
 - 1.3.2 Provide temporary and/or permanent mechanical and electrical service as indicated, to maintain Owner's operation without interruption, before cutting, relocating or removal of existing services.
- 1.4 HANDLING AND STORAGE
 - 1.4.1 Handle and store materials and products on the job in such a manner that no damage shall be done to the material and products, the structure, the site and surrounding property. Construct and maintain such service roads as may be necessary to provide at all times safe, convenient and adequate access for materials, products and other supplies.
 - 1.4.2 Confine operations of the work of this Contract to limits indicated on Drawings.
 - 1.4.3 Allocate an area of the site for the storage of materials and products brought to the job by all Sections. Keep the storage area tidy at all times. Do not use other areas of the site for storage.
 - 1.4.4 Lobbies, corridors, and washrooms shall be kept clean of construction materials at all times.
 - 1.4.5 The building shall be properly closed and locked at nights, Sundays, holidays and other occasions when the work is not in progress.
 - 1.4.6 Protect materials and products from damage during handling, storage and installation.
 - 1.4.7 Store materials in dry weather-tight, lockable enclosures.
 - 1.4.8 Store cementitious and clay products clear of the earth or concrete floors and away from walls.
 - 1.4.9 Keep sand dry and clean and store on tight, wooden platforms, and covered with tarpaulins during inclement weather, if exposed to same.
 - 1.4.10 Protect metals against damage, dirt or dampness.
 - 1.4.11 Store packaged or bundled products in original and undamaged condition with manufacturer's seals and labels intact.
 - 1.4.12 Provide flat, solid support for all sheet products during storage.
 - 1.4.13 Store and mix paints in a room assigned for this purpose. Keep room under lock and key. Remove oily rags and any other combustible materials every night. Take every precaution to prevent spontaneous combustion.
 - 1.4.14 Make good or replace damaged materials to the satisfaction of the Consultant.
- 1.5 SIGNS ON PROPERTY
 - 1.5.1 Signs on the Project will be restricted to one sign showing the name of the Project, the names of Owner, Architect and Consultants designed by the Consultant to be supplied and erected by the

Contractor, one sign showing the Contractor's name and site safety signage specified in Section 01 00 00 General Requirements.

1.5.2 Do not exhibit other signs or advertisements other than warning signs on the site.

1.5.3 No construction signs will be permitted on the building or site.

1.5.4 Maintain signage until Certificate of Substantial Performance of the Work, unless otherwise directed by the Consultant.

1.5.5 Destroy and dispose of signage off site.

1.6 LIMITS OF THE SITE

1.6.1 Confine materials, products, equipment and temporary structures within the limits of the site as shown on the Drawings.

1.7 PLANT AND MACHINERY

1.7.1 Provide formwork, scaffolding, ladders, cranes, derricks, tackle, gangways, planks, fans, screens, gantries, tarpaulins, tools and machinery for the proper execution of the Work.

1.8 ACCESS/DELIVERIES AND TRAFFIC CONTROL

1.8.1 Arrange for delivery of materials, products and equipment to arrive when needed and at times to prevent interfering with vehicular traffic on the streets and pedestrian traffic on sidewalks.

1.8.2 Provide Access roads as may be necessary to provide safe and adequate access for materials, products and other supplies. Provide and maintain access sidewalks, roadways, and similar facilities as may be required for access to the Work. Do not block public roads, or impede traffic or danger safety of the students during work of this Project and to temporary block traffic then provide flag person to direct traffic acceptable to Ministry of Labour Standard. Remove accumulations of ice and snow from areas providing access to Site. Ensure that access is available for emergency vehicles. Comply with fire plan for vehicular traffic. Bridge excavations with construction and steel cover plate to safely support any load that could be imposed and provide personnel to assist in deliveries to building(s) as required.

1.8.3 Access to the site shall be as established by the Owner at the commencement of the Work.

1.9 HOURS OF WORK TO BE CONFIRMED BY FACILITY MANAGER.

1.9.1 Normal working hours shall be 7:00 am to 5:00 pm Monday through Sunday, except holidays. Special permission shall be obtained from the Owner to change to a different time schedule.

1.10 TEMPORARY FIRE PROTECTION

1.10.1 Operable fire extinguishers shall be provided by the Contractor, and shall be kept within the work areas throughout the construction period. Extinguishers shall be sufficient in number and of suitable types to combat potential fires in the work area.

1.11 SYSTEM SHUT DOWNS

1.11.1 Requests for any system shutdowns will be processed a week in advance.

1.12 GARBAGE REMOVAL

- 1.12.1 The Contractor shall ensure that all his subcontractors, including telephone company, remove all garbage and debris from the Work on a daily basis. Should it be necessary for the Owner to remove Contractor's garbage or debris due to inaction by the Contractor, the Contractor shall be invoiced for the cost thereof. Temporary storage of garbage or debris outside the Work areas is not permitted.
- 1.12.2 Corridors, lobbies, and other common areas are to be kept clear of any residual debris.
- 1.12.3 Garbage of a flammable nature (eg paper) shall not be allowed to accumulate, but shall be removed from the site as quickly as possible.

1.13 TRANSPORTING MATERIALS ON STREETS

- 1.13.1 The Contractor shall, if so directed by the Consultant or the City Engineer, provide "tight trucks", approved by the Engineer, to haul soft or wet material over streets, in order to prevent litter on the streets. In all cases where any materials are dropped from the trucks of the Contractor, he shall clean up same as often as directed and also keep all sidewalks clean and free from dirt and mud.
- 1.13.2 If the Contractor refuses or neglects to clean up said litter when order to do so by the Consultant or Engineer, the Owner will have the necessary cleaning and the cost of same will be deducted from monies due to the Contractor.
- 1.13.3 All construction and demolition materials shall be transported in accordance with the City requirements and by-laws, including all amendments.

1.14 PARKING

- 1.14.1 All parking by the Contractor is his responsibility. The Owner makes no representation that parking will be available. Under no circumstances shall vehicles impede or block access to the existing building.

1.15 HOISTS AND LIFTING FACILITIES

- 1.15.1 Install and operate an adequate number of elevators or hoists which shall be available for use by all trades and subcontractors. Hoists or elevators shall be properly positioned so as not to interfere with the construction, and if located outside the building, the exterior walls shall be protected against damage.

1.16 DUST NUISANCE

- 1.16.1 Prevent nuisance to adjacent properties near the work from dust, by taking appropriate anti-dust measures at such times as found necessary, and in response to complaints of dust received from the public.

1.17 SNOW AND ICE

- 1.17.1 Remove all accumulations of ice and snow from the property and sidewalks and access to the property. Ensure that access is provided at all times for all emergency vehicles.

1.18 REMOVAL OF TEMPORARY FACILITIES

- 1.18.1 Remove temporary facilities from the site when directed by the Consultant.

1.19 TRAFFIC CONTROL

- 1.19.1 Do not block roads or impede traffic. Keep construction traffic to designated roads only. Provide flag-person to direct traffic as required.
- 1.19.2 Provide a hard surface area at the Place of the Work for cleaning down trucks prior to entry onto municipal roads or private roads outside of the Place of the Work.
- 1.19.3 Keep public and private roads free of dust, mud and debris resulting from truck, machinery and vehicular traffic related specifically to this Project, for the duration of Work.
- 1.19.4 Clean roads regularly, public or private. Wash down and scrape flush roads at least daily when earth moving operations take place. Maintain public property in accordance with requirements of authorities having jurisdiction.

1.20 ENVIRONMENTAL/POLLUTION CONTROL/SITE CLEANING

- 1.20.1 Prevent the escape of untreated effluent, be it liquid or gaseous substance or any liquid or solid wastes, being objectionable or detrimental to adjoining areas of the construction site.
- 1.20.2 Burning or burying of rubbish, waste, and the like is not permitted on construction site.
- 1.20.3 Only fires for heating bitumen and temporary heaters as specified are permitted on site.
- 1.20.4 Take care to prevent staining or smoke damage to structure or materials. Replace stained or damaged work.
- 1.20.5 Make every effort to provide environmental protection, take precautionary measures to prevent excessive noise, sounds, vibrations, dust, air pollution, smoke, etc., which may become objectionable to people occupying adjacent areas.
- 1.20.6 Keep building site clean and free of unsightly collection of waste materials and debris. Provide for temporary storage and collection of waste materials, and dispose to local authorities having jurisdiction recommendations at intervals to maintain a clean site condition.
- 1.20.7 Confine apparatus, the storage of materials and the operations of workers to the site. Do not unreasonably encumber the premises with construction materials.

END OF SECTION

PART 1 - GENERAL

1.1 PRODUCT QUALITY

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

1.2 STANDARDS

- 1.2.1 The work of each trade shall be carried out by skilled, experienced personnel who have been certified to carry out the work by various trade associations and in accordance with the Apprenticeship and Trades Qualifications Act and applicable regulations.
- 1.2.2 Where reference is made to specification standards produced by various organizations, conform to the latest edition of the standards specified as amended and revised to the date of the Contract.
- 1.2.3 Each subcontractor must possess and be familiar with the specified standards which affect their work.
- 1.2.4 Generally, materials and workmanship shall meet or exceed the requirements of CAN/CSA, ASTM, CGSB, CAN/UL and manufacturer's printed instructions.

1.3 SUBSTITUTIONS

- 1.3.1 The Contractor shall base his Tender Price upon the Tender Documents.
- 1.3.2 The Owner and the Consultant may consider requests for substitutions from that specified in the Tender Documents, providing the requests are submitted in writing describing such substitutions in full detail, the type of material, equipment or method and reasons for deviating from the Tender Documents.
- 1.3.3 In making a request for a substitution, confirm in writing that:
- .1 The Contractor has investigated the proposed product and method and determined it to be equal or superior in all respects to that specified.
 - .2 The same guarantee is given for the proposed substitution as for the product and method originally specified.
 - .3 The installation of the proposed substitution will be coordinated into the Work, and such changes in the Work will be made as required to accept the substitution and to ensure the Work is complete in all respects. The cost of changes in the Work necessary to incorporate a proposed substitution is to be included in any proposed increase or decrease to the Contract Price associated with the proposed substitution.
 - .4 Do not substitute materials, equipment or methods unless such substitutions have been specifically approved in writing prior to the close of tenders by the Consultant.
 - .5 The Owner reserves the right to accept or reject, at its sole discretion, any proposed substitution.

1.4 WORKMANSHIP

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

END OF SECTION

PART 1 - GENERAL

1.1 SUBSTITUTIONS - MATERIALS AND PRODUCTS

- 1.1.1 Work of the Project shall be based upon using new materials and products specified or indicated by reference to standards, codes, specifications, to a manufacturer's name, by trade name or by catalogue reference, except where a material or product is indicated as being reused. Where two or more trade names are specified the choice shall be optional with the Contractor.
- 1.1.2 Contract Price shall be based on the materials and products specified, whether available or not at the time of bidding.
- 1.1.3 Requests for substitutions prior to Bid Date will not be accepted.
- 1.1.4 Materials and products specified without the "or other approved manufacture" / "or approved alternate" clause following the name of the material or product shall be supplied without substitution.
- 1.1.5 Where the Specifications include the "or other approved manufacture" / "or approved alternate" clause substitutions will be considered by the Consultant if:
- .1 products specified are not available, or
 - .2 substitute products to those specified, which are brought to the attention of, and considered by the Consultant as equivalent to those specified will result in a credit to the Contract Price, or
 - .3 substitute products to those specified, which are brought to the attention of, and considered by the Consultant as superior to those specified will not result in a change to the Contract Price and Contract Time.
- 1.1.6 Substitutions may be proposed by the Contractor under the following conditions:
- .1 Submission of proposed substitutions shall show the material and product names and complete specifications and shall state what difference, if any, will be made in the Contract Price and Contract Time for each substitution, should it be accepted.
 - .2 Indicate name and manufacturer of product specified, for which substitute is requested and where in Specification product is specified.
 - .3 Respective costs of items originally specified and the proposed substitution.
 - .4 Confirmation of proposed substitution delivery, in writing by Product manufacturer.
 - .5 Compliance with the building codes and requirements of authorities having jurisdiction.
 - .6 Affect concerning compatibility and interface with adjacent building materials and components.
 - .7 Compliance with the intent of the Contract Documents.
 - .8 Reasons for the request.
- 1.1.7 Should proposed substitution be accepted either in part or in whole the Contractor shall assume full responsibility when the substitution affects any other work. Any Contract Document changes required as a result of the substitution shall be executed by the Consultant at the Contractor's expense.
- 1.1.8 Proposed substitutions shall satisfy all design conditions and other specified requirements. Properties included but not limited to the following, as applicable, will be considered:
- .1 Physical dimension requirements to satisfy the space limitations, static and dynamic weight limitations, structural properties, audible noise levels, vibration generation, interchangeability of parts or components, accessibility for maintenance, possible removal or replacement, colours, textures and compatibility with other materials,

products, assemblies and components.

- 1.1.9 Cost of all changes in work of other Sections necessitated by use of proposed material and product substitutions shall be borne by the Contractor.
- 1.1.10 Bring to the attention of Owner and Consultant, in writing, the effect of all changes in the work of other Sections necessitated by use of proposed material and product substitutions. Should the contractor fail to bring to the attention of the Owner and the Consultant, the effect of any and all changes, due to the use of proposed materials or product substitutions, then cost of changes in the work of other Sections shall be borne by the Contractor.
- 1.1.11 Substitutions submitted on shop drawings without following requirements of this section prior to submission of the affected shop drawings will cause the shop drawings to be rejected.

1.2 SUBSTITUTIONS - METHODS OR PROCESSES

- 1.2.1 Contractor may suggest for consideration of the Consultant, substitutions to methods or processes described in the Specifications and/or shown on the Drawings and other Contract Documents. Any application for such substitutions shall indicate how such substitutions are advantageous to the Owner or to the better fulfilment of the Contract. There shall be no obligation on the parties concerned to accept any such suggestions.
- 1.2.2 Contractor shall be responsible for substitutions to methods or processes concerning such work, and the warranty covering all parts of the work shall not be affected.
- 1.2.3 Cost of all changes in work of other Sections, necessitated by the use of substituted methods or processes, shall be borne by the Contractor. Contract Document changes required as a result of the substitution shall be executed by the Consultant, at Contractor's expense.
- 1.2.4 Substituted methods or processes shall be accommodated by space allotted for the specified methods or processes.

1.3 CREDITS ARISING FROM SUBSTITUTIONS

- 1.3.1 Any and all credits arising from accepted substitutions shall be credited to the Contract in such sums as may be assessed by the Consultant and Contract Price will be adjusted accordingly. No substitutions will be permitted without prior written approval of the Consultant.

1.4 CODE REQUIREMENTS SUBSTITUTIONS

- 1.4.1 All proposed substitutions for materials, products, methods and processes shall meet the requirements of the National Building Code, Ontario Building Code, and the requirements of authorities having jurisdiction.
- 1.4.2 Proposed substitute materials, products, methods and processes shall not negate the compliance of adjacent materials, products and constructions with the requirements of the National Building Code, Ontario Building Code, and the requirements of authorities having jurisdiction, to which the proposed substitutions may be applied or attached.
- 1.4.3 Contractor shall obtain written approval of proposed substitutions from authority having jurisdiction and shall submit approval with the proposed substitution for the Consultant's consideration.

END OF SECTION

PART 1 - GENERAL

1.1 CLEAN UP DURING CONSTRUCTION

- 1.1.1 During construction, maintain the work in a tidy condition and free from accumulation of waste products, debris, snow and ice other than that caused by the Owner, Other Contractors or their employees.
- 1.1.2 At reasonable intervals during progress of the Work, clean-up site, building and access, and dispose of waste materials, rubbish and debris. Provide containers and locate on site for collection of waste materials, rubbish and debris. Do not allow waste materials, rubbish and debris to accumulate and become unsightly or hazardous.
- 1.1.3 Move waste materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights. Fog spray dusty debris with water.
- 1.1.4 Conduct clean up and disposal operations to comply with local ordinances and anti-pollution laws. Burning or burying of rubbish and waste materials on the Project site is not permitted. Do not dispose of volatile fluid wastes (such as mineral spirits, oil or paint thinner) in storm or sanitary sewer systems or into streams or waterways. Remove waste materials, rubbish and debris from the site and legally dispose of at public or private dumping areas off the Owner's property.
- 1.1.5 Vacuum clean interior building areas when ready to receive finish painting and continue vacuum cleaning on an as-needed basis until building is ready for acceptance or occupancy.
- 1.1.6 Wash down exterior exposed aluminum surfaces using a solution of mild domestic detergent in warm water, applied with soft clean wiping cloths. Take special care to remove all dirt from corners. Wipe interior surfaces clean when curtain wall work is completed.
- 1.1.7 Remove excess sealant by moderate use of mineral spirits or other solvent acceptable by the sealant manufacturer and the metal fabricator.
- 1.1.8 Where the accumulation of dirt does not respond to the washing or cleaning, refer the condition to the Consultant, with recommendations as to the remedial action required; but, do not undertake any cleaning procedure of a more severe nature without the written approval of the Consultant.
- 1.1.9 Remove concrete and alkali wash-offs on surfaces to prevent etching of glass and/or metal.
- 1.1.10 Remove temporary protective materials and coatings.
- 1.1.11 Clean exterior glass during construction, every 3 months or more frequently, to prevent the glass from being etched by alkaline water.

1.2 CLEANING AT SUBSTANTIAL PERFORMANCE

- 1.2.1 Upon attaining Substantial Performance of the Work, remove surplus products, tools, construction machinery and equipment not required for the performance of the remaining work. Also remove waste products and debris and leave the work clean and suitable for occupancy by the Owner unless otherwise specified.
- 1.2.2 All final cleaning shall be carried out under this Section and the building shall be left in condition to meet the approval of the Consultant. The final cleaning shall not commence until authorized by the Consultant. This work shall include, without being limited to, the cleaning of floors, walls,

windows, ceilings, fixtures and equipment, the removal of debris and all work required on the interior and exterior to complete the building and site cleaning.

- 1.2.3 All floors shall be cleaned in a manner acceptable to the Consultant.
- 1.2.4 Stains, paint, grease, oil, temporary protection and covers, plaster, mortar droppings, labels, caulking and sealant compounds, and dirt shall be removed. Damaged painted areas shall be touched up. All surfaces and items, including without being limited to, walls, ceilings, doors, windows, glass, partitions, fixtures, hardware, mechanical and electrical equipment shall be dusted and/or polished.
- 1.2.5 Replace broken and scratched glass.
- 1.2.6 Remove debris off roofs. Sweep and wash clean paved areas outside the building. Rake clean landscaped areas.
- 1.2.7 Replace heating, ventilating and air conditioning filters if units were used during construction. Vacuum clean ducts, fans, blowers and coils if units were used without filters during construction.
- 1.2.8 Ensure that the inside of all air handling systems are clean and free from dust, and debris when building is turned over to Owner.
- 1.2.9 Vacuum out and wipe clean all electrical and signal panels, switchboards, transformers and other electrical equipment.
- 1.2.10 Use experienced workmen or professional cleaners for final cleaning. Use only cleaning materials recommended by manufacturer of surface to be cleaned. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.
- 1.2.11 Completion of the Contract shall not be attained until the Contractor has removed surplus products, tools, construction machinery and equipment. Removed waste products and debris, other than that caused by the Owner, other Contractors or their employees.
- 1.3 HAZARD CONTROL
 - 1.3.1 Conduct cleaning and disposal operations in strict accordance with all applicable codes, ordinances and anti-pollution laws.
 - 1.3.2 Store volatile matters in covered metal containers and remove from site at end of each working day. Do not dispose of volatile and toxic wastes in storm or sanitary drains, streams or waterways.

END OF SECTION

PART 1 - GENERAL

1.1 CONTRACT COMMISSIONING

- 1.1.1 Expedite and complete deficiencies and defects identified by the Consultant.
- 1.1.2 Submit required administrative and technical documentation, such as Statutory Declarations, Worker's Compensation Certificate, warranties, certificates of approval or acceptance from regulating bodies.
- 1.1.3 Review inspection and testing reports to verify conformation to the intent of the Documents and that changes, repairs or replacements have been completed.

1.2 AS BUILT-DRAWINGS

- 1.2.1 Prior to application for Substantial Performance, allowing sufficient time for review, clearly, neatly, and accurately transfer information from marked up white prints to diskettes. Print lettering and numbers in size to match original. Lines may be drawn freehand but shall be neat and accurate. Add "AS-BUILT" at each drawing title block. Should extensive changes and deviations to a drawing make the information illegible, re draft the drawing. Submit email copy for consultant's review and comments.
Once the consultant confirmed, submit two (2) USB key of entire final closeout documents including As-builts CAD files and PDFs and (2) hard copy sets of entire close-out documents including As-builts drawings to Client Office.

***GC/Subcontractor is responsible for the producing of CAD As-built Drawings.**

1.3 MAINTENANCE INSTRUCTIONS AND DATA BOOK

- 1.3.1 Provide one electronic copy and three sets of maintenance instructions and data books, together with the record drawings as specified in the preceding Article, to the Owner prior to the date of Substantial Performance.
- 1.3.2 Submit one email copy of the book for the Consultant's review prior to submitting the books to the Owner.
- 1.3.3 The books shall contain the name of the Contractor and the date of Substantial Performance for the Project. Supply the following data:
 - .1 Complete listing of materials, products, and equipment including serial numbers, manufacturer's names, and sources of supply.
 - .2 Description of each system, with the description of each major component of the systems.
 - .3 Operation and installation instructions for each assembly, component and system.
 - .4 Complete maintenance instructions for each assembly, component and system. Include warnings of harmful practices.
 - .5 Lists of spare parts for each assembly, component and system complete with names and addresses of suppliers.
 - .6 Cleaning, maintaining and preserving instructions for all materials, products and surfaces. Include warnings of harmful cleaning, maintaining and preserving practices.
 - .7 A lubrication schedule of all equipment.
 - .8 Final reviewed shop drawings.
 - .9 Copies of all warranties.

- .10 Operating curves of mechanical and electrical equipment.
- .11 Page-size Valve Tag Schedule and Flow diagrams.
- .12 Water treatment procedures and tests.
- .13 Final balancing reports for the mechanical systems.
- .15 Copies of all warranties.
- .16 **Once the consultant confirmed, submit two (2) USB key of entire final closeout documents including As-builts CAD files and PDFs and (2) hard copy sets of entire close-out documents including As-builts drawings to Client Office.**

1.3.4 Books shall be three-ring hard cover loose-leaf binders, indexed as to contents and identified on the binding edges as "Maintenance Instructions and Data Book", with name of project. The binders shall contain the name of the Contractor and the date of Substantial Performance for the Project.

1.3.5 Terminology used in the various indexed sections of the books shall be consistent.

1.4 MAINTENANCE MATERIALS

1.4.1 Deliver to the site, unload and store where directed, maintenance materials specified in the various Sections of the Specifications. Obtain receipt from the Owner for delivered materials.

1.4.2 Package materials so that they are protected from mechanical damage and loss of essential properties.

1.4.3 Label packaged materials for proper identification of contents. If applicable give colour and finish, room number or area where material is used.

1.5 DISTRIBUTION SYSTEM DIAGRAMS

1.5.1 Prior to application for Substantial Performance, submit framed single line diagrams of the electrical distribution systems.

1.6 TRIAL USAGE AND INSTRUCTIONS – MECHANICAL

1.6.1 Thoroughly instruct the Owner's authorized representative in the safe operation of the systems and equipment.

1.6.2 Arrange and pay for the services of qualified manufacturer's representatives to instruct Owner on specialized portions of the installation; such as, refrigeration machines, boilers, automatic controls, and water treatment.

1.6.3 Submit a complete record of instructions as part of the maintenance instructions and data book given to the Owner. For each instruction period, supply the following data:

- .1 Date.
- .2 System or equipment involved.
- .3 Names of persons giving instructions.
- .4 Names of persons being instructed.
- .5 Other persons present.

1.6.4 Instructional period shall be carried out during a continuous period of 30 days.

- 1.6.5 The Owner shall be permitted trial usage of systems or parts of system for the purpose of testing and learning operational procedures. Trial usage shall not affect the warranties, not be construed as acceptance thereof; and no claim for damage shall be made against the Owner for any injury or breakage to any part or parts of such systems due to the aforementioned tests, where such injuries and/or breakage are caused, directly or indirectly, by a weakness or inadequacy of parts, or by defective materials or workmanship of any kind whatsoever.

1.7 TRIAL USAGE AND INSTRUCTIONS – ELECTRICAL

- 1.7.1 Provide services of manufacturer's specialized representatives to instruct Owner in operation of systems and equipment.
- 1.7.2 Permit the Owner's representatives, in order to familiarize themselves with the equipment, to operate systems for a reasonable period of time, as may be arranged.
- 1.7.3 Trial usage of any equipment by the Owner shall not affect the warranties, nor be construed as acceptance of the equipment or system, and no claim for damage shall be made against the Owner for injury or breakage to any part or parts of the aforementioned system or systems due to any such test, where such injuries or breakage are caused, in whole or in part, directly or indirectly, by a weakness or inadequacy of parts, or by defective materials or workmanship of any kind whatsoever.
- 1.7.4 Review information provided in maintenance instructions and data book with the Owner's representatives to ensure the Owner has a complete understanding of the electrical equipment and systems and their operation.

1.8 WARRANTIES

- 1.8.1 Extended warranties (warranties of more than two years duration) where specified in the Contract Documents, shall be provided by the Contractor and shall be in a form acceptable to the Consultant.
- 1.8.2 Where manufacturers offer, as a general policy, extended warranties on their products or other greater benefits than those called for in the specifications, the Contractor shall obtain the benefit of such extended warranties for the Owner and shall certify that he has done so before making the final claim for payment.
- 1.8.3 Upon completion of the Contract by the Contractor, or upon other termination of this Contract, the Contractor hereby agrees and covenants to assign to the Owner all warranties and guarantees which the Contractor has received from the sub trades employed by him on the Project.
- 1.8.4 Specified warranty periods shall not be construed as limiting the provisions of the General Conditions.
- 1.8.5 The carrying out of replacement work and making good of defects shall be executed at times convenient to the Owner and this may require work outside of normal working hours at the Contractor's expense.

1.9 SUBSTANTIAL PERFORMANCE OF THE WORK

1.9.1 Deficiency review:

- .1 Neither Owner nor Consultant will be responsible for preparation or issuance of extensive lists of deficiencies. Contractor assumes prime responsibility for ensuring that items

- shown and described in the Contract Documents are complete. Any reviews to approve the certificate of Substantial Performance of the Work will be immediately cancelled if it becomes obvious to the Consultant that extensive deficiencies are outstanding.
- .2 The Contractor shall conduct an inspection of the Work to identify deficiencies and defects, which shall be repaired. When the Contractor considers that the Work is substantially performed, the Contractor shall prepare and submit to the Consultant a comprehensive list of items to be completed or corrected and apply for a review of the Work by the Consultant to determine if Substantial Performance of the Work has been achieved.
 - .3 The Contractor's request described above shall include a statement by Contractor that the Work to be reviewed by Consultant for deficiencies is, to the best of the Contractor's knowledge, in compliance with Contract Documents, reviewed shop drawings, and samples, and that deficiencies and defects previously noted by Consultant have been repaired.
 - .4 No later than fifteen (15) working days after the receipt of the Contractor's request described above, but contingent upon the prior receipt, by the Consultant, of the closeout submittals in the manner and form specified in this section, the Consultant and the Contractor will review the Work to identify any defects or deficiencies. If necessary, the Contractor shall tabulate a list of deficiencies to be corrected prior to Substantial Performance of the Work being certified by the Consultant.
 - .5 During review, the Consultant and the Contractor will decide which deficiencies or defects must be rectified before Substantial Performance of the Work can be certified, and which defects are to be treated as warranty items.
 - .6 Provide a schedule of planned deficiency review having regard to the foregoing.

1.9.2 Certification of Substantial Performance of the Work:

- .1 When the Consultant considers that the deficiencies and defects have been completed and that it appears that the requirements of the Contract Documents have been substantially performed, the Consultant shall issue a certificate of Substantial Performance of the Work to the Contractor, stating the date of Substantial Performance of the Work.
- .2 The certificate of Substantial Performance of the Work shall be prepared in form required by Construction Lien Act.

1.9.3 Final Inspection for completion of the Contract:

- .1 Deficiencies and defects shall be made good before the Contractor submits a written request for final review of the Work and before the Contract is considered complete.
- .2 When Contractor is satisfied that the Work is complete, and after the Contractor has reviewed the Work to verify its completion in accordance with the requirements of the Contract Documents, the Contractor shall submit a written request for a final review by the Consultant, who in turn will notify the Owner.
- .3 If there are any deficiencies identified as a result of this review, they shall be listed by the Consultant and submitted to the Contractor. This list shall be recognized as the final deficiency list for purposes of acceptance of the Work under the Contract.
- .4 Such deficiencies shall be corrected by a date mutually agreed upon between Consultant and the Contractor, unless a specific date is required by Contract, and a further review by the Consultant shall be called for by the Contractor following his own review to take place within seven (7) days from date of request.
- .5 Contractor shall thereafter submit invoice for final payment.
- .6 Money shall be withheld for deficiency work and will be released only when all deficiencies have been completed. No partial payment to be recognized until all work is completed.

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

END OF SECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- 1.1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
- 1.1.2 Related Specification Sections:
- 1.1.3 Division 22: Plumbing
- 1.1.4 Division 23: HVAC, HVAC Controls, Testing and Balancing, and Air Distribution
- 1.1.5 Division 25: Building Automation and Controls
- 1.1.6 Division 26: Electrical
- 1.1.7 Division 27: Communications
- 1.1.8 Division 28: Electronic Safety and Security

1.2 SUMMARY

- 1.2.1 Section includes requirements and procedures for conducting equipment and system commissioning, including the following:
 - 1. Completion of commissioning procedures on specific equipment and systems as indicated under “Related Sections” below.
 - 2. Verification of operational and functional performance of specific equipment and systems for compliance with the Owner’s Project Requirements as described in the “Related Sections” below.
 - 3. Fundamental Commissioning of all commissioned systems shall be accomplished through the review of owner’s project requirements and basis of design, review of construction documents, designation of the commissioning team, incorporating commissioning requirements into construction documents, implementing a commissioning plan, prefunctional system tests, functional performance tests and writing a summary commissioning report.
 - 4. The commissioning process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product.

1.3 DEFINITIONS

- 1.3.1 BOD: Basis of Design
- 1.3.2 Commissioning: The systematic process of ensuring that building’s energy related systems are installed, calibrated and perform appropriately in accordance with the Owner’s Project Requirements (OPR), engineer’s basis of design (BOD), and as represented in the construction documents and specifications.
- 1.3.3 Commissioning Authority (CxA): Independent entity responsible for overseeing the specified commissioning procedures and under contract directly with the Owner or Owner’s Representative.
- 1.3.4 Commissioning Report: Report prepared by the Commissioning Authority, detailing the commissioning procedures performed, inspection and testing results and the current version of the Issues Log indicating the process to resolve any outstanding issues.

- 1.3.5 Functional Performance Testing: The process of testing and documenting system parameters under simulated or actual operating conditions.
- 1.3.6 Installation and Startup Checklists: Installation and start-up items to be completed by the appropriate party prior to Functional Performance Testing.
- 1.3.7 Issues Log: List of noted deficiencies discovered and corrective actions taken as a result of commissioning process.
- 1.3.8 O&M: Operations and Maintenance
- 1.3.9 OPR: Owner's Project Requirements
- 1.3.10 Physical Inspection Process: On-site inspection and review of related system components for conformance to the specifications.
- 1.4 COORDINATION
 - 1.4.1 Commissioning Team (Abbreviations):
 - .1 Architect and Design Engineers – Design Team (A/E)
 - .2 Controls Contractor (CC)
 - .3 Commissioning Authority (CxA)
 - .4 Electrical Contractor (EC)
 - .5 General Contractor (GC)
 - .6 Mechanical, Electrical and Plumbing Subcontractors (MEP)
 - .7 Owner / Owner's Technical Staff (OS)
 - .8 Owner's designated Project Manager (PM)
 - .9 Testing and Balancing Contractor (TAB)
 - 1.4.2 Management: The CxA is hired by the Owner or owner's representative. The CxA directs and coordinates the commissioning activities. All members work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents. The CxA's responsibilities are the same regardless of who hired the CxA.
 - 1.4.3 Scheduling: The CxA will work with and provide sufficient notice to the PM and GC to schedule commissioning activities. The GC will integrate all commissioning activities into the master schedule. All parties will address scheduling on an ongoing basis and make necessary notifications in a timely manner in order to expedite the commissioning process.
- 1.5 COMMISSIONING TEAM RESPONSIBILITIES
 - 1.5.1 The responsibilities of various parties in the commissioning process are provided in this section. It is noted that the services for the Project Manager, Construction Manager, Architect, HVAC mechanical and electrical designers/engineers are not provided for in this contract. That is, the Contractor is not responsible for providing their services. Their responsibilities are listed here to clarify the commissioning process.
 - .1 Design Team Responsibilities:
 - .1 Attend commissioning scoping meeting, controls integration meeting and additional meetings, as necessary.

- .2 Complete the Basis of Design (BOD) documentation, assist with development of the Owner's Project Requirements (OPR) document and sequence of operation documentation as required by CxA.
 - .3 Perform normal submittal review, construction observation, as-built drawing preparation, etc., as contracted.
 - .4 Assist in resolution of system deficiencies identified during commissioning.
 - .5 Review and approve operations and maintenance manuals (O&M).
- .2 Commissioning Authority (CxA) Responsibilities:
- .1 Design, Construction and Acceptance Phase:
 - 1. Develop and coordinate execution of testing plan and commissioning activities to verify and document systems are functioning in accordance with design intent and Contract Documents.
 - 2. May assist with problem-solving of deficiencies, but ultimately that responsibility lies with the contractors and design engineer of record.
 - 3. Not responsible for design concept, design criteria, code compliance, general construction scheduling, cost estimating, or construction management.
 - 4. Plan and conduct a commissioning scoping meeting and other commissioning meetings.
 - 5. Coordinate the commissioning work and, with the GC and PM, ensure that commissioning activities are being scheduled into the master schedule.
 - 6. Request and review additional information required to perform commissioning tasks, including contractor submittals, O&M materials, contractor start-up and checkout procedures.
 - 7. Perform site visits to observe component and system installations.
 - 8. Develop start-up and initial systems checkout plan with Subcontractors.
 - 9. Approve systems installation by reviewing Installation Checklists completed by the Contractor and subcontractors.
 - 10. Approve systems startup by reviewing start-up reports and by selected site observation.
 - 11. Review TAB execution plan.
 - 12. With necessary assistance and review from installing contractors, write the functional performance test procedures for equipment and systems. Submit to PM for review, and for approval if required.
 - 13. Coordinate, witness, document and approve functional performance tests performed by installing contractors. Coordinate retesting as necessary.
 - 14. With the GC and Subcontractors, maintain master deficiency and resolution record and provide Owner with written progress reports and recommended actions. Additional costs to oversee, retest and correct deficiencies shall be paid by the GC.
 - 15. Review the O&M manuals.
 - 16. Prepare and deliver the systems manual to the owner's operating staff.
 - 17. Prepare a final commissioning report.
- .3 General Contractor Responsibilities:
- .1 Construction and Acceptance Phase:
 - 1. Facilitate coordination of commissioning work by CxA and integrate commissioning activities into the master schedule.
 - 2. Attend commissioning scoping meeting and additional meetings, as necessary.
 - 3. Furnish copies of construction documents, addenda, change orders, RFI, submittals and shop drawings related to commissioned equipment and systems to CxA.
 - 4. Ensure Subcontractors execute their commissioning responsibilities according to the contract documents, specifications and Commissioning Plan.

5. Work with Subcontractors to prepare O&M manuals, according to specifications, including updating original sequences of operation and plans to Record conditions.
 6. Provide all documentation requested by the commissioning authority relating to the preparation of the Systems Manual.
 7. Assist in resolution of system deficiencies identified during commissioning. Correlate the resolution of all deficiencies with final payment to associated contractor less warranty retention.
- .4 Mechanical, Electrical, Controls and TAB Subcontractor Responsibilities:
- .1 Construction and Acceptance Phase:
1. Attend commissioning kick-off meeting, additional commissioning coordination meetings and deficiency resolution meetings, as necessary.
 2. Provide additional requested documentation, prior to normal O&M manual submittals, to CxA for development and review of start-up and functional testing procedures.
 3. Assist in clarification of operation and control of commissioned equipment as necessary for writing detailed testing procedures.
 4. Develop start-up and checkout plan for commissioned equipment based on manufacturer's recommendations and vendor's in-house checklists. Submit to CxA for review and approval prior to start-up.
 5. During startup and checkout process, execute pre-functional checklists for commissioned equipment. Perform and document completed startup and system operational checkout procedures. Be present on the job site to review pre-functional checklists results with the CxA as requested.
 6. Resolve A/E punch list items before implementation of functional testing.
 7. Air and water TAB to be completed with discrepancies and problems resolved before functional testing.
 8. Perform functional testing, under direction of CxA, for commissioned equipment.
 9. Resolve equipment or system deficiencies by making hardware or software changes necessary to satisfy project plans and specifications and retest as required.
 10. Prepare O&M manuals according to specifications, including updating original sequences of operation and plans to Record conditions.
 11. Coordinate with equipment manufacturers to determine requirements to maintain validity of warranties.
 12. Provide all necessary handheld instruments in order to perform startup, checkout, pre-functional testing, functional testing and deficiency resolution.
 13. TAB to provide test and balance plan to CxA for approval 3 weeks before balancing begins.
 14. TAB to maintain a deficiency log (including air, water & controls issues) provided to the CxA on a weekly basis.
 15. TAB to submit final test and balance data to CxA for review.
- .5 Controls Contractor Responsibilities:
- .1 Sequences of Operation Submittals: Controls submittals to include complete and detailed sequences of operation for each piece of equipment.
- .2 Control Drawings Submittal shall include:
1. Graphic schematic depictions of systems and individual components associated with the control system, including equipment primarily controlled by packaged controls. All control interfaces to embedded controls within packaged systems will be fully detailed.
 2. Full points list including for each point, system name, point abbreviation and description, point type, and display unit.

- .3 Controls Contractor to prepare and submit to the CxA a written plan that will be followed to test, checkout and adjust control system prior to functional performance testing. Plan shall include verification of all installations of end devices, wiring between device and controller, calibration of analog inputs, point-to-point verification, and controller software configuration. Control system checkout is a component of prefunctional testing and all specifications requirements of prefunctional checklists shall apply.
 - .4 Controls Contractor to be present as necessary to manipulate control system and record results of calibration process and enter results into control system software or equipment software.
 - .5 Signed and dated certification to CxA and Owner upon completion of control system checkout.
 - .6 Record Drawing version of control drawings and sequences of operation to be included in final controls O&M manual submittal.
- .6 Owner's Technical Staff Responsibilities:
- .1 Design, Construction and Acceptance Phase:
 - 1. Provide Owner's Project Requirements (OPR)
 - 2. Provide final acceptance of building contingent upon the resolution of all deficiencies identified during the commissioning process.
- .7 Manufacturer's Representative and Equipment Suppliers Responsibilities:
- .1 Provide requested submittal data, including detailed start-up procedures, installation and operation manuals, controls wiring diagrams and specific responsibilities of Owner to keep warranties in effect.
 - .2 Provide information requested by CxA regarding equipment sequence of operation and testing procedures.
 - .3 Assist in equipment testing per agreements with contractors.
- 1.6 COMMISSIONING PROCESS
- 1.6.1 Commissioning Plan. The commissioning plan is developed by the CxA to provide guidance to the team in execution of the commissioning process.
 - 1.6.2 Kick-Off Meeting. Members of design and construction team involved in the commissioning process meet and discuss scope of work, tasks, schedules, deliverables, and responsibilities for implementation of Commissioning Plan.
 - 1.6.3 Submittals. The General Contractor submits commissioning documents to the CxA during regular submittals. The commissioning documents to be submitted as part of regular submittals include manufacturer's installation instructions, startup and test procedures, operation and maintenance instructions, performance data and control drawings.
 - 1.6.4 Installation and Startup. The subcontractors, under their own direction, execute and document equipment installation and startup using the pre-functional checklists and perform startup and initial checkout. Completed checklists are provided to the CxA as documentation of the commissioning progress. In some cases, the CxA may elect to witness the completion of installation and startup procedures.
 - 1.6.5 Functional Performance Tests. The functional test procedures will be developed by the CxA. Functional testing will not begin until all startup/prefunctional tests have been received and accepted by the CxA and the Owner. The functional performance tests will be executed by the contractor owning the work. The CxA will direct and witness the tests and collect documentation confirming that the tests were completed. Deferred testing is conducted, as specified or required.

- 1.6.6 Deficiencies and Non-conformance. Commissioned systems which fail to meet the requirements of Installation, Startup or Functional Performance Tests will be corrected at the subcontractor's expense and the system will be retested. An ongoing Issues Log, maintained by the CxA, will be provided to owner and Design Team.
- 1.6.7 O&M Manuals. The CxA will review the O&M documentation for completeness.
- 1.6.8 Systems Manual. The CxA will prepare and deliver the Systems Manual.
- 1.6.9 Commissioning Report. The CxA compiles final commissioning report which summarizes tasks, findings, and documentation of commissioning process. The report addresses actual performance of building systems in reference to design intent and contract documents and includes an executive summary of the process and results of the commissioning program, including observations, conclusions and any outstanding items, a history of any system deficiencies identified and how they were resolved, including any outstanding issues or seasonal testing scheduled for a later date and systems performance test results and evaluation.

1.7 SYSTEMS TO BE COMMISSIONED

The following new systems will be commissioned as part of this project.

- 1.7.1 Heating, ventilation, air conditioning, and refrigeration (HVAC&R) and associated controls, including, but not limited to:
 - .1 Air distribution system
 - .2 Variable Air Volume Terminal Units
 - .3 Air Conditioning Units
 - .4 Exhaust Fans
 - .5 Radiant Heaters
 - .6 Building Automation System
- 1.7.2 Plumbing, including domestic hot water systems, pumps, and controls
- 1.7.3 Electrical, including service, distribution, lighting, and controls, including daylighting controls

PART 2 – PRODUCTS

2.1 TEST EQUIPMENT

- 2.1.1 The General Contractor and Manufacturers shall provide all equipment required to conduct the tests specified. The General Contractor shall advise the commissioning team of instrumentation to be used and the dates the instruments were calibrated.
- 2.1.2 All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. All equipment shall be calibrated according to the manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

PART 3 – EXECUTION

3.1 MEETINGS

- 3.1.1 Commissioning Kick-off. The CxA will conduct a Commissioning Kick-off Meeting to ensure that the roles and responsibilities are understood by all commissioning team members.

3.1.2 Commissioning Progress. The CxA will facilitate commissioning progress meetings as necessary to review commissioning progress and to identify any outstanding issues to the commissioning team.

3.2 SUBMITTALS

3.2.1 The General Contractor will provide commissioning submittals to the CxA for systems to be commissioned as defined in Part 1, Section 1.7, Systems to be Commissioned. Systems that are not within the commissioning scope do not require commissioning submittals. Commissioning submittals must include equipment manufacturer and model number, the manufacturer's printed installation and detailed start-up procedures, full sequences of operation, O&M data, performance data, any performance test procedures and control drawings. The submittals should also include the installation and checkout materials that are actually shipped with the equipment and the actual field checkout sheet forms to be used by the factory or field technicians.

3.2.2 The General Contractor will provide all documentation requested by the CxA relating to the preparation of the Systems Manual.

3.2.3 After the Submittal is approved by the designer the CxA will request additional information from design team, contractors and Subcontractors such as O & M and installation literature or other technical data in order to facilitate the commissioning process.

3.2.4 CxA may request additional design and operations narrative from Subcontractors and A/E.

3.3 STARTUP, PRE-FUNCTIONAL INSPECTION CHECKLISTS

3.3.1 Prefunctional checklists are important to ensure that the equipment and systems are properly installed and operational and to ensure that functional testing may proceed without unnecessary delays. Each piece of equipment receives full prefunctional checkout by the responsible contractor. Only individuals that have direct knowledge and witnessed that a line item task on the prefunctional checklist was actually performed shall initial or check that item. The prefunctional testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system.

3.3.2 Development. The General Contractor will develop prefunctional checklists and startup plan during submittal reviews. All vendor information must be submitted to the CxA for review at least four weeks prior to arrival of the equipment on site. The checklists should include, at minimum, all manufacturer or vendor Installation and Startup instructions. The CxA will review and approve the procedures in the prefunctional and startup checklists. The CxA will also note any procedures that must be added to the checklists.

3.3.3 Pre-functional checklists: Pre-functional checklists shall verify all aspects of equipment including but not limited to equipment manufacturer, model, capacity, efficiency, accuracy, status, full modulation capability, type, ratings, accessories, compatibility, installation methods and other project specification requirements.

3.3.4 Completion. The General Contractor or appropriate sub-contractor designated by the GC will complete prefunctional checklists and startup procedures for equipment to be commissioned, as defined in Part 1, Section 1.7, Systems to be Commissioned. Contractors schedule pre-functional testing activities and inform CxA of the schedule to enable the CxA to attend if desired. Prefunctional and Startup checks must be completed by the GC or sub-contractor and approved by the CxA prior to commencing Functional Performance Testing. GC completes all pre-functional tests in their entirety and submits completed pre-functional test reports to the CxA for review. Subcontractors and vendors execute startup and checkout and provide CxA with signed and dated copy of completed startup reports. The CxA will witness some, but not all equipment start-up.

3.4 FUNCTIONAL PERFORMANCE TESTING

- 3.4.1 Before Functional Performance Testing procedures are executed the GC must have submitted all commissioning submittals to the CxA and completed Pre-functional and Startup Checklists and TAB is completed for the given system being commissioned. Controls system and equipment it controls are not functionally tested until points have been calibrated and pre-functional checklists are completed. Lighting control system or lighting control component prefunctional checklists must be complete before functional testing is scheduled for lighting controls.
- 3.4.2 Objectives and Scope. Demonstrate each system is operating according to documented design intent, construction documents, and/or bidder design package. Functional testing verifies components, equipment, systems, and interfaces between systems operate correctly and include operating modes, interlocks, control sequences, and responses to emergency/life safety conditions. Verification procedures are reviewed, witnessed, and documented by the CxA.
- 3.4.3 Forms. The CxA will develop functional test procedures and forms based on project plans and specifications, contractor approved submittals and contractor submitted installation, operation & maintenance manuals for each piece of equipment being commissioned. IO&M manuals will be required to be submitted to the CxA during pre-functional test development. The GC or appropriate sub-contractor will review the tests for feasibility, safety, equipment and warranty protection prior to execution.
- 3.4.4 Development of Forms. Test procedure forms, developed by the CxA, to include the following information:
- .1 System and equipment or component name(s).
 - .2 Equipment location and ID number.
 - .3 Date.
 - .4 Participating parties.
 - .5 Instructions for setting up test, including special cautions and limits.
 - .6 Specific procedures to execute test.
 - .7 Acceptance criteria of proper performance with date passed and initials boxes.
 - .8 Section for comments or notes.
 - .9 Approval of Forms. The CxA may submit to the Owner or Design Team (A/E) the test forms for review.
 - .10 Test Methods. Functional Performance Testing, depending on equipment, may be achieved by direct manipulation of system inputs such as temperature sensors, setpoints, or short-term monitoring of parameters using stand-alone data loggers or DDC controls system (trend logging). A combination of methods may be required to test complete sequence of operations. The testing method to be used will be specified on the forms developed by the CxA.
 - .11 Schedule. The GC or sub-contractor shall keep the CxA informed of progress with pre-functional checklists and startup of equipment and systems. Functional testing will not be scheduled until all control system start-up and checkout plans, TAB reports and prefunctional checklists have been completed and submitted to the CxA for review and approval. The CxA will schedule the Functional Performance Testing through the Owner, GC and appropriate sub-contractors.
 - .12 Dry Run Tests. CxA will provide the contractor Functional Test forms for dry run testing by the contractor. The contractor will execute all functional tests in advance of formal functional testing with the CxA, owner and construction team. In addition the contractor will review their associated approved submittal to ensure that the installed system meets the requirements of the approved submittal prior to functional testing.

- .13 Test Completion. The sub-contractor responsible for installing the equipment will perform the Functional Performance Tests. Each test procedure is performed under conditions that simulate normal building operating conditions as closely as possible. The sub-contractor performing the tests shall provide all necessary materials and system modifications to measure performance and produce testing conditions described on the forms. The CxA will witness and document the tests. If damage to equipment or system results from the implementation of a functional performance test that was sent to the contractors for review, it is the contractor's responsibility to provide all equipment and labor necessary to make repairs.
- .14 Sampling. The CxA, at their discretion, may use a quality based sampling strategy to verify Functional Performance Testing for multiple identical pieces of equipment. When sampling is used, the CxA will witness and document Functional Performance Testing for a representative cross section of identical equipment.
- .15 Problem Solving. The CxA may recommend solutions to problems or deficiencies found, however the burden of responsibility to solve, correct and retest problems is with the GC, Subcontractors and A/E.
- .16 Deferred Testing. Deferred testing may be required due to seasonal variation in operations of equipment or due to inappropriate occupancy condition. Control strategies may require additional testing during opposite season to verify performance of HVAC system and controls.

3.5 DOCUMENTATION, ISSUES LOG, AND APPROVAL OF TESTS

- 3.5.1 Documentation. The CxA will witness and document the results of Functional Performance Testing using the forms developed for that purpose. The completed forms will be included in the Final Commissioning Report and the O&M Manuals.
- 3.5.2 Non-Conformance. Minor deficiencies identified during Functional Performance Testing may be corrected immediately and retested with resolution documented on procedure form. Larger deficiencies which cannot be resolved on-site will be rescheduled for testing at a later date. In all cases the CxA will make note of non-compliance and corrections made on the forms.
- 3.5.3 Issues Log. Deficiencies identified during Functional Performance Tests that cannot be corrected during the testing will be documented by the CxA in the Issues Log. The Issues Log shall include details of components or systems found to be non-compliant with parameters of test plans or project documents and attempts to identify responsible party. The log will be provided to all commissioning team members.
- 3.5.4 Cost of Retesting. Cost to conduct retesting will be covered by the sub-contractor, unless the deficiencies are due to manufacturer defect.
- 3.5.5 The cost to retest a prefunctional or functional test beyond 10% of the total number of tests will be back-charged to the responsible Sub.
- 3.5.6 For a deficiency identified, not related to any prefunctional checklist or start-up fault, the following shall apply: The CxA and PM will direct the retesting of the equipment once at no "charge" to the GC for their time. However, the CxA's time for a second retest will be charged to the GC, who may choose to recover costs from the responsible Sub.
- 3.5.7 The time for the CxA to execute any re-testing required because a specific prefunctional checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be back-charged to the GC, who may choose to recover costs from the party responsible for executing the faulty prefunctional test.
- 3.5.8 Approval. The CxA will document each completed Functional Performance Test on the forms.

- 3.5.9 Where Functional Performance Tests indicate systems are functioning normally, the CxA will formally provide approval of Functional Performance Tests after review.
- 3.5.10 CxA recommends acceptance of each test to Owner or Owner's Project Manager.
- 3.5.11 Owner gives final approval on each test.
- 3.5.12 CxA and owners final approval of all tests and resolution of all deficiencies is necessary before the owner will accept the building and turnover of the building to the owner can take place. Final payment to GC and all contractors may be withheld by the owner subject to the prerequisite of final acceptance of the building by the owner.

3.6 OPERATIONS AND MAINTENANCE MANUALS

- 3.6.1 Contents. The O&M Manual will be provided by the GC and will include the following items, at a minimum:

- .1 A narrative describing the system, including:
- .2 Startup, normal operations, shutdown, unoccupied operation, seasonal changeover and manual operation;
- .3 Contact information of equipment manufacturer or vendor;
- .4 Control drawings and schematics;
- .5 Installation, operating and maintenance instructions;
- .6 Maintenance schedules;
- .7 Parts list, including suppliers for parts;
- .8 List of special tools required for maintenance;
- .9 Performance and warranty data;
- .10 Troubleshooting & alarms.
- .11 Format. The O&M Manual must be provided in a format which will allow for efficient and easy access. An electronic copy shall be provided in a widely supported format. If a physical copy is provided, the O&M Manual must be bound in labeled binders and be divided with tabs.
- .12 The specific content and format requirements for the standard O&M manuals are detailed in the specifications.
- .13 Review and Approval. Prior to substantial completion the contractors submit to the CxA for review the O&M manuals, documentation and redline as-builts *for systems that were commissioned* to verify compliance with the specifications and project requirements. The CxA will communicate deficiencies in the manuals to the PM or A/E, as requested. The CxA also reviews each equipment warranty and verifies that all requirements to keep the warranty valid are clearly stated. Upon successful review of the manuals, the CxA will recommend approval and acceptance of the O&M Manuals to the Design Team. This work does not supersede the A/E's review of the O&M manuals according to the A/E's contract.

3.7 SYSTEMS MANUALS

- 3.7.1 Contents. The Systems Manual will be developed and prepared by the CxA with the assistance of the General Contractor, and will include the following items, at a minimum:

- .1 Executive Summary
- .2 Owner's Project Requirements
- .3 Basis of Design
- .4 System single-line diagrams
- .5 Construction record documents and specifications
- .6 Approved submittals
- .7 As-built sequences of operations
- .8 Original setpoints for all commissioned systems
- .9 Recommended schedule for recommissioning
- .10 Recommended schedule for sensor recalibration
- .11 Equipment operations and maintenance manuals
- .12 Equipment preventative maintenance schedules

- .13 Confirmation of completed training for the owner and occupants
- .14 Ongoing system optimization procedures
- .15 Final commissioning report

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

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

1.2 RELATED WORK

- 1.2.1 Refer to Asbestos Report- removal of contaminated materials, friable asbestos containing materials, and PCB's.
- 1.2.2 Removal and relocation of mechanical and electrical items indicated as relocated and reused are specified under respective Mechanical and Electrical Drawings. Co-ordinate the removal and relocation of these items.

1.3 REFERENCE STANDARDS

1.3.1 American National Standards Institute (ANSI):

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

1.3.2 National Fire Protection Association (NFPA):

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

1.3.3 Provincial Legislation:

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

1.4 DEFINITIONS

- 1.4.1 Demolish: Detach items from existing construction and legally dispose of them off site, unless indicated to be removed and salvaged or removed and reinstalled.
- 1.4.2 Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.
- 1.4.3 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- 1.4.4 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed, removed and salvaged, or removed and reinstalled.

1.5 EXAMINATION

- 1.5.1 Visit and examine the site and note all characteristics and irregularities affecting Work of this Section. Submit a pre-demolition inspection report. Ensure the Owner of premises being inspected is represented at inspection.
- 1.5.2 Where appropriate prepare a photographic or video record of existing conditions, particularly of existing work scheduled to remain.
- 1.5.3 Where applicable, examine adjacent tenancies not part of the scope of work. Determine extent of protection required to areas and related components not subject to demolition.
- 1.6 PROTECTION
- 1.6.1 Do not commence demolition until all personnel and Owner's equipment are removed from the area being demolished.

PART 2 - PRODUCTS

2.1 SALVAGE MATERIALS

- 2.1.1 Salvage materials, products, and equipment indicated. Carefully remove items to be salvaged, protect during alteration and reinstall in locations indicated.
- 2.1.2 Refer to sprinkler, mechanical and electrical Drawings and specifications for sprinkler, mechanical and electrical work to be reused.
- 2.1.3 Salvage the following items for reuse and return to the Owner in an adequately preserved and usable condition on date of Substantial Performance or other mutually agreed date:
 - .1 Millwork, fire extinguishers, lockers, lights, clocks, bells and plumbing fixtures.
 - .2 Remove existing ceiling and light fixtures, as indicated for reuse or return to the owner.
- 2.1.4 All materials and products from the demolition except noted otherwise shall become the property of the Contractor. Remove all material and debris from the site as quickly as possible and dispose of legally. Burning of debris on the site will not be permitted.
- 2.1.5 Salvage materials, products, and/or equipment as directed by the Consultant. Remove carefully items to be salvaged to the locations designated. Protect during demolition and store above items. Materials and/or equipment directed to be salvaged shall remain the property of the Owner.
- 2.2 REPAIR MATERIALS
- 2.2.1 Use repair materials identical to existing materials:
 - .1 If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - .2 Use a material whose installed performance equals or surpasses that of existing material.
 - .3 Comply with material and installation requirements specified in individual Specification Sections.

- 2.2.2 Floor Patching and Levelling Compounds: Cement based, trowelable, self-levelling compounds compatible with specified floor finishes; gypsum based products are not acceptable for work of this Section.
- 2.2.3 Concrete Unit Masonry: Lightweight concrete masonry units, and mortar, cut and trimmed to fit existing opening to be filled. Provide standard hollow core units, square end units and bond beam units as indicated on drawings.
- 2.2.4 Brick: Install brick and mortar, cut and trimmed to fit existing opening to be filled, once demolition of hollow metal door and frame is completed. Match brick and mortar to existing adjacent materials as approved by the Consultant. Provide ties and accessories as required to complete the installation.
- 2.2.5 Gypsum Board Patching Compounds: Joint compound to ASTM C475, bedding and finishing types thinned to provide skim coat consistency to patch and prepare existing gypsum board walls ready for new finishes in accordance with Section 09 21 16 – Gypsum Board Systems.
- 2.2.6 Fireproofing: Patch and repair all fireproofing damaged during demolition of adjacent surfaces with compatible fireproofing materials. Provide test reports from fireproofing manufacture warranting installation, adhesion and compatibility between existing and new fireproofing materials.
- 2.2.7 Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to Division 7 for new roofing requirements.

PART 3 - EXECUTION

3.1 SEQUENCE OF ALTERATIONS

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

3.2 SCREENS

- 3.2.1 Provide temporary barriers, guard rails, protective covers, screens, enclosures, tarpaulins etc., as may be required to enclose work areas from other areas of the building, to maintain security, to confine dust, noise and workmen to the work area, and to give full protection to the public, building occupants, workmen employed for demolition and to adjoining property, in compliance with authorities having jurisdiction. Locate screens as directed by the Consultant.
- 3.2.2 It is essential that the existing building be maintained weathertight at all times. Provide temporary protection, enclosures, tarpaulins, etc., as may be required to weatherproof any openings made in the Work.
- 3.2.3 Construct dustproof and windproof screens as required to completely enclose the work areas and the access passages to the work areas from the other areas of the existing building. Locate partitions as directed by the Consultant.
- 3.2.4 Build screens of 90 mm (3-5/8") metal studs at 400 mm (16") centres sheathed with sheets of 16 mm (5/8") gypsum board on both sides with close joints. Where exposed to the weather, fully cover screens with a heavy waterproof and dustproof paper with lapped and sealed joints. Fill spaces between studs with 100 mm (4") fibrous glass or mineral wool insulation batts to deaden sound.

- 3.2.5 Thoroughly pack framing at junctions of screens with floors, walls and ceilings with batt insulation in a manner to prevent infiltration of dust, dirt, etc. Over all junctions of screens with floors, walls and ceilings, apply continuous 40 mm (1-1/2") wide strips of masking tape both sides of screen to ensure that rooms within closed off areas which are not being altered are kept dust free.
- 3.2.6 Remove screens and make good damaged or blemished adjoining work when directed.
- 3.3 EXISTING SERVICES
 - 3.3.1 Arrange and pay for the disconnection, capping and for plugging of all gas, water, hydro, telephone and other services to the structures.
 - 3.3.2 Notify in advance each utility company involved and obtain approvals before commencing work.
- 3.4 DEMOLITION WORK
 - 3.4.1 Refer to Drawings for extent of selective demolition work. Do all demolition work not specified to be done under other Sections.
 - 3.4.2 Carry out selective demolition in strict accordance with provincial and municipal authorities having jurisdiction.
 - 3.4.3 Take precautions to guard against movement of existing building and structures and displacement of elements of the building to remain. If at any time the safety of such elements appear to be in danger, suspend operations and notify the Consultant promptly. Take measures to support such elements. Do not resume demolition until the Consultant issues instructions.
 - 3.4.4 The work shown on the Drawings, Schedules and Specifications may or may not be all the work required, do all demolition, make good all finishes and execute all necessary work including incidentals to make a complete job of the alterations.
 - 3.4.5 Cut off, cap, divert, or remove existing water, gas, electric and other services in areas being altered which are affected by the changes as required or as directed by the municipal authorities and the utility company concerned, and the Consultant. Protect and maintain active services to the existing building.
 - 3.4.6 Perform the Work in such a manner so as to cause a minimum of noise or interference to the use of the existing building.
 - 3.4.7 Whenever it becomes necessary to cut or interfere in any manner with existing apparatus for short periods of time, Do work at such times as agreed upon between the Owner, Consultant, and the Contractor.
 - 3.4.8 Where new work connects with existing and where existing work is altered, all necessary cutting and fitting required to make satisfactory connections with the existing work shall be performed under this Contract, so as to leave the entire work in a finished and workmanlike condition.
 - 3.4.9 Make good materials and finishes which are damaged or disturbed during the process of additions and reconstruction under the Contract.
 - 3.4.10 Where existing work is to be made good, the new work shall match exactly the old work in material, form, construction and finish unless otherwise noted or specified.
 - 3.4.11 Perform drilling of existing work carefully, leaving a clean hole no larger than required.

- 3.4.12 Provide, throughout the entire construction period, proper and safe means of fire exit from all zones of the existing building at all times to the approval of the authorities having jurisdiction.
- 3.4.13 Protect work in the existing buildings, such as floors, finishes, trim, etc., as completely as possible to hold the replacing of damaged work by each Section to a minimum.
- 3.4.14 Properly co-ordinate the various Sections taking into account also the existing installations to assure the best arrangement of pipes, conduits, ducts and mechanical, electrical and other equipment, in the available space. Under no circumstances will any extra cost be allowed due to the failure by the Contractor to co-ordinate the work. If required, in critical locations, interference and/or installation drawings shall be prepared showing the work of the various Sections as well as the existing installation, and these drawings shall be submitted to the Consultant for review before the commencement of work.
- 3.4.15 Remove existing finishes as indicated on the Drawings to neat, straight lines and leave substrate clean and even, suitable for new finishes indicated.
- 3.4.16 At the end of each work shift leave work in a safe condition so that no part of the building or its finishes are in danger of toppling, collapsing or falling.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

- 1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.
- 1.1.2 This Section includes supply and installation of unit masonry assemblies consisting of the following:
- .1 Veneer Brick
 - .2 Architectural Concrete Masonry Units (CMUs)
 - .3 Mortar, and Grout
 - .4 Reinforcing steel
 - .5 Masonry joint reinforcement
 - .6 Ties and anchors
 - .7 Miscellaneous masonry accessories

1.2 REFERENCES

- | | | |
|--------|--------------------------|---|
| 1.2.1 | ASTM A82-02 | Standard Specification for Steel Wire, Plain, for Concrete Reinforcement |
| 1.2.2 | ASTM A116-11 | Standard Specification for Metallic-Coated, Steel Woven Wire Fence Fabric. |
| 1.2.3 | ASTM A123/A123M-13 | Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products. |
| 1.2.4 | ASTM A153/A153M-09 | Standard Specification for Zinc Coated (Hot-Dip) on Iron and Steel Hardware. |
| 1.2.5 | ASTM A167-99 (2009) | Standard Specification for Stainless and Heat-Resistant Chromium-Nickel Steel Plate, Sheet and Strip. |
| 1.2.6 | ASTM A580/A580M-15 | Standard Specification for Stainless Steel Wire. |
| 1.2.7 | ASTM C207-06(2011) | Standard Specification for Hydrated Lime for Masonry Purposes. |
| 1.2.8 | ASTM C331/C331M-14 | Standard Specification for Lightweight Aggregates for Concrete Masonry Units. |
| 1.2.9 | CSA A23.1-09/A23.2-09 | Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete. |
| 1.2.10 | CAN/CSA G164-M92 (R2003) | Hot Dip Galvanizing of Irregularly Shaped Articles. |
| 1.2.11 | CSA S304-14 | Design of Masonry Structures. |
| 1.2.12 | CSA A82.56-M1976 | Aggregate for Masonry Mortar. |
| 1.2.13 | CSA A165 Series-14 | CSA Standards on Concrete Masonry Units. |

- 1.2.14 1 CSA A179-14 Mortar and Grout for Unit Masonry.
- 1.2.15 CSA A370-14 Connectors for Masonry.
- 1.2.16 CSA A371-14 Masonry Construction for Buildings.
- 1.2.17 CSA G30.3-M1983(R1998) Cold Drawn Steel Wire for Concrete Reinforcement.

1.3 DEFINITIONS

- 1.3.1 Solid block: A masonry unit with a net cross sectional area of at least 75% of its gross sectional area in any plane parallel to its bearing surface.
- 1.3.2 One hundred percent (100%) solid block: A masonry unit with plain flat ends and without cores.
- 1.3.3 Administrative Requirements - Pre-Construction Conference: Arrange a site meeting attended by the contractor's superintendent, the Subcontractor's representative and foreman for this project, the Consultant, materials supplier(s), and other relevant personal before commencement of work for this Section; agenda for meeting will include; but not be limited to, the following:
 - .1 Confirmation of specifications and details for the project
 - .2 Required mortar, grout and concrete testing, batch control and grouting procedures
 - .3 Installation requirements of air/vapour membranes and insulation and coordination with other components of the Work
 - .4 Confirmation of cavity compartmentalization and drainage requirements
 - .5 Confirmation of appearance of exposed block lintels
 - .6 Confirmation of reinforcement at corners and wall intersections
 - .7 Coordination of interior and exterior crack control measures
 - .8 Confirmation of trowelled or tooled joints to concealed and exposed masonry faces
 - .9 Confirmation of methods for keeping mortar out of cavity space
 - .10 Confirmation of methods for controlling efflorescence during construction
 - .11 Confirmation of membranes and membrane flashing materials and details used for construction
 - .12 Review of submitted masonry unit samples
 - .13 Review of hot and cold weather requirements
- 1.3.4 Coordination: Coordinate components of the work of this Section with work performed by other Sections including; but not limited to, the following:
 - .1 Rain Screen Wall Construction: Masonry veneer forms a part of the exterior rain screen and protective facing. Construct assembly to allow for ventilation, drainage and pressure equalization of the voids between the veneer and the insulation with the outside pressures. Construct cavity space divided into separate compartments as a means of controlling these pressure differences within the building envelope.
 - .2 Steel Support Angles and Brackets: Coordinate requirements for structural steel support angles and brackets supplied and installed onto the building structure by Section 05 50 00.

1.4 DESIGN REQUIREMENTS

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

- 1.4.2 Comply with CSA A370, CSA A371, CSA S304, local building codes, authorities having jurisdiction and these Specifications. Should conflict occur, the more strict shall govern.
- 1.4.3 Comply with CAN3-A371 for construction tolerances. Tolerances shall not accumulate.
- 1.4.4 Irregularity in mortar joints of wall faces exposed or painted in the completed work shall not be noticeable when viewed from a distance of 15'.
- 1.5 SOURCE QUALITY CONTROL
 - 1.5.1 The Consultant may appoint an independent testing company to test each type of masonry unit and mortar. Tests for masonry units shall be in accordance with CSA S304, and CSA A165 as appropriate. Submit products selected at random in presence of Consultant to the testing company for testing when directed.
 - 1.5.2 Submit unit compression test and net area and absorption tests to Consultant prior to delivery of materials to the site.
 - 1.5.3 Include testing cost as part of this Section.
- 1.6 FIELD QUALITY CONTROL
 - 1.6.1 Perform field quality control tests as part of work of this Section.
 - 1.6.2 Perform site tests to determine moisture content of unit at time of delivery to site.
 - 1.6.3 Submit three test reports for each type of mortar and grout in accordance with CSA A179 .
 - 1.6.4 Site test clay masonry units to determine initial rate of absorption in accordance with CSA A179.
- 1.7 SUBMITTALS
 - 1.7.1 Submit two samples of each type of masonry unit, reinforcing, ties, anchors, accessories and cured coloured mortar for approval before delivery of materials to the site.
 - 1.7.2 Submit two brick samples, each consisting of 6 bricks, showing range of colours and texture, stacked with simulated joints.
 - 1.7.3 Submit layout of cavity wall locations for approval.
 - 1.7.4 Products on site shall match approved samples.
 - 1.7.5 Shop Drawings: Submit shop drawings indicating the following:
 - .1 Indicate sizes, profiles, coursing, and locations of special shapes for concrete masonry units.
 - .2 Indicate sizes, profiles, and locations of each stone trim unit required.
 - .3 Detail corner units, end dam units, and other special applications for fabricated flashings.
 - 1.7.6 Informational Submittals: Provide the following submittals when requested by the Consultant: Submit ULC Assembly Listings and Materials cut sheets for fire rated assemblies as follows:
 - .1 Not later than 30 working days following Award of Contract, submit copies of ULC Assembly and Materials Listing for indicating ULC Number and how assembly meets the

- rating criteria for assemblies listed on drawings or meets requirements of Supplementary Standard SB-3 of Ontario Building Code
 - .2 Use the same system and material as would be required for a tested assembly for the project; ULC Listings are tested with the specific materials indicated; substitutions will not be permitted unless evidence of equivalency is confirmed.
 - .3 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site; include manufacturer's printed instructions for installation.
- 1.8 MOCK-UP
- 1.8.1 Prior to commencement of work, construct a 1000 mm (40") high and 1500 mm (60") long sample wall for each type of masonry wall on site at locations on the building approved by the Consultant.
 - 1.8.2 Allow Consultant to inspect sample wall during the various stages of its construction.
 - 1.8.3 Sample wall shall show the specified mortar, bond, joint treatment, back-up masonry, cast-in-place concrete and metal stud, reinforcement, insulation, vapour barrier, and flashing where applicable. Remove rejected sample walls from site. Approved sample wall may form part of the completed work. All work shall match approved sample wall.
 - 1.8.4 Co-ordinate erection of sample wall with Sections providing back up construction.
- 1.9 PRODUCT DELIVERY, STORAGE AND HANDLING
- 1.9.1 Deliver and store masonry units, palletized, level and under protective covering. Do not overload structure.
 - 1.9.2 Protect materials and products from deterioration by weather, mechanical damage and other causes, and from soiling.
 - 1.9.3 Keep masonry materials and products completely free from frost, snow and ice.
- 1.10 COLD WEATHER WORK
- 1.10.1 Comply with CSA A371 and the following:
 - .1 Where possible, deliver materials required to the site in advance of freezing temperatures.
 - .2 Use dry, unfrozen masonry units.
 - .3 Building on frozen work is prohibited. Remove sections of masonry deemed frozen and damaged before continuing construction of that section.
 - .4 Do not use scorched sand, salts, or anti-freeze admixtures.
 - 1.10.2 Cold Weather Construction Requirements
 - .1 Provisions for work in progress:

Condition	Requirement
Ambient temperature above 40°F (4.5°C)	Normal construction practice. Cover stored materials.

Ambient temperature below 40°F (4.5°C) or temperature of units below 40°F (4.5°C)	Heat mortar materials to produce mortar temperatures between 40°F (4.5°C) and 120°F (49°C) at time of mixing. Maintain mortar above freezing until used in masonry. If units have a temperature below 20°F (-7°C), heat to above 20°F (-7°C). Remove visible ice from units.
Ambient temperature is between 25°F (-4°C) and 20°F (-7°C)	Heat masonry under construction from both sides. Install wind breaks when wind velocities reach 15 mph (24 km/h).
Ambient temperature is below 20°F (-7°C)	Provide heat enclosure for masonry under construction and maintain temperature above 32°F (0°C) within that enclosure.

2. Protection of newly completed work:

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

1.11 HOT WEATHER PROTECTION

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

PART 2 - PRODUCTS

3.1 MATERIAL

- 3.1.1 Concrete block: CSA A165.1, autoclaved, low pressure steam or bubble cured. All interior walls and partitions built of exposed concrete block to use bullnose units at corners.

- .1 Classification: S/15/A/M, 75% solid for all locations where structural members bear on concrete block. (Type A, B Concrete)

- .2 H/15/A/M, for all other block work.
 - .3 Fire Resistant Concrete Masonry Units: Manufactured in accordance with CSA A165:
 - .1 2 Hour Fire Rating: H/15/C/O
 - .2 1 Hour Fire Rating: H/15/A/O
 - .4 Size: Modular imperial to sizes indicated on Drawings.
 - .5 Special shapes:
 - .1 Provide square units for exposed corners.
 - .2 Provide purpose made shapes for lintels and bond beams.
 - .3 Provide additional special shapes required for project.
 - .4 Manufacture special shapes at same time and with the same batch as standard concrete block to be used.
- 3.1.2 Face Brick: Brampton brick 'Red' colour with 'Velour' texture, Modular size, type FBX and Glen-Gery brick '900 Red' colour with 'Matt' texture, Modular size, type FBX. (colour, pattern and size to match with existing building's brick).
- .1 Special shapes: Provide special sizes and shapes as shown on drawings and as required including but not limited to, plain ends, halves, jambs, sash, lintel, bullnose, and other shapes. Special shapes shall be manufactured to shape, not cut.
 - .2 Notwithstanding the appearance requirements of the above mentioned CSA Standards, block shall be free from all surface indentations, surface cracks and other defects detrimental to the appearance of the finished surface. Block having visual defects shall be rejected for exposed areas but may be used for concealed or unfinished areas.
 - .3 Efflorescence: When testing in accordance with CSA A82.2, concrete blocks shall be efflorescence free.
 - .4 Freeze/thaw resistance: Free of disintegration, weight loss, delamination, and pop outs when tested in accordance with CSA A165.3.
 - .5 Load bearing, hollow, normal weight units: H/15/A/M.
 - .6 Walls and partitions exposed to weather, normal weight: H/15/A/M.
 - .7 Load bearing, solid normal weight units: S/15/A/M.
 - .8 Load bearing, solid, lightweight units: S/15/B/M.
 - .9 Load bearing, hollow, lightweight units: H/15/B/M.
 - .10 Non load bearing, hollow, normal weight units: H/15/A/M.
 - .11 Non load bearing, solid, normal weight units: S/15/A/M.
 - .12 Non load bearing, hollow, lightweight units: H/15/B/M.
 - .13 Non load bearing, solid, lightweight units: S/15/B/M.
 - .14 Fire ratings: Provide concrete blocks having void to solid ratios and aggregate as required to achieve required fire ratings for width of fire rated walls shown. Use concrete block units as specified above and of special aggregate type L1 as required to obtain fire ratings of walls, which cannot be achieved with concrete block units of standard type S or N aggregates.
 - .15 Aggregates for light weight concrete blocks: ASTM C331.
 - .16 Aggregates for normal weight concrete blocks: CSA A23.1.
 - .17 Architectural concrete block: 2-Rib, Split-Face,.
 - .18 Supply masonry units in compliance with "Intended Use of Different Types of Masonry Units as listed in Appendix 'C' of CSA A165.1..
- 3.1.3 Portland cement: Type 10.
- 3.1.4 Masonry cement: Type H or Type L.
- 3.1.5 Sand: CSA A82.56M, as amended by CSA A179.
- 3.1.6 Lime: ASTM C207, hydrated lime.

- 3.1.7 Water: Clear and free from injurious amounts of deleterious substances.
- 3.1.8 Colour pigments: Pure mineral pigment, mineral oxide content minimum 70%. Fillers; inert. Maximum carbon black content; 1% water soluble matter. Colours to be selected by Consultant from standard manufacturer's range.
- .1 Extra Strong Colour by Elementis Pigments Inc.,
 - .2 Staybrite by Sternson Limited, or other approved manufacture.
- 3.1.9 Non-shrink grout: Minimum compressive strength of 35 Mpa (5000 psi) at 28 days. Include non-ferrous expansion agents where exposed to view or weather.
- .1 Sika Grout 212 By Sika,
 - .2 Sealtight CG-86 by W.R. Meadows of Canada Ltd.,
 - .3 Thoro Multigrout by Harris Specialty Chemicals, or other approved manufacture
- 3.1.10 Parging mortar: Type N, having a compressive strength of 5.0 Mpa (759 psi) minimum, 1 part Portland cement to not less than 2 1/2 nor more than 3 1/2 parts sand by volume.
- 3.1.11 Control joint material:
- .1 Rapid Control Joint by Dur O Wal Limited,
 - .2 Titewall BL-A by Blok lok Ltd., or other approved manufacture.
- 3.1.12 Premoulded filler: 100% over sized:
- .1 Rodofam PR grade by Sternson Limited,
 - .2 Sealtight Rescor by W.R. Meadows of Canada Ltd., or other approved manufacture.
- 3.1.13 Mineral wool filler: Mineral fibre batt insulation by Roxul Company, or other acceptable equivalents.
- 3.1.14 Through-wall flashing material: Modified bitumen, glass scrim reinforced elastomeric, 0.9 mm (35 mils) thick, Blueskin TWF by Henry Company, or other approved manufacture.
- 3.1.15 Flexible anchors and adjustable ties: 9 gauge galvanized rods.
- 3.1.16 Horizontal reinforcing:
- .1 Reinforcing: Truss type, consisting of 9 ga. wire complying with CSA G30.3, two side rods welded to a continuous diagonal formed cross rod forming a truss design with alternating welds not exceeding 8". Width of reinforcing unit shall be 1 1/2" less than nominal thickness of wall, BL 30 Blok Truss by Blok Lok or other approved manufacture.
 - .2 Galvanizing: ASTM A116 Class 3 mill galvanized for interior walls and ASTM A153 Class B2 hot dipped galvanized after fabrication for exterior walls.
- 3.1.17 Masonry Unit Veneer/Concrete or Concrete Masonry Unit Substrate Tie Systems:
- .1 Backer Plate: Fabricated from stainless steel meeting requirements of CSA A370-04(R2009) and ASTM A1011/A101aM-12; designed to transfer wind loads to steel stud framing; length to suit total cavity, insulation and sheathing thickness, as detailed on Drawings.
 - .2 Ties: Wire ties fabricated from stainless steel wire in accordance with CSA G30.18-09; length to allow for cavity width and to extend minimum 2" into masonry unit joint.

- .3 Fasteners: Self tapping metal screws to metal stud backup as recommended by tie manufacturer consisting of close tolerance bits for use in percussion drills, and hammer driven anchors with pullout strengths of 5.4 kN for 20 MPa concrete and 3.75 kN for hollow concrete masonry unit with a 1" embedment:
 - .1 Fero Holdings Ltd., Rap-Tie System
 - .2 Blok-Lok, BL-407

3.1.18 Insulation fasteners: Wedge Lok by Block Lok Limited.

3.1.19 Interior and Exterior Single Wythe Concrete Block Walls:

- .1 Single wythe interior and exterior concrete block walls: Horizontal reinforcement shall be ladder type or truss type having two parallel side rods 3/16" diam. welded to 3/16" cross rods forming a ladder or truss design. Side rods shall be notched or knurled. Design ladder or truss reinforcement to allow placement of side rods at center-line of both face shells of concrete block.

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

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

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

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

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

3.2 MORTAR TYPES

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

TYPE	PORTLAND CEMENT	HYDRATED LIME OR PUTTY	MASONRY CEMENT TYPE H	AGGREGATE LOOSE DUMP CONDITION	28 DAY COMPRESSIVE STRENGTH
S	1	½	0	4-1/2	12.5 MPa (1800 psi)
	½	0	1	4-1/2	
N	1	1	0	6	5 MPa (750 psi)
	0	0	1	3	

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

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

3.2.4 Add colouring pigment to mortar for face work if required. Colours to be selected by the Consultant from the manufacturer's standard range. Under no circumstances shall colour pigment loading exceed 6% per 55 lb. of dry mixed mortar. Mix colouring pigment into mortar in accordance with manufacturer's written instructions and as required to ensure colour uniformity and consistency.

3.3 MORTAR LOCATIONS

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

3.3.2 Back up masonry to exterior walls: Type S.

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

3.3.4 Non load bearing partitions: Type N.

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

3.4 MORTAR PREPARATION

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

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

3.4.3 Do not mix different types of mortar in the same mixer unless the mixer is thoroughly cleaned first.

3.4.4 When air temperature is 27°C or higher, use and place mortar in its final position within two hours of mixing it. When air temperature is less than 27°C use and place mortar in its final position within 2 1/2 hours of mixing it. Discard mortar not used within above times.

3.4.5 Mortars which have stiffened within mix/use time limits due to moisture evaporation may be re tempered by adding enough water as is necessary to produce proper workability consistent with the initial rate of absorption of the masonry units.

3.5 GROUTS

3.5.1 Measure and mix grout products accurately according to CSA A179M.

3.5.2 Do not mix different types of grout in same mixer or mixer used for mixing of mortar unless mixer is thoroughly cleaned.

3.5.3 Use and place grout in its final position within 2 1/2 hours of mixing it. Discard grout not used within 2 1/2 hours.

3.5.4 Grout types by volume shall be as follows:

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

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

3.6 ACCESSORIES

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

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

3.6.2 Mortar Dropping Control Devices:

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

PART 3 - EXECUTION

4.1 LINES AND LEVELS

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

4.2 CUTTING AND PATCHING

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

4.3 BUILT INS

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

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

4.3.3 Anchor steel door frames in place and build masonry around them. Do not attach door frames to walls by fastening to wood nailers. Use steel anchors. Solidly grout voids between masonry and

steel frames for doors full with masonry mortar or fine grout. Keep exposed faces of frames free from mortar. Remove droppings promptly.

4.4 PROVISIONS FOR OTHER TRADES

4.4.1 Provide openings in masonry walls where required or indicated.

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

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

4.5 ERECTION – GENERAL

4.5.1 Erect masonry to correct dimensions, plumb, true and with level courses.

4.5.2 Maintain joints vertical in alternate courses or as broken by bond pattern in line, throughout the entire height.

4.5.3 Reinforce masonry as required, to support wall mounted equipment, building components and fixtures provided under other Sections.

4.5.4 Verify the loads to be supported and the arrangement and type of fastenings with the appropriate Section.

4.5.5 Lay masonry exposed to view or to receive a brushed or sprayed finish carefully with even joint widths, and with exposed faces flush and even throughout. Broken corners and spoiled units are not acceptable. Do not use units which are too contrasting in appearance. Provide satisfactory blending of tones and textures.

4.5.6 Where resilient base is indicated, tool joints to within 4" of the floor. Strike joints at base flush.

4.5.7 Lay block to receive adhesive-applied gypsum board plumb, with joints finished flush.

4.5.8 Level, align and plumb masonry for application of thin set applied ceramic tile to requirements of 09 30 00 - Ceramic Tile, with joints struck flush.

4.5.9 The corners of concrete masonry units projecting into habitable areas and exposed or painted in the finished work shall be single or double bullnosed as required to suit the particular location. Lay specially shaped masonry units required or shown on Drawings.

4.5.10 Completely fill and tool head and bed joints to provide support for vapour barrier adhesive.

4.5.11 Completely fill joints in solid block masonry with mortar. Fully cover the end areas and bearing areas of the face shells of hollow units with mortar.

4.5.12 Provide anchors, ties, crimps, and other mason's iron work required for the construction of the work.

4.5.13 Build in anchors, nailers, accessories, flashings and other items required as the masonry work progresses. Solidly fill with non-shrink grout all voids in masonry into which anchor bolts or other connection materials are built.

- 4.5.14 Fill hollow metal door and borrowed light frames occurring in masonry with grout.
- 4.5.15 Provide grout setting bed for flashing under window sills.
- 4.5.16 Determine the location and size of openings to be left in masonry walls for heating, ventilating, plumbing, electrical fixtures, ducts, boxes and other items. Pass conduits and piping through hollow cells of blocks or build around them and split blocks. Build chases and openings as required accurately located and neatly finished, as the work progresses. Cut block for electrical boxes and recessed equipment accurately using a carborundum saw. Provide square clean edges.
- 4.5.17 Tooth new masonry into existing, where existing openings are to be filled in. necessary for construction purposes to "stop-off" a horizontal run of masonry, rake back 1/2-block length in each course. Toothing is not permitted, except with the written approval of the Consultant.
- 4.5.18 Tool joints in exposed masonry to a neat concave finish using 5/8" diameter non staining tool. Before tooling, ensure that surface of mortar is thumb print hard and has lost water sheen. Strike joints flush in concealed locations. Rake alternate joints back 1/2" where masonry is to receive plaster directly. Do not rake back joints containing reinforcing.
- 4.5.19 Where fresh masonry joins masonry that is partially or totally set, clean and lightly wet the exposed surface of the set masonry so as to obtain the best possible bond with the new work.
- 4.5.20 Where the joints in interior masonry will be apparent in the completed building, start interior walls and the back-up masonry for exterior walls with a 4" starter course, or as necessary to achieve a neat appearance at the door head/lintel condition.
- 4.5.21 Where insulation and vapour barrier are to be built into masonry walls. Co-ordinate the erection of the masonry with the installation of insulation under Section 07 21 00, Building Insulation. Strike joints flush on exterior face of interior wythes and parge this surface with a 1/4" thick coating of cement mortar. Trowel surface smooth to receive vapour barrier adhesive. Build exterior wythe tight to completed insulation.
- 4.5.22 Provide light weight aggregate as required for fire rated partitions.
- 4.5.23 Lay all joint 3/8" thick unless otherwise specified or indicated on Drawings.
- 4.5.24 Use lightweight aggregate units for concrete masonry visible or painted in the finished work.
- 4.5.25 Other masonry units shall be of lightweight aggregate or of regular sand and gravel aggregates.
- 4.6 COMPOSITE EXTERIOR WALLS
 - 4.6.1 Construct exterior brick masonry using brick to match existing brick. Use only clean, sound brick. Brickwork shall match adjacent existing brickwork in coursing, bonding, colouring of brick and mortar and shall blend into existing, to approval of Consultant.
 - 4.6.2 Tooth new brickwork into existing.
 - 4.6.3 Supply insulation fasteners to Section 07 21 00 for installation.
- 4.7 PARTITIONS
 - 4.7.1 Unless otherwise shown or specified, lay concrete block masonry in running bond.

- 4.7.2 Build up non load bearing walls to within 1" of underside of structure unless shown otherwise. Obtain lateral support anchors from Section 05 10 00. Secure lateral support anchors to structure along wall. Perform necessary drilling of concrete. Where junction of wall and structure will be visible in the completed building, lay sash block so that grooves engage in legs of metal anchors such that anchorage is concealed. Where junction of wall and structure will be concealed, lay top course to engage lateral support angles. Install mineral wool filler in void between top of wall and underside of structure. Cut filler around legs of concealed anchors. Leave ready for caulking.
- 4.7.3 Use concrete aggregate block for walls and partitions on slabs on grade. At all other locations use light weight block.
- 4.7.4 Carry partitions up through ceiling to slab or metal deck above.
- 4.7.5 Where walls and partitions are pierced by structural members, ducts, pipes, fill voids with mortar to within 1" of such members flush with wall face. Fill spaces between partition and structural members, ducts and pipes with glass fibre or mineral wool insulation compressed 50% completely from one side of wall to other.
- 4.8 REINFORCING AND ANCHORING
- 4.8.1 Reinforce and anchor masonry as required by local by laws when greater requirements are not specified or shown.
- 4.8.2 Unless otherwise shown, tie walls at corners in masonry bond, alternate courses.
- 4.8.3 At wall intersections, terminate one wall at the face of the other and build in prefabricated sections of truss type connectors at 16" o.c. vertically.
- 4.8.4 Provide horizontal reinforcing above first block course above floors slab and in first block course below floor slab, with box ties to anchor face masonry to back up.
- 4.8.5 Reinforce hollow concrete masonry walls with truss reinforcing every 16" o.c. to suit wall thickness.
- 4.8.6 Cut alternate continuous reinforcing at control joints in straight walls. Lap splices in continuous length reinforcing 6".
- 4.8.7 Install masonry reinforcing in two consecutive courses above and below openings in walls, extending not less than 3' 0" on both sides of opening.
- 4.8.8 Use adjustable wall ties where the horizontal joints in adjacent wythes of masonry walls requiring reinforcing are not in vertical alignment. Install ties 12" o.c. horizontally and 16" vertically.
- 4.8.9 Solidly fill with mortar all voids in masonry into which anchor bolts, reinforcing steel or other connection materials are built.
- 4.9 LINTELS
- 4.9.1 Lintels over openings in masonry shall have a minimum bearing of 8" on each side of opening. Provide building paper bond barrier at ends and under bearing parts of lintels.
- 4.9.2 Install loose steel lintels and bearing plates. Grout under lintels and/or bearing plates at each jamb with full bed of mortar.

- 4.9.3 Provide reinforced concrete block lintels of same thickness as wall for block walls of less than 8" thickness and for other block walls where units are to be painted or visible in the completed work. Construct lintels with special concrete lintel units. Supervise the filling of voids of units with concrete and their reinforcing with deformed steel bars. Cure before applying loads. Provide temporary support for lintels consisting of a level platform, true to the proper elevation and of sufficient strength to support the load without visible deflection. Maintain supports in place for a minimum of 7 days and for a period sufficient to permit the concrete to cure and gain sufficient strength to safely support all loads. Lay masonry units with full mortar coverage on all abutting edges with joints shoved tight. Where masonry construction is continued above the lintel, place the first course of masonry units on the lintel in a full mortar bed.

4.10 BEARING AND ANCHORAGE

- 4.10.1 Provide at least 16" of 100% solid masonry under bearing of beams, girders, trusses and lintels extending 8" beyond each side of bearing, at least 8" of 100% solid masonry under joists and under slabs. Hollow units filled with concrete are not acceptable. Provide a concrete distribution pad in lieu of solid masonry specified above for bearing plates anchored with bolts. Solid masonry in locations visible in the completed work shall be of same material and appearance as adjacent wall surface.

4.11 INSTALLATION DAMPPROOF COURSES

- 4.11.1 At walls having grout fill, turn dampproof course material up at least 8" on the face of the back-up masonry and terminate in a reglet.
- 4.11.2 In all cases extend dampproof course material through full thickness of face masonry.
- 4.11.3 Make 100% watertight seal between dampproof course material strips with waterproof adhesive. Make 100% watertight seal between dampproof course material and items passing through it.

4.12 REPOINTING

- 4.12.1 Cut back defective joints 1/2" taking care not to damage units. Remove dust and loose materials by brushing or by water jet. If water jet is used, allow excess water to drain before repointing.
- 4.12.2 Repoint with mortar similar to original mortar mix. Pre hydrate mortar by mixing with only a portion of required water, two hours before use. At end of curing period, rework mortar, adding remaining water.
- 4.12.3 Pack mortar tightly in thin layers and tool to required joint finish.

4.13 CLEANING

- 4.13.1 Clean masonry according to masonry unit manufacturer's written instructions.
- 4.13.2 Where mortar or stains cannot be removed as specified above, propose other methods to the Consultant for approval. Employ methods approved by the Consultant and remove mortar and stains.

4.14 PROTECTION

- 4.14.1 Provide and maintain protection against entry of moisture into masonry whenever work is interrupted. Use non staining water repellant paper, polyethylene sheet or tarpaulins overhanging

walls 2' 0" minimum and secured in place to prevent wind uplift. Similarly protect exposed ledges to be covered by flashing or other material until such materials are installed.

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

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.
- 1.1.2 Provide all labour, materials, products, equipment and services required to complete the metal fabrications work necessary and/or indicated on the Drawings and specified herein including all metal work which is not specified elsewhere.

1.2 REFERENCES

- | | | |
|--------|--------------------------|--|
| 1.2.1 | ASTM A53/A53M-12: | Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless. |
| 1.2.2 | ASTM A123/A123M-13 | Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products. |
| 1.2.3 | ASTM A143/A143M-07(2014) | Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedures for Detecting Embrittlement. |
| 1.2.4 | ASTM A153 / A53M-09 | Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware. |
| 1.2.5 | ASTM A167-99(2009) | Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate. |
| 1.2.6 | ASTM A307-14 | Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength. |
| 1.2.7 | ASTM A325-14 | Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength. |
| 1.2.8 | ASTM A394-08(2015) | Standard Specification for Steel Transmission Tower Bolts, Zinc-Coated and Bare. |
| 1.2.9 | ASTM A563-15 | Standard Specification for Carbon and Alloy Steel Nuts. |
| 1.2.10 | ASTM A653/A653M-15 | Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process. |
| 1.2.11 | ASTM A780/A780M-09(2015) | Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings. |
| 1.2.12 | ASTM 1011/A1011M-14 | Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength, Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra High-Strength. |
| 1.2.13 | ASTM C939-10 | Standard Test Method for Flow of Grout for preplaced-aggregate Concrete (Flow Cone Method) |

- 1.2.14 ASTM C1107/1107M-14a Standard Specification for Packaged Dry Hydraulic-Cement Grout (Nonshrink)
- 1.2.15 CAN/CGSB 1.108-M89 Bituminous Solvent Type Paint.
- 1.2.16 CAN/CGSB 1.171-98 Inorganic Zinc Coating.
- 1.2.17 CAN/CGSB 1.181-99 Organic, Ready Mixed, Zinc Rich Coating.
- 1.2.18 CAN/CSA-G40.20-04(R2009) General Requirements for Rolled or Welded Structural Quality Steel.
- 1.2.19 CAN/CSA-G40.21-04(R2009) Structural Quality Steel.
- 1.2.20 CAN/CSA G164-M92 (R2003) Hot Dip Galvanizing of Irregularly Shaped Articles.
- 1.2.21 CISC/CPMA 2-75 Quick-Drying Primer For Use on Structural Steel.
- 1.2.22 CSA W47.1-09(R2014) Certification of Companies for Fusion Welding of Steel Structures.
- 1.2.23 CSA W47.2-11 Certification of Companies for Fusion Welding of Aluminum.
- 1.2.24 CSA W59-13 Welded Steel Construction (Metal Arc Welding).
- 1.2.25 CAN/CSA W117.2-12 Safety in Welding, Cutting and Allied Processes.
- 1.3 QUALIFICATIONS OF WELDING
 - 1.3.1 Welding of steel and aluminum shall be undertaken only by a fabricator fully approved by the Canadian Welding Bureau and CSA W47.1 and CSA W47.2, as may be applicable.
 - 1.3.2 Conform to safety requirements of CAN/CSA W117.2 for welding operations.
- 1.4 DESIGN
 - 1.4.1 Design the work of this Section in accordance with the Ontario Building Code and the by-laws of the local municipality.
 - 1.4.2 Maximum deflection for individual members shall not exceed 1/360th, of the span.
 - 1.4.3 Work of this Section which will support other items or will be required to support structural loads of any nature shall be designed by a Professional Structural Engineer registered in Ontario and who shall affix his/her professional seal and signature to the shop drawings for such items.
 - 1.4.4 Work of this Section to be executed by firm thoroughly conversant with laws, by-laws and regulations which govern, and capable of workmanship of best grade of modern shop and field practice known to recognized manufacturer's specializing in this work.
- 1.5 SUBMITTALS
 - 1.5.1 Shop drawings:

- .1 Make thorough examination of drawings and details, determine the intent, extent, and materials, and be fully cognizant of requirements when preparing shop drawings.
 - .2 Submit shop drawings showing and describing in detail all work of this Section including large scale detail of members and materials, of connection and interfacing with work of other Sections, jointing details, and of anchorage devices, dimension, gauges, thicknesses, description of materials, metal finishing, as well as other pertinent data and information.
 - .3 Digital files of design drawings shall not be used in the preparation of shop drawings.
- 1.5.2 Submit necessary templates and instructions where fastenings or anchors have to be built in by other trades.
- 1.5.3 Work designed by a Professional Engineer shall bear signature and stamp of the engineer.
- 1.5.4 Submit adequate written instructions for protection of completed work, and proper methods and materials to be used in cleaning.
- 1.6 **STORAGE, DELIVERY, HANDLING AND PROTECTION**
- 1.6.1 Coordinate deliveries to comply with construction schedule and arrange ahead for strategic off the ground, under cover storage locations. Do not load any area beyond the design limits.
- 1.6.2 Adequately protect and crate all components against damage, dirt, disfigurement and weather during delivery and storage. Damaged materials shall not be used and shall be replaced by approved material.
- 1.6.3 Cover and protect the work of other Sections in the area of work from damage. Make good all damage to the satisfaction of the Consultant.
- Protect the installed work of this Section and on completion the work shall be examined and damage shall be remedied to the complete satisfaction of the Consultant.
- 1.7 **WARRANTY**
- 1.7.1 Warrant Miscellaneous metals work of this Section against defects in materials and workmanship in accordance with General Conditions but for an extended period of two (2) years and agree to repair or replace faulty materials or work which appears during warranty period, without cost to the Owner/Tenant. Defects shall include, but not limited to, deflection, opening of joints, or deterioration of metal.

PART 2 - PRODUCTS

- 2.1 **MATERIALS**
- 2.1.1 Structural Steel Sections and Steel Plate: New stock (not weathered or rusted); to conform to CAN/CSA-G40.21, Grade 300W (44W) and Grade 350W (50W) for wide flange shapes.
- 2.1.2 Hollow Structural Sections (HSS): New stock; to conform to CAN/CSA-G40.21, Grade 350W (50W), Class C, stress relieved.
- 2.1.3 Sheet Steel (Structural Quality): Conforms to ASTM A1011/A1011M.
- 2.1.4 Sheet Steel (Commercial Quality): Conforms to ASTM A653/A653M, stretcher levelled or temper rolled.

- 2.1.5 Tube: Conforms to ASTM A53.
- 2.1.6 Welding materials: Complying with CSA W59.
- 2.1.7 Interior primer: Complying with CISC/CPMA 2-75, oil alkyd type.
- 2.1.8 Stainless steel: Type 302 or 304 alloy, complying with ASTM A167.
- 2.1.9 Aluminum sheet: 1100 alloy, H14 temper, anodizing quality.
- 2.1.10 Aluminum extrusions: Alcan 6063 alloy, T5 temper.
- 2.1.11 Steel members, fabrications and assemblies shall be galvanized after fabrication by the hot dip process in accordance with CAN/CSA G-164 or ASTM A123.
- 2.1.12 Bolts, nuts and washers and iron and steel hardware components shall be galvanized in accordance with CAN/CSA G-164 or ASTM A153. Nuts and bolts shall be supplied in accordance with ASTM A307, A325, A394 and A563 as applicable.
- 2.1.13 Products shall be safeguarded against embrittlement in conformance with ASTM A143.
- 2.1.14 Organic zinc rich primer: Complying with CAN/CGSB 1.181 "Galvafruid SB Grade" by W.R. Meadows of Canada Ltd., "Kem Organic Zinc Rich Primer No. 6430" by Sherwin-Williams Company of Canada Ltd., "Glid-Guard Glid-Zinc Organic Line 5526 Line" by the Glidden Company Limited, or other approved manufacture.
- 2.1.15 Inorganic zinc coating: Complying with CAN/CGSB 1.171, "Glid-Guard Glid-Zinc No. 5535 Line" by Glidden Company Limited, or other approved manufacture.
- 2.1.16 Interior primer for steel: Complying with CISC/CPMA 2-75a.
- 2.1.17 Bituminous paint: Complying with CAN/CGSB 1.108.
- 2.1.18 Non-Shrink Grout: Premixed, high strength, maximum bearing, impact resistant, non-shrink non-metallic aggregate grout having minimum 76 Mpa 28 day compressive strength and conforms to ASTM C939 and ASTM C1107/C1107M, 'Embeco Premixed Grout' by Master Builders Technologies Ltd., or 'Tartan Grout Iron' by Webster & Sons Ltd., or 'Sika Grout 212 HP' by Sika Canada Inc.
- 2.2 FABRICATION
 - 2.2.1 Verify all dimensions on the site before preparing Drawings or proceeding with shop work.
 - 2.2.2 Insofar as practical, execute fitting and assembly in the shop with various parts of assemblies ready for erection at the building site.
 - 2.2.3 Fabricate the work true to dimensions and square. Accurately fit members with hairline joints, and join using adequate fastening.
 - 2.2.4 Construct finished work free from distortion and defects detrimental to appearance and performance.
 - 2.2.5 File or grind exposed welds smooth and flush. Do not leave grinding marks. Construct internal and external corners with sharp lines. Provide continuous welds unless otherwise approved by the Consultant in writing.

- 2.2.6 Fabricate metal work complete with all components required for anchoring to concrete; bolting or welding to structural frames; standing free; or resting in frames or sockets in a safe and secure manner.
- 2.2.7 Weld all connections unless approved otherwise in writing by the Consultant.
- 2.2.8 Execute exposed fastenings neatly where approved and of the same material, colour and finish as the base metal, on which they occur.
- 2.2.9 Counter sink exposed fastenings, where such are approved in writing, and make as inconspicuous as possible with bolts cut off flush with nuts. Construct fastenings of the same material and finish as the base material on which they occur.
- 2.2.10 Insulate contact surfaces to prevent electrolysis due to metal to metal contact or between metal and masonry or concrete. Use bituminous paint, butyl tape, building paper or other approved means.
- 2.2.11 Thoroughly de-scale steel work before delivery to project site. Remove roughness and irregularities, clean with a wire brush, remove oil and grease and prime with one shop coat of paint to a 2 mil thickness.
- 2.2.12 Primer interior steel work supplied under this Section with one shop coat of interior primer.
- 2.2.13 Do not prime the following surfaces:
 - .1 steel to be encased in concrete;
 - .2 non-ferrous metals;
 - .3 surfaces and edges to be field welded. If painted, remove paint for field welding for a distance of at least 2" in all sides of the paint.
- 2.2.14 Hot-dip galvanize steel, where specified, in accordance with CAN/CSA G164 (coating weight as prescribed for type of article), or ASTM A653/G90 (coating weight; 1.25 oz./sq.ft.) as applicable. Galvanize after fabrication where possible. Follow recommended precautions to avoid embrittlement of the base metal by overpickling, overheating or during galvanizing.
- 2.2.15 Touch-up galvanized steel where galvanizing is damaged during installation with zinc rich primer, in accordance with ASTM A780.
- 2.2.16 Stainless steel shall be finished in No. 4 bright, brush finish, unless otherwise noted.
- 2.3 ANCHOR BOLTS AND OTHER MEANS OF ANCHORAGE
 - 2.3.1 Provide all anchor bolts and expansion bolts or other means of anchorage required for building into floors, walls and ceilings, where it is necessary to secure metal and wood to concrete, masonry or steel work. Supply anchor bolts, nuts and similar hardware to the respective Sections for fastening.
- 2.4 MISCELLANEOUS STEEL SECTIONS
 - 2.4.1 Supply and install all steel items not indicated to be supplied under other Sections.
 - 2.4.2 Where sections are required to be built into masonry or concrete supply such members to the respective Sections.

2.5 CONCEALED SUPPORT ELEMENTS AND FRAMING

- 2.5.1 Supply and install all support elements and framing as shown on the Drawings for the items listed herein. Construct supports from rolled steel sections assembled by welding.
- 2.5.2 Design supports to withstand, within acceptable deflection limitations, their own weight, the weight of the items to be supported, loads imposed by the motion of supported items, where applicable, and all live loads, static and dynamic which might be applied to the supported items in the course of their normal function. Design supports with a safety factor of 3. Design supports further as required to accommodate structural deflection.
- 2.5.3 Provide all accessories, inserts and fixings necessary for attachment of supports to building structure. Drill supports as required to receive attachment of supported items. Arrange supports to avoid conflicts with pipes, ducts, precast concrete connections, thermal and vapour barrier construction, framing provided under other sections, and such that supports and their fixings are fully concealed from view within the finished work.
- 2.5.4 Paint all supports unless galvanizing is specified.
- 2.5.5 Provide concealed support elements or framing as required for the following items:
 - .1 Vanities.
 - .2 Grab bars occurring on gypsum board partitions.

2.6 LINTELS

- 2.6.1 Supply loose steel lintels to other Sections where required for building into the work. Fabricate lintels as shown on the Drawings. Galvanize lintels which will be exposed to the exterior.
- 2.6.2 Lintels for wall of less than 8" nominal thickness shall be masonry lintels supplied and installed under Section 04200.

PART 3 - EXECUTION

3.1 INSTALLATION

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

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCES

- 1.2.1 CSA-O141-05(R2014) Softwood Lumber
- 1.2.2 CAN/ULC-102-2019-(R2024) Standard Method of Test for Surface Burning
Characteristics of Building Materials and Assemblies
- 1.2.3 CAN/CSA O80-Series-21 Wood Preservation
- 1.2.4 CSA B111-1974 (R2003) Wire Nails, Spikes and Staples
- 1.2.5 CSA O121:17 (R2022) Douglas Fir Plywood

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

- 1.3.1 Accept delivery of pressed steel door frames. Be responsible for any damage to frames from time of delivery until accepted by the Consultant after installation.
- 1.3.2 Provide dry storage areas for rough carpentry materials. Stack lumber 152mm (6") clear of floor.
- 1.3.3 Protect fire-retardant materials against high humidity and moisture.
- 1.3.4 Install temporary wood protection strips at door jambs and similar locations vulnerable to damage.
- 1.3.5 Cover materials stored on site with tarpaulins or polyethylene sheets to prevent moisture, absorption and impairment of structural and aesthetic-properties.

1.4 QUALITY ASSURANCE

- 1.4.1 Identify all lumber and plywood delivered to the site by the grading stamp of an approved association or independent grading agency.

PART 2 - PRODUCTS

2.1 MATERIALS

- 2.1.1 Wood materials: Straight, sawn square, true, dressed four sides, properly sized and shaped to correct dimensions from nominal sizes indicated or specified.
- 2.1.2 Lumber grade and moisture content: Comply with official grading rules of NLGA for the particular lumber and grade, and structurally complying with the latest requirements of the NBC. Use only grade marked lumber.

- 2.1.3 Maximum moisture content of lumber: 7% for interior work, 19% for exterior work.
- 2.1.4 Softwood lumber: Comply with CSA O141.
- 2.1.5 Douglas Fir Plywood: Complying with CSA O121, COFI Exterior.
- 2.1.6 Framing lumber: Lumber for structural components shall be of species and grade specified, well seasoned, processed and stamped at same mill with appropriate grade markings. Conform to requirements of Standard Grading Rules for Canadian Lumber of National Lumber Grades Authority the (NLGA) with latest supplements, approved by the Canadian Lumber Standards Administrative Board.
 - .1 No. 1 Construction grade, Spruce, Balsam Fir, Lodgepole Pine or Ponderosa Pine.
- 2.1.7 All wood materials: Well seasoned, free from defects that would impair strength or durability.
- 2.1.8 Wood curbs: Vacuum/pressure impregnated in accordance with CAN/CSA O80.1 to an average net retention of [6.0 kg/m³|0.40 lb./ft³]. Wolman CCA preservative or other approved manufacture. Species shall be southern pine, ponderosa pine, fir, western hemlock or jack pine.
- 2.1.9 Blocking, concealed framing, cant strips, grounds, nailing strips: No. 2 Ontario White Pine, No. 2 Red Pine, or Construction No. 1 Jack Pine, all complying with the grading rules of NLGA, or Construction Douglas Fir complying with COFI standard grading and dressing rules.
- 2.2 PRESSURE PRESERVATIVE TREATED MATERIALS FOR ALL EXTERIOR APPLICATIONS / FRAMING
 - 2.2.1 Pressure Preservative Treated Lumber: Lumber graded and stamped in accordance with applicable grading rules and standards of associations or agencies approved to grade lumber by Canadian Lumber Standards Accreditation Board in accordance with CAN/CSA O80 Series.
 - .1 Species: Pine or Spruce-Pine
 - .2 Grade: No.2 or better structural posts and lumber, pieces may be grade stamped or shipment certified by letter of compliance.
 - .3 Grading authority: NLGA, paragraph 131CC
 - .4 Material having twisted grain or structural defects affecting integrity of lumber will not be acceptable for this project.
 - .5 Use only material with radius edges, minimum 6 mm.
 - .6 Kiln dry lumber materials to 8% moisture content or less.
 - 2.2.2 Pressure Preservative Treated Plywood: Treated in accordance with CAN/CSA O80 Series, using water-borne preservative to obtain minimum net retention of 4 kg/m³ of wood. Plywood or laminated materials shall be manufactured with exterior grade adhesives. After treatment, plywood shall be kiln dried to moisture content of 8% or less.
- 2.3 PRESSURE FIRE RETARDANT TREATED MATERIALS
 - 2.3.1 Treat by pressure impregnation with fire-retardant chemicals in accordance with CAN/CSA O80 Series to provide classification for flame spread of not more than 25, smoke developed of not more than 75 in accordance with CAN/ULC-102.
 - 2.3.2 All fire retardant wood must comply with the requirements in AWPA Standard C20 for lumber and C27 for plywood.

- .1 AWPAC20: Structural Lumber, Fire-Retardant Pressure Treatment, lumber materials shall only be of species listed. After treatment, lumber 50 mm or less in thickness shall be kiln dried to moisture content of 8% or less.
 - .2 AWPAC27: Plywood, Fire-Retardant Pressure Treatment, plywood or laminated materials shall be manufactured with exterior grade adhesives. After treatment, plywood shall be kiln dried to moisture content of 8% or less.
 - .3 All species to comply with CAN/ULC S102 for surface-burning characteristics and shall bear identification showing classification and type of fire retardant.
- 2.3.3 Each piece or bundle of fire-retardant treated material or panel to bear ULC inspection label or stamp attesting to FRS rating indicating flame spread, smoke developed, and fuel contributed classification meeting AWPAC20 and C27 for Type A Use.
- 2.3.4 Fire retardant chemicals used to treat lumber must comply with FR-1 of AWPAC Standard P17 and shall be free of halogens, sulphates and ammonium phosphate.
- 2.3.5 Acceptable materials: Plywood and lumber materials treated by licensed applicators with fire retardant materials from the following:
- .1 Hickson Corporation – Dricon FRTW
 - .2 Hoover Treated Wood Products Inc. – Pyro-Guard
 - .3 Chemical Specialties Inc. – D-Blaze
 - .4 Or Approved Equivalent
- 2.3.6 Rough hardware: Nails, screws, bolts, lag screws, anchors, special fastening devices and supports as required for the erection of all rough carpentry items.
- 2.3.7 Fastenings, nails, bolts, screws, lag screws, anchors, special fastening devices and supports as required for the erection of all rough carpentry items: Complying with CSA B111.
- 2.4 FABRICATION
- 2.4.1 Comply with CSA-O86 for all fabrication and assembly of structural components off site, or on site.
- 2.4.2 Treat wood in contact with masonry, or concrete, with wood preservative before setting in place. Apply preservatives in accordance with the manufacturer's written instructions.
- 2.4.3 Design construction details for expansion and contraction of materials.
- 2.4.4 Machine sand surfaces exposed in the finished work. Hand sand to an even smooth surface free from scratches.
- 2.4.5 Refer to structural drawings for sizes and structural requirements.
- 2.5 FABRICATION - FIRE RETARDANT TREATMENT
- 2.5.1 Pressure fire retardant treat lumber prior to final milling. Each piece shall bear the mark of Underwriters' Laboratories of Canada indicating conformance to Standard CAN/ULC-102.

PART 3 - EXECUTION

- 3.1 INSTALLATION - GENERAL

- 3.1.1 Supply all labour, materials, equipment, services and perform all operations required to complete all rough carpentry work to the full intent of the drawings and as herein specified.
- 3.1.2 Consult with and co-operate with other Sections in advance and build-in or make provisions for installation of other work.
- 3.1.3 Provide running members of the longest lengths obtainable.
- 3.1.4 Slowly feed machine-dressed members using sharp cutters. Provide finished members free from drag, feathers, slivers or roughness of any kind. Remove machine marks by sanding.
- 3.1.5 Properly frame material with tight joints and rigidly secure in place. Use glue-blocks where necessary.
- 3.1.6 Design construction methods for expansion and contraction of the materials.
- 3.1.7 Conceal joints and connections wherever possible. Locate prominent joints only where directed.
- 3.1.8 Erect work plumb, level, square and to the required lines.
- 3.1.9 Do not regard blocking, strapping and other rough carpentry indicated as complete or exact. Provide rough carpentry items required for the installation of the work of other Sections. Blocking shall be through-bolted to structure.
- 3.1.10 Set and secure wood level, plumb and to correct locations indicated on Drawings. Ensure horizontal bowing is kept to a minimum.
- 3.1.11 Provide temporary bracing and anchorage required to hold members in place until permanently secured. Ensure member ends have sufficient bearing area.
- 3.2 **INSTALLATION - GROUNDS, STRAPPING AND FURRING**
 - 3.2.1 Install grounds of a thickness required for the application of finishes. Install roomside surfaces of grounds plumb and in true plane throughout. Secure grounds to metal furring with 16 ga. galvanized soft annealed tie wire.
 - 3.2.2 Provide wood furring and strapping for applied facings, cupboards, caseworks, lockers, cubicles etc.
 - 3.2.3 Provide 25mm x 50mm (1" x 2") strapping at 406mm (16") o.c. to suit details. Secure to nailing strips.
 - 3.2.4 Furring generally shall be 50mm x 50mm (2" x 2") at 406mm (16") o.c. erected to suit job conditions, where indicated.
 - 3.2.5 Shim members as required to provide a true and plumb surface.
- 3.3 **INSTALLATION - CANT STRIPS, BLOCKING AND CURBS**
 - 3.3.1 Apply wood preservative to all surfaces of wood cant strips and blocking to be covered with flashing.

- 3.3.2 Provide wood blocking as indicated. Provide curbs around roof openings wider than 10" in any direction. Build up curbs of 50mmx150mm (2" x 6") members to 305mm (12") minimum above finished roof level. Bolt or anchor curbs securely in place at 610mm (2'-0") o.c. Provide blocking under cants equal to insulation thickness.
- 3.3.3 Provide 19mm (3/4") thick, fire retardant treated, plywood mounting boards as required for mechanical and electrical equipment. Securely fasten to concrete, masonry or gypsum wallboard framing.
- 3.3.4 Immediately apply, in instance where primed work is cut, a coat of wood preservative to the resulting raw surfaces.
- 3.3.5 Provide wood blocking for anchoring of window frames.
- 3.3.6 Provide double studs or wood blocking and bolts in stud partitions for fastening of handrails, grab bars, to be capable of supporting 230 kg (500 lb) downward pull and 1.3 kN applied force in any direction per CSA/ASC B651. Provide double studs and blocking for anchoring of door frames, and other items anchored to stud partitions.
- 3.3.7 Provide 16mm (5/8") thick fire retardant treated plywood fastened to metal stud framing, at washroom mirrors. Provide 16mm (5/8") thick plywood backing for mirrors fastened to block.
- 3.3.8 Co-ordinate with Section 09 29 00 - Gypsum Board, the installation of wood blocking for fastening of wall mounted accessories and casework
- 3.4 INSTALLATION - ROUGH HARDWARE
 - 3.4.1 Supply and install rough hardware, including hardware for temporary enclosures.
 - 3.4.2 Provide fasteners long enough so that at least half their length penetrates into the second member and as recommended by COFI. Minimize splitting of wood members by staggering the fasteners in the direction of the grain and by keeping fasteners well in from edges. Use spiral, annular or resin coated nails for plywood.
 - 3.4.3 Fasten to hollow masonry units with toggle bolt, to solid masonry or concrete with lead expansion shields and lag screws. Do not use organic fibre or wood plugs.
- 3.5 INSTALLATION - PRESSED STEEL FRAMES
 - 3.5.1 Set frames plumb and square in their exact location. Firmly block and brace to prevent shifting. Shim up where required to ensure proper alignment dimensions from finished floor to head of frame. Install temporary wood spreaders at midheight.
 - 3.5.2 Where pressed steel frames are installed in concrete walls, secure frames to concrete using lead expansion shields and anchor bolts. Perform drilling of concrete as required. Fill recessed bolt heads flush to frame face with approved metal filler and sand smooth.
 - 3.5.3 Install fire rated door frames in accordance with requirements of authorities having jurisdiction to provide the required rating.
 - 3.5.4 Install fire rated door frames in accordance with requirements of National Fire Protection Association and authorities having jurisdiction to provide the required rating.
- 3.6 PRESSURE PRESERVATIVE TREADED WOOD INSTALLATION

- 3.6.1 Comply with AWPA M4.
- 3.6.2 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation. Allow first coating to fully soak into grain before applying second coating in accordance with manufacturer's instructions.
- 3.6.3 Remove with fine sandpaper, chemical deposits on treated wood to receive applied finish.
- 3.6.4 Use only hot-dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of preservative treated materials.
- 3.6.5 Use water-borne preservative treated wood for:
 - .1 Wood in contact with masonry or concrete,
 - .2 Wood within 450 mm of grade,
 - .3 Wood decking and fence boards,
 - .4 Wood in contact with flashings,
 - .5 Wood in contact with waterproofing membranes, confirm compatibility with membrane manufacturer prior to application.
- 3.6.6 Use oil-borne preservative treated wood for:
 - .1 Wood in contact with the ground,
 - .2 Wood in contact with freshwater,
 - .3 Landscaping timbers,
 - .4 Retaining walls,
 - .5 Piers or docks,
 - .6 Pilings,
 - .7 Bases of utility poles,
 - .8 Bases of fence posts.
- 3.7 PRESSURE FIRE RETARDANT TREATED WOOD INSTALLATION
 - 3.7.1 Field Cuts:
 - .1 Do not rip, mill or conduct extensive surfacing of fire retardant treated lumber, label will be voided.
 - .2 Only end cuts, drilling holes and joining cuts are permitted.
 - .3 All cuts on plywood will be considered end cuts.
 - .4 Fire-retardant lumber and plywood can be given a light sanding for cosmetic cleaning after treatment.
 - .5 Pre-cut to the greatest extent possible before treating.
 - 3.7.2 Fire retardant treated plywood used in structural applications shall be graded or span-rated material.
 - 3.7.3 Use only hot-dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of fire resistant treated materials.
 - 3.7.4 Where humidity conditions are such that moisture may condense between hardware and treated wood, hardware shall be back-primed with a corrosive-inhibitive paint.

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

END OF SECTION

FINISH CARPENTRY AND MILLWORK

PART 1 - GENERAL

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

1.2 RELATED WORK UNDER OTHER SECTIONS

- | | | |
|-------|------------------|---------------------|
| 1.2.1 | Section 06 10 00 | Rough Carpentry. |
| 1.2.2 | Section 08 71 00 | Finishing Hardware. |

1.3 REFERENCES

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|--------|---|---|
| 1.3.1 | ANSI/NPA A208 2009 | Medium Density Fiberboard for Interior Use. |
| 1.3.2 | ASTM D1037-12 | Standard Test Method of Evaluating the Properties of Wood-Based Fiber and Particle Panel Materials. |
| 1.3.3 | NEMA LD3-2005 | High Pressure Paper Base, Decorative Laminates. |
| 1.3.4 | CAN3-O188.0-M78 | Standard Test Methods for Mat Formed Wood Particleboard and Waferboard. |
| 1.3.5 | CAN3 O188.1-M78 | Interior Mat Formed Wood Particleboard. |
| 1.3.6 | CSA O112 Series-(R2014) | Evaluation of Adhesives for Structural Wood Products |
| 1.3.7 | CSA O121-08(R2013) | Douglas Fir Plywood. |
| 1.3.8 | CAN/CSA O141-05(R2014) | Softwood Lumber. |
| 1.3.9 | CSA 0151-09(R2014) | Canadian Softwood Plywood. |
| 1.3.10 | NFPA 80-2013 | Fire Doors and Other Opening Protectives. |
| 1.4 | QUALITY ASSURANCE | |
| 1.4.1 | The work of this Section shall be executed by fully equipped, expert craftsmen, highly skilled in millwork fabrication, having a minimum of five (5) years continuous Canadian experience in successful manufacture/fabrication and installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request. | |
| 1.4.2 | Unless otherwise specified herein comply with the requirements for Custom grade work as set out in the Quality Standards for Architectural Millwork published by the AWI/AWMAC. | |
| 1.4.3 | Supplements and modifications to the above standards as indicated on the drawings or as specified herein shall govern work of this section. | |
| 1.5 | PRODUCT DELIVERY, STORAGE AND HANDLING | |

- 1.5.1 Accept delivery of cabinet work and doors.
- 1.5.2 Inspect millwork, cabinet work and doors for damage, upon delivery to the site. Items which cannot be readily corrected by sanding, or do not have primer or sealer applied shall be promptly returned to the manufacturer.
- 1.5.3 Store millwork, casework, and doors in a dry and clean location. If required, store in a temperature and humidity controlled area.
- 1.5.4 Arrange for proper sequence and scheduling of millwork delivery so as not to delay the progress of the work. Prevent materials not reasonably required from accumulating.
- 1.5.5 Be responsible for any damage to doors from time of delivery until accepted by Owner after installation.
- 1.5.6 Provide dry storage areas. Stack materials with 150 mm (6") clearance off the floor.
- 1.5.7 Accept delivery of finishing hardware. Store hardware in a dry, locked and supervised area.
- 1.5.8 Protect installed hardware from damage and blemishes.
- 1.5.9 Protect fire-retardant materials against humidity and moisture.
- 1.5.10 Protect counter tops with 6 mm (1/4") plywood or other suitable sheet material.
- 1.6 SUBMITTALS
 - 1.6.1 Submit shop Drawings for all items showing large scale details of construction. Indicate profiles of members, jointing, fastenings, strapping, cut-outs for mechanical and electrical services and related items.
 - 1.6.2 Submit three 300 mm x 300 mm (12" x 12") samples of wood and plastic laminate veneers, and three 300 mm (12") long samples of wood trim, to be supplied to the project, before proceeding. Samples shall show colours, profiles, edging and construction.
- 1.7 ADMINISTRATIVE REQUIREMENTS
 - 1.7.1 Coordination: Coordinate sizes and locations of framing, blocking, furring, and reinforcements provided by work that is specified in other Sections is complete before starting work of this Section.
 - 1.7.2 Pre-Construction Meeting: Arrange a preconstruction meeting attended by Contractors personnel, Consultant, finish carpentry Subcontractor to discuss:
 - .1 Installation requirements
 - .2 Special surface effects and finishing
 - .3 Coordination of work with adjacent finishes
 - .4 Protection of finishes
 - .5 Acceptability of substrates and quality of materials being used for the project
- 1.8 SITE CONDITIONS
 - 1.8.1 Site Measurements: Verify dimensions by site measurements before fabrication and indicate measurements on Shop Drawings where casework is indicated to fit walls and other construction;

coordinate fabrication schedule with construction progress to avoid delaying the Work; locate concealed framing, blocking, and reinforcements that support woodwork by site measurements before being enclosed and indicate measurements on Shop Drawings.

- 1.8.2 Established Dimensions: Establish dimensions and proceed with fabricating casework without confirmed site measurements where site measurements cannot be made without delaying the Work; coordinate with the construction to ensure that actual dimensions correspond to established dimensions; allow for trimming and fitting.
- 1.8.3 Ambient Conditions: Maintain area or room in which casework is being installed at a uniform temperature and humidity for 24 hours prior to, during and after installation in accordance with AWS for relative humidity and moisture content; provide additional lighting to maintain a minimum of 430 lx on surfaces and areas where casework is being installed.
- 1.9 WARRANTY
- 1.9.1 Warrant plastic laminate work of this Section against defects in materials and workmanship in accordance with General Conditions but for an extended period of two (2) years and agree to repair or replace faulty materials or work which appears during warranty period, without cost to the Owner/Tenant. Defects shall include but not be limited to, opening of joints, cracking, shrinkage, warpage, delamination of plastic laminate.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- 2.1.1 Wood members: Clean, seasoned, straight, square and true on all four sides. Comply with minimum size and tolerances of CSA O141. Grade-mark all wood materials. Kiln dry wood materials for interior use to a moisture content of 4% to 8%.
- 2.1.2 Douglas Fir plywood: Comply with CSA O121. Western Softwood Plywood: Comply with CSA O151. Exposed two sides shall be Grade G2S, and exposed one side shall be Grade G/Solid. Consider fitment doors exposed on both sides.
- 2.1.3 Lumber grading - Complying with official grading rules of NLGA.
- 2.1.4 Lumber species, Group D Balsam Fir or Spruce, complying with CAN/CSA 3-086, unless noted otherwise.
- 2.1.5 Hardwood for paint finish: Paint grade Birch.
- 2.1.6 Hardwood Plywood: Comply with CSA O115 Type II, Exposed faces shall be Architectural Grade, selected veneers and unexposed faces shall be sound grade. Exposed faces and edges shall be belt sanded other faces regular sanded.
- 2.1.7 Wood veneer: Of species specified to match approved sample, minimum 0.8 mm (1/32") thick, architectural quality selected for uniformity of colour, figure and grain. Piece veneers shall be parallel clipped, jointed by tapeless splicer and edge glued. Face veneers shall not contain open joints, face depressions, glue stain, patches, plastic repair or any other manufacturing irregularities or defects.
- 2.1.8 Medium Density Fibreboard (MDF): Premium grade, 770 kg m³ (48 lbs/ft³), complying with ANSI A208.2, as tested in accordance with ASTM D1037 methods.

- 2.1.9 High Density Fibreboard (HDF): Premium grade, 882 kg/m³ (55 lbs/ft³), complying with ANSI A208.2, as tested in accordance with ASTM D1037 methods.
- 2.1.10 Exposed framing solid members and trim: quarter sawn, architectural grade, matched for compatibility of grain and colour.
- 2.1.11 Concealed framing: Comply with NLGA, S-Dry No. 1 grade Ontario White Pine or Douglas Fir; comply with BCLMA construction grade.
- 2.1.12 Sealer: Water-repellent penetrating wood preservative, LePage's Wood Preservative, distributed by LePage's Ltd., Solignum distributed by Sturgeons Ltd., or other approved manufacture.
- 2.1.13 Fire retardant treatment of plywood and particle board: Conforming to CAN/CSA O80.27-M to provide a flame spread rating of 25 or less, in accordance with test method CAN/ULC-S102 of Underwriter's Laboratories of Canada.
- 2.1.14 Glue for wood assemblies: Comply with CSA O112.4, polyvinyl adhesive.
- 2.1.15 Adhesive for decorative laminate fabrication: Formulated for decorative laminate and to suit application without failure.
- 2.1.16 Plastic laminate facing sheet: High pressure decorative laminated plastic sheet complying with NEMA Publication LD3-2000, Class 1:
- .1 Grade:
 - .1 Laboratory Grade 840/LGP
 - .2 General Purpose (HGL and VGL)
 - .3 Post Forming (PF)
 - .4 Backing Grade (BK)
 - .2 Type:
 - .1 Heavy Duty (HD) 2.0 mm (0.08") thick.
 - .2 Standard Duty (S) 1.2 mm (0.048") thick.
 - .3 Light Duty (LD) 0.75 mm (.03" thick).
 - .3 Colour:
 - .1 Lummia- Midnight Sun T765 (MA) by Tafisa
 - .2 Materia- Moonlight T761(MA) by Tafisa
 - .3 Lummia- Sheer Beauty T581 (PM) by Tafisa
 - .4 First Class T583 (KA) by Tafisa
 - .5
- 2.1.17 Melamine: Melamine resin impregnated paper, thermally fused to particle board, Formica MCP by Cyanamide Canada Limited, Arborite Cladboard by Domtar Construction Materials, or other approved manufacture. Furniture finish in colour to be selected by Consultant.
- .1 P601 - Blanc/White by Sublime Collection
- 2.1.18 Closet doors: Melamine faced hollow core wood doors complying with CAN/CSA O132.2, provided with lock blocks and intermediate stiles and rails to provide adequate support for fastening and hardware.
- 2.1.19 Plastic laminate for General Counter to be GP HGL, Pattern Series by Formica or approved equal.

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

2.2 CABINET HARDWARE

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

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

Swing-Up Fitting, Free Flap 1.7, Set
Hinge 165D 3903 FULL SC DOW MOD14
Hinge 165D 3904 HALF SC DOW MOD6
Door Pulls CBH245 - 4-1/2" C32D
MPL F.W. SCREW MOD 1 3000/4000
MPL PRE/11MM MOD 1 3000/4000
Chrome Plated Polished 124.02.220
Shelf Support Strip ST.NIP 16X6X3500
Shelf Support ST. ZIP. 16X28MM
ACCURIDE C3832-C10 ST. ZIP. 100LB
ACCURIDE C3832-C12 ST. ZIP. 100LB
ACCURIDE C3832-C14 ST. ZIP. 100LB
ACCURIDE C3832-C16 ST. ZIP. 100LB
ACCURIDE C3832-C18 ST. ZIP. 100LB
ACCURIDE C3832-C20 ST. ZIP. 100LB
Elbow Catch Solid Brass CHR.PL
Lock Core ZN.NI.MATT KEY DIFF TA
Deadbolt Lock Body RD.R.H./L.H.
Deadbolt Lock Body RD.DR.
Strike Plate ANGLED ST. BL.
Cyl. ROSETTE BR.NI.MATT 17.4/24MM
Furniture Glide PL. WH. DIA. 16MM

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

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

- 2.2.4 For 6 mm (1/4") thick sliding glass doors:

Track Set	Richelieu 1551210, Satin Aluminum
Hardware Set	Richelieu BP15510

- 2.2.5 Closet rods and flanges:

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

- 2.2.6 Shelf and rod: Steel, white enamel, Model No. 1797 by Hager.
- 2.2.7 Cabinet keying: Key all cabinets and drawer locks alike for each room, except teachers' closets, which shall be keyed to match classroom door.
- 2.2.8 Provide accessories such as rubber door silencers (2 per drawer or door), and other items necessary for completion of the cabinet work.
- 2.3 FABRICATION - GENERAL
- 2.3.1 Check job dimensions and conditions and notify the Owner in writing of unacceptable conditions. Do not proceed until remedial instructions are received.
- 2.3.2 As far as practical, assemble work at the shop and deliver to the job ready for installation. Leave ample allowance for fitting and scribing on the job.
- 2.3.3 Fabricate work square and to the required lines. Recess and conceal fasteners and anchor heads. Fill with matching wood plugs.
- 2.3.4 Provide wood members free from bruises. Blemishes, mineral marks, knots, shake and other defects. Select for colour, grain and texture. Machine and hand sand surfaces exposed in finished work to even smooth surface free from defects detrimental to appearance.
- 2.3.5 Provide running members in the maximum lengths obtainable. Provide thickness of members in maximum dressed size of standard lumber. Where thickness or width indicated is not available in hardwoods, use glue laminations to obtain sizes required. Spline or key solid boards 6" and wider and glue under pressure. Provide unexposed backs of veneers having the same physical characteristics as the face veneer.
- 2.3.6 Design construction details for expansion and contraction of materials. Unless otherwise specified work shall be glued, and blind nailed. Properly frame material with tight, hairline joints and hold rigidly in place. Use glue blocks where necessary. Conceal joints and connections wherever possible. Locate prominent joints where directed. Glue and pin mortise and tenon joints. Intermediate joints between supports will not be permitted. Set and fill surface nails. Prevent opening-up of glue lines in the finished work.
- 2.3.7 Comply with glue manufacturer's recommendations for lumber moisture content, glue shelf life, pot life, working life, mixing, spreading, assembly time, time under pressure and ambient temperature.
- 2.3.8 Provide exposed end grain of solid members and edges of exposed plywood with matching solid edging at least 6 mm (1/4") thick.
- 2.3.9 Seal finish carpentry items before they leave the fabricating shop. For surfaces to receive natural or stain finish ensure that sealer is compatible with the final finish. Co-operate with
- 2.3.10 Section 09 90 00 and obtain written approval of proposed sealer.
- 2.4 FABRICATION - TRIM
- 2.4.1 Trim members shall be of sizes and profiles indicated. Trim members shall be slow-fed work,

free from chatter and other machine marks.

- 2.4.2 Provide trim over 63 mm (2 ½") wide with backs ploughed or kerfed. Mitre all joints. Carefully machine drum-sand exposed flat surface. Minimize sanding on the job.

2.5 FABRICATION - CABINET WORK

- 2.5.1 Check job dimensions and conditions and notify Consultant in writing of unacceptable conditions. Do not proceed until remedial instructions are received.
- 2.5.2 As far as practical, assemble work at the shop and deliver to the job site ready for installation. Leave ample allowance for fitting and scribing on the site.
- 2.5.3 Unit bodies shall be minimum 19 mm (¾") thick plywood. All bodies shall have backs.
- 2.5.4 Use HGL, HD plastic laminate for horizontal working surfaces. Use VGL, S for exposed vertical surfaces.
- 2.5.5 Provide melamine on interior exposed surfaces.
- 2.5.6 Vanities and counters containing sinks shall have waterproof plywood backing for Corian and quartz countertop.
- 2.5.7 Other surfaces shall be HGL and VGL, LD. Colour and sheen to approval of Consultant.
- 2.5.8 Install metal supports supplied under Section 05 99 90 - Miscellaneous Metals, for support of vanities.

2.6 FABRICATION - PLASTIC LAMINATE FACED WORK

- 2.6.1 Comply with NEMA , Publication LD3-2000, Class 1, High Pressure, Paper Base, Decorative Laminates.
- 2.6.2 Provide cores of not less than 19 mm (¾") nominal thickness solid face Douglas Fir or Western Softwood Plywood.
- 2.6.3 Apply backing sheet to laminated flatwork. Apply uniform coating of sealer on exposed edges. Provide backing sheet of sufficient thickness to compensate stresses caused by the facing sheet.
- 2.6.4 Self-edge straight-line-edging with 1.2 mm (0.048") standard material and radius corners with post-forming material; apply with same adhesive as facing sheet. Chamfer edges uniformly at approximately 20° using machine router.
- 2.6.5 Locate joints at 2400 mm to 3000 mm (8'-0" to 10'-0") o.c. At L-shaped corners mitre plastic laminate, to the outside corner. Accurately fit members together to provide tight and flush butt joints, in true planes. Provide 6 mm (¼") blind spline and approved type draw bolts; one draw bolt at maximum 450 mm (18") centres. Colour-match adjoining units.
- 2.6.6 Provide cut-outs as required for inserts, fixtures and fittings. Use radiused corners and chamfer edges around cut-outs to avoid chipping laminate.
- 2.6.7 Post-form laminate work to details indicated. Provide same core and laminate profiles to provide continuous support and bond for the entire surface.

- 2.6.8 Assemble work, true and square. Arrange adjacent parts of continuous laminate work to match in colour and pattern.

2.7 FABRICATION - VENEERED PANELS

- 2.7.1 Fabricate wood veneered panels from fire retardant wood particle board cores, minimum 13 mm (1/2") thick with backing sheet, solid edge strips, and face veneer of species indicated.
- 2.7.2 Book matching panels.
- 2.7.3 Apply uniform coating of sealer on exposed edges. Provide backing sheet of sufficient thickness to compensate stresses caused by facing sheet.
- 2.7.4 Provide cut-outs as required for inserts, fixtures and fittings. Use radius corners and chamfer edges around cut-outs to avoid chipping laminate / veneer.

PART 3 - EXECUTION

3.1 INSTALLATION - MILLWORK

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

3.2 INSTALLATION - CABINETWORK

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

3.3 INSTALLATION - PANELLING

- 3.3.1 Install panelling with concealed fastening.

- 3.3.2 Install work, true and square. Arrange adjacent panels to match in colour and pattern.
- 3.4 INSTALLATION - DOORS
 - 3.4.1 Install hollow metal doors supplied under Section 08 10 00.
 - 3.4.2 Check doors for correct size. If improperly sized return to manufacturer for corrections.
 - 3.4.3 Prepare doors to receive hardware. Check each hardware item before installation. Drill pilot holes of suitable diameter.
 - 3.4.4 Install doors. Maintain an even clearance, not exceeding 1/8", between door and frame and 19 mm (3/4"), at floor to allow free action of door. Allow for proper clearance where carpet is scheduled.
 - 3.4.5 Install doors with warp age not to exceed 2 mm (3/32") measured diagonally across door.
 - 3.4.6 Install door grilles where required.
 - 3.4.7 Install fire rated doors in accordance with requirements of authorities having jurisdiction to provide the required rating. Install fire rated doors and frames according to NFPA 80.
- 3.5 INSTALLATION - FINISHING HARDWARE
 - 3.5.1 Install finish hardware in accordance with manufacturer's written instructions. Do not modify finish hardware without manufacturer's written approval.
 - 3.5.2 Install finish hardware secure, plumb, level, and true to line.
 - 3.5.3 Install finish hardware to template.
 - 3.5.4 Cut and fit to substrate avoid damage and weakening. Reinforce attachment substrate as necessary for installation and operation.
 - 3.5.5 Completely cover cut-outs with hardware item.
 - 3.5.6 Mortise work to correct location and size without gouging, splintering, and causing irregularities in exposed finish work.
 - 3.5.7 Surfaces for Paint or Other Finish:
 - .1 Where cutting and fitting is required on substrata to be painted or similarly finished, install, fit, and adjust hardware prior to finishing.
 - .2 Remove hardware and place in original packaging.
 - .3 Re-install hardware after finishing operation is complete.
 - 3.5.8 Install hardware items affixed to concrete with machine screws and threaded metal expansion shields.
 - 3.5.9 Set, fit, adjust and clean hardware according to manufacturer's written instructions.
 - 3.5.10 Lubricate moving parts as recommended by hardware manufacturer. Use graphite type lubrication if no other is recommended.

- 3.5.11 After installation of hardware under this section, check opening units for correct fit and uniformity of space around perimeter of units, or between units. Provide smoothly operating opening units free from binding.

3.6 HARDWARE MOUNTING HEIGHTS

- 3.6.1 Mortise lock strike: 990 mm (39") from centre of knob to finished floor.
- 3.6.2 Deadlock strike: 1270 mm (50") from centre of cylinder to finished floor.
- 3.6.3 Mortised night latches: 1270 mm (50") from centre of cross bar to finished floor.
- 3.6.4 Panic sets: 1020 mm (40") from centre to finished floor.
- 3.6.5 Door pulls: 1020 mm (40") from centre to finished floor.
- 3.6.6 Push plates: 1120 mm (44") from centre to finished floor.
- 3.6.7 Blank strikes: 1270 mm (50") from centre to finished floor.
- 3.6.8 Blank fronts: 1270 mm (50") from centre to finished floor.
- 3.6.9 Door closer arms: To allow maximum degree of swing.
- 3.6.10 Floor stops: To allow maximum degree of swing.

3.7 ADJUSTING AND CLEANING - HARDWARE

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

3.8 CLEANING

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

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.
- 1.1.2 Provide all labour, materials, products, equipment and services required to complete the building insulation and vapour barrier work indicated on the Drawings and/or specified herein.
- 1.1.3 All thermal insulation and vapour barrier work throughout the entire project not specified under other Sections is the work of this Section.
- 1.1.4 Comply with applicable code requirements, where combustible insulation or vapour retarder materials are used, including supply and installation of approved non-combustible backing and independently supported, non-combustible insulation covering except where these provisions are expressly specified as the work of other Sections.
- 1.1.5 Continuity of the vapour and air retarder within the construction specified herein and with adjacent retarder construction is the responsibility of this Section.

1.2 RELATED WORK SPECIFIED UNDER OTHER SECTIONS

- 1.2.1 Fire stopping and smoke seals: Section 07 84 00.

1.3 REFERENCES

- 1.3.1 ASTM C165-07(2012) Standard Test Method for Measuring Compressive Properties of Thermal Insulations.
- 1.3.2 ASTM C272/C272M-12 Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions.
- 1.3.3 ASTM C612-14 Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
- 1.3.4 ASTM D1621-10 Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- 1.3.5 ASTM E84-15a Standard Test Method for Surface Burning Characteristics of Building Materials.
- 1.3.6 ASTM E96/E96M-14 Standard Test Method for Water Vapor Transmission of Materials.
- 1.3.7 CAN/ULC S701-11 Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- 1.3.8 CAN/ULC S702-14 Standards for Mineral Fibre Thermal Insulation for Buildings.
- 1.3.9 CAN/ULC-S101 Standard Method of Fire Endurance Tests Of Building Construction And Materials

1.4 QUALITY ASSURANCE

- 1.4.1 Perform the work of this Section by an insulation subcontractor of recognized standing having not fewer than 5 years proven experience in this type of work.
- 1.4.2 Employ only skilled mechanics having experience in the work specified, and having an understanding of the design principles of the thermal and vapour barriers which they are providing.
- 1.4.3 Submit proof of the above requirements to the Consultant upon request.
- 1.4.4 Apply insulation and vapour barrier provisions as specified to sample panels of masonry cavity wall erected under Section 04 20 00 - Unit Masonry. Sample shall show co-ordination of this work with masonry reinforcement.
- 1.5 **PRODUCT DELIVERY, STORAGE AND HANDLING**
 - 1.5.1 Store packaged materials and products in their original wrappings or containers with manufacturer's labels and seals intact. Store flammable materials outside the building, protect from all-weather hazards and open flame. Abide by all fire protection regulations imposed by authorities having jurisdiction, and take precautionary measures to avoid fire.
 - 1.5.2 Do not store insulation in direct contact with the earth, road surface, or floors. Place suitable forms or skids under the insulation upon delivery to protect the insulation from absorbing dampness from the surrounding terrain or floor. Cover material with approved tarpaulins and secure.
 - 1.5.3 In cold weather, provide warm storage for adhesives such that their consistency is suitable for ease of application.
- 1.6 **SITE CONDITIONS**
 - 1.6.1 Protect surfaces, and in particular the building cladding finish, from being marred or contaminated by the materials, by means of protective covers, boards, tapes and other approved means.
 - 1.6.2 Supervise the work of other Sections where such work is closely associated with the work of this Section and report any damage done to the work of this Section.
 - 1.6.3 Protect the work of this Section from damage due to high velocity winds until the building cladding or other permanent protection is in place.
- 1.7 **WARRANTY**
 - 1.7.1 Submit 2-year warranty against defects in materials, products and workmanship in the work of this Section. Warranty shall extend to the integrity and continuity of the air/vapour barrier and thermal barrier.

PART 2 - PRODUCTS

- 2.1 **MATERIALS – INSULATION**
 - 2.1.1 Rigid Insulation Board for EIFS System & Composite Wall Panel:
 - .1 Insulation Boards supplied by EIFS Manufacturer shall be ROCKBOARD 80 mineral wool insulation board made from basalt rock and slag, a non-combustible product with fire resistance properties and a melting point of approximately 2150°F (1177°C).
 - .2 Mineral wool insulation board properties to include low thermal conductivity, high compression resistance and able to repel water. Mineral wool fibre insulation board must

have a minimum actually density of 128 kg/m³ (8 lb/ft³) and an RSI Value @ 25.4mm @ 24°C of 0.70m²K/W (R-Value @ 75°F of 4.0hr.ft²/Btu). Minimum insulation thickness to be not less than 75 mm (3 inches) maximum insulation thickness to be not greater than 127 mm (5 inches) and have the following Fire Performance properties:

1. ASTM E 136 Behaviour of Materials at 750°C (1382°F) Non-Combustible.
2. CAN/ULC-S114 Test for Non-Combustibility Non-Combustible
3. ASTM E 84 (UL 723) Surface Burning Characteristics Flame Spread = 0, Smoke Developed = 0
4. CAN/ULC-S102 Surface Burning Characteristics Flame Spread = 0, Smoke Developed = 0

- 2.1.2 Mineral Wool board insulation: Conforming to ASTM C612, Type 1B, "A.F. 530" by Owens-Corning Canada Inc., "ROCKBOARD 40" by Roxul Inc., or other approved manufacture. Insulation shall have a "k" factor of 0.25 BTU/hr/sq ft/°F/1" thickness at a mean temperature of 24°C, and a nominal density of 4 lbs/cu ft. Deformation of fibrous glass rigid board shall not exceed 10% when tested at 25 lbs/sq ft. in accordance with ASTM C165.
- 2.1.3 Fibrous glass board insulation: Conforming to ASTM C612, Type 1B, "A.F. 530" by Owens-Corning Canada Inc., "RXL 40" by Roxul Inc., or other approved manufacture. Insulation shall have a "k" factor of 0.25 BTU/hr/sq ft/°F/1" thickness at a mean temperature of 24°C, and a nominal density of 3 lbs/cu ft. Deformation of fibrous glass rigid board shall not exceed 10% when tested at 25 lbs/sq ft. in accordance with ASTM C165.
- 2.1.4 Masonry cavity wall Insulation: Expanded polystyrene complying with CAN/ULC S701, Type 3 R-5 per 1" thickness (RSI 0.87 / 25mm) and a minimum compressive strength of 25 psi (172 kPa); shiplapped edges; "Styrofoam CavityMate CS" by Dow Chemical of Canada Ltd., or other approved manufacture, thickness as indicated on drawings.
- 2.1.5 Steel/wood stud Insulated Sheathing: Extruded polystyrene insulation conforming to CAN/ULC S701 Type 2 having a minimum R value of R5 per 1" (RSI 0.87 / 25mm) and a minimum compressive strength of 30 psi (210 kPa). "Styrofoam Cladmate or Cladmate XL" by Dow Chemical of Canada Ltd., or other approved manufacture, thickness as indicated on drawings.
- 2.1.6 Perimeter/below slab insulation: Extruded polystyrene insulation conforming to CAN/ULC S701 Type 4 having a minimum R value of R5 per 1" (RSI 0.87 / 25mm) and a minimum compressive strength of 30 psi (210 kPa). "Styrofoam SM" by Dow Chemical of Canada Ltd., or other approved manufacture, thickness as indicated on drawings.
- 2.1.7 Semi-rigid board insulation: Fibrous glass "A.F. 110" by Owens-Corning (Schuller International) Canada Inc., "RXL 20" by Roxul Inc., or other approved manufacture. Insulation shall have a "k" factor of 0.262 BTU/hr/sq ft/°F/1" thickness at a mean temperature of 24°C and a nominal density of 1.1 lbs/cu ft.
- 2.1.8 Batt insulation: Lightweight, resilient, inorganic fibrous batts (blankets) complying with CAN/ULC S702, Type 1, fibrous glass by Owens-Corning (Schuller International) Canada Inc., fibrous mineral by Roxul Inc., or other approved manufacture.
- 2.1.9 Non-encapsulated 2" thick glass fibre roof insulation with a density of at least 0.75 lb/ft³ shall be inverted in the deck webs.
- 2.1.10 High Density Underslab Insulation Board: Closed-cell, cellular, foamed, smooth skin, extruded expanded polystyrene, having 100 psi compressive strength, thicknesses as indicated on drawings and specified herein, conforming to CAN/ULC S701, Type IV.

- .1 Basis of Design Materials:
 - .1 Styrofoam HI-100 by Dow Chemical Canada Inc.
 - .2 Foamular 1000 by Owens-Corning Canada Inc.
- 2.1.11 Foamed-In-Place Insulation: Two component polyurethane froth/spray kit, UL Class I (flame spread of 25 or less), Great Stuff by Dow Building Solutions Inc., or approved equal.
- 2.2 MATERIALS - VAPOUR BARRIERS
 - 2.2.1 Polyethylene vapour barrier: 6 mil sheet, suitable for Class 1 Construction and approved by Underwriters' Laboratories of Canada and having a perm rating of 0.09, by Dupont Canada Limited, or other approved manufacture.
- 2.3 MATERIALS - ADHESIVES
 - 2.3.1 Insulation adhesive: Fire retardant vapour barrier type compatible with polystyrene foam: "Air-Bloc 21" by Henry Company, or other approved manufacture.
- 2.4 MATERIALS - MECHANICAL FASTENERS
 - 2.4.1 Insulation fasteners for application to air/vapour barrier membrane: Perforated plates with special anchors for insulation, "Soprseal Clips" by Soprema Waterproofing Inc., perforated base, spindle-type "Insul-Anchors" by Continental Studwelding Ltd.
 - 2.4.2 Stick clips: By Eckel Industries of Canada Limited, Morrisburg, Ontario, or other approved manufacture. Clip size and type shall suit application and insulation thickness.
 - 2.4.3 Split clips: 14 gauge galvanized clips of sufficient length to allow 1" to be bent over the gypsum lath, by Eckel Industries of Canada Limited, Morrisburg, Ontario, Canadian Hilti Limited or other approved manufacture.
 - 2.4.4 Adhesive for applying clips: High strength, resilient adhesive having a drying time of 0 to 30 minutes (rapid initial set), and 24 hours final set. Adhesive shall be compatible with insulation adhesive, insulation, vapour barrier and substrate and shall be non-corrosive to galvanized steel and polyvinyl chloride. Where used in conjunction with a vapour barrier insulation adhesive, its permeability shall not exceed that of insulation adhesive.
 - 2.4.5 Z-section strapping: Roll-formed from 25 gauge electro-galvanized sheet steel and having a 1-1/4" minimum wide flanges and web depth to suit insulation thickness. Provide flanges knurled to facilitate acceptance of screws, and with rolled lips at outer edges for added stiffness.
 - 2.4.6 Galvanized screw type fasteners with 1" galvanized washers. Fasteners shall be at least 1/2" longer than the thickness of the insulation.
- 2.5 MATERIALS - MISCELLANEOUS
 - 2.5.1 Tape: Laminated aluminum foil/fibreglass scrim/fire resistance kraft paper tape, 2" minimum wide, and with a perm rating of 0.03.
 - 2.5.2 Tape for use with exterior insulation sheathing and vapour barrier: Contractor's Sheathing Tape 3M-Y-8086.
 - 2.5.3 Unless otherwise specified, the numerical values required herein for material characteristics shall be as determined by the latest editions of the test procedures of standards listed below:

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|----|-----------------------|------------------|
| .1 | Permeability: | ASTM E96/E96M; |
| .2 | Deformation: | ASTM C165; |
| .3 | Compressive strength: | ASTM D1621; |
| .4 | Flame spread: | ASTM E84; |
| .5 | Water absorption: | ASTM C272/C272M. |

PART 3 - EXECUTION

3.1 INSPECTION

- 3.1.1 Ensure that surfaces to receive air/vapour barrier (adhesive) or insulation are dry, firm, straight, slightly textured for bond, and free from loose material, projections, ice, frost, slick, grease, oil or other matter detrimental to bond of the air/vapour barrier (adhesive) or uniform bedding of the insulation.
- 3.1.2 Maintain surface and ambient temperatures constantly between 38°C and 10°C during application and curing of adhesive except as permitted otherwise by the Consultant in writing.
- 3.1.3 Report surfaces left unacceptable by other trades to the Consultant.

3.2 INSTALLATION - GENERAL

- 3.2.1 Allow new concrete to cure a minimum of 2 weeks.
- 3.2.2 Fill any spalled concrete or open mortar joints to provide an even plane.
- 3.2.3 Joints in drywall shall have been taped.
- 3.2.4 Install insulation to thicknesses shown on the Drawings.
- 3.2.5 Install all materials in accordance with the manufacturers' printed directions unless otherwise specified herein.
- 3.2.6 In construction separating interior from exterior, locate vapour barrier on the warm-in-winter side of the insulation.
- 3.2.7 Ensure a uniform, continuous thermal and vapour barrier effect. Where insulation and vapour barriers are to be provided under other Sections, co-ordinate the work such that thermal and vapour barrier continuity is achieved.
- 3.2.8 Pay the cost of repair satisfactory to the Consultant of precast or in situ concrete chipped, spalled or otherwise damaged by the use of powder activated or pneumatic fixings in connection with the work of this Section and for resulting delays. The Consultant reserves the right to restrict the use of such fixings where substrates are damaged. Powder activated fixing devices, where approved, shall be the low-velocity type having a double guidance system.
- 3.2.9 Where insulation and vapour barrier are fixed to the inside face of exterior wall components or cladding units, arrange insulation such that joints in insulation boards are coincident with the joints in the exterior wall components. Butt insulation board joints tightly. Provide a 1/2" fold in the vapour barrier over these joints.
- 3.2.10 Where hangers for suspended ceilings and where supports for heating units pass through insulation and vapour barrier construction, butter apertures liberally with vapour barrier adhesive and ensure continuity of thermal and vapour barrier provisions.

3.3 INSTALLATION - MECHANICAL FASTENERS

- 3.3.1 Install clips to supplement all adhesive attachment of rigid cellular and fibrous glass board insulation and elsewhere, where specified. Apply clips to substrate using adhesive or, where approved by the Consultant and the precast concrete fabricator using powder-activated or pneumatic fixings.
- 3.3.2 Support adhesive-applied clips in place until adhesive has set. Where insulation adhesive is to form a vapour barrier, extend clip adhesive over substrate a distance of 6" around clip so that it becomes integral with subsequently applied vapour barrier adhesive coating.
- 3.3.3 Where insulation adhesive is to form a vapour barrier, and clips are applied using powder-activated or pneumatic fixings, embed clips in adhesive and butter clip with adhesive after fixing such that vapour barrier continuity is ensured.
- 3.3.4 Provide insulation fasteners generally at 1'-0" centres both ways with 2 fasteners minimum for each full board width and 4 fasteners minimum for each full board length.
- 3.3.5 Where no finishing or protective material is to be applied directly to insulation and vapour barrier assembly, use stick clips. Arrange clips generally at 1'-0" centres both ways with 2 clips minimum for each full board width and 4 clips minimum for each full board length. Where insulation occurs on the undersides of horizontal construction, provide each clip with a 2" diameter 28 gauge galvanized steel washer before applying retainer.
- 3.3.6 Where gypsum wallboard, or other board finish is to be installed directly over insulation vapour barrier assembly, apply the specified z-section strapping to the substrate using powder-activated or pneumatic fasteners. Arrange strapping to suit the fixing requirements of the board to be applied.
- 3.3.7 Where rigid insulation is to be applied to interior face of exterior walls, apply z-section strapping to substrate using powder-activated or pneumatic fasteners. Arrange strapping to suit the fixing requirements of the board to be applied.
- 3.3.8 Where gypsum board ceiling finish is to be applied over insulation, apply Z-section strapping fastened through first lay in of gypsum board to furring members. Arrange strapping to suit fixing requirements of gypsum board.
- 3.3.9 Where anchors and supports pass through insulation and air/vapour barrier construction, ensure continuity of thermal and air/vapour barrier provisions.
- 3.3.10 Tape all joints of insulation sheathing with sheathing tape. Solidly tape around anchors and other protrusions through insulation sheathing.
- 3.3.11 Where insulation is applied directly to concrete substrates, install insulation fasteners tightly into drilled holes, with head of fastener snug to face of insulation board.
- 3.3.12 When gypsum wallboard finish is to be applied directly over insulation, i.e. exterior basement walls, and elsewhere as shown, install z-section strapping to the substrate using powder-activated or pneumatic fasteners. Arrange strapping to suit fixing requirements of the board insulation.

3.4 INSTALLATION - INSULATION

- 3.4.1 Install insulation on exterior walls, where shown. Cut and fit insulation snugly around anchors, penetrations, obstructions, openings, corners, around door frames, electrical receptacles, etc. Carry insulation above ceiling, full height of exterior walls.
- 3.4.2 Press insulation boards firmly to substrate impaling them on clips without bending clips. Bevel board edges abutting sloping surfaces.
- 3.4.3 Butt insulation boards tightly and stagger joints. Cut out back of board insulation as required to accommodate substrate irregularities and build up over cut out areas on the other side as required to ensure thermal barrier uniformity.
- 3.4.4 Individual insulation boards shall be arranged so that 12" minimum widths are provided.
- 3.4.5 Where more than one layer of insulation is required, stagger successive layer joints with the joints of the preceding layer and bed in adhesive trowelled solidly over the preceding layer.
- 3.4.6 Where board insulation has an integral vapour barrier facing, tape all board facing joints and the junctions of board facings with adjacent construction. Seal tape in a full-width continuous coating of adhesive. Lap joints in tape 4" and seal with adhesive. Where clips pierce vapour barrier, butter the puncture liberally with the specified vapour barrier adhesive.

3.5 INSTALLATION - INSULATION OVER AIR/BARRIER MEMBRANE

- 3.5.1 Where insulation is applied to air/vapour barrier membrane, install insulation fasteners onto membrane to ensure adequate bond without penetrating the membrane and supplement adhesive bond with a small power activated fastener applied through fastener base to structure. Press insulation boards firmly to substrate and fasten to anchors.
- 3.5.2 Provide insulation fasteners generally at 1'-0" centres both ways with 2 fasteners minimum for each full board width and 4 fasteners minimum for each full board length.
- 3.5.3 Where anchors and supports pass through insulation and air/vapour barrier construction, ensure continuity of thermal and air/vapour barrier provisions.

3.6 INSTALLATION - BATT INSULATION

- 3.6.1 Friction fit insulation between studs.
- 3.6.2 Butt batts tightly and tape joints at batt ends and at junctions of batt installations with adjacent vapour barrier construction. Bed tape in a full-width continuous coating of adhesive. Lap joints in tape 4" and seal with adhesive.
- 3.6.3 Tear apart batt insulation and pack tightly into spaces where shown and generally into miscellaneous building cavities as required to ensure a continuous thermal barrier where such provision is not specified under other Sections.
- 3.6.4 Pack batt insulation into cavity between concrete columns and precast concrete facings.

3.7 METAL AIR/VAPOUR BARRIER

- 3.7.1 Brake form barriers from sheet metal to permit assembly using self-tapping screws, and attachment using powder activated or pneumatic fixings or other means of secure fastening.

- 3.7.2 Make provision in barrier design to accommodate movement resulting from thermal change and structural deflection.
- 3.7.3 Form edges to 45° to permit peripheral and joint sealing.
- 3.7.4 Cut, fit and form metal air/vapour barriers as required to accommodate conflicting framing, granite panel connections and other obstructions.
- 3.7.5 Fabricate supplementary framing from rolled steel sections as may be required.
- 3.7.6 Ensure the continuity of the air, vapour and thermal barriers within the construction specified herein and with adjacent construction.
- 3.8 PATCHING
 - 3.8.1 Perform cutting and patching necessary to accommodate irregularities in the work of this Section caused by appurtenances of the work of other Sections including piping, ductwork and electrical conduit projecting through the thermal or vapour barriers.
 - 3.8.2 Ensure the continuity of the thermal and vapour barriers where such items project through the barriers. Allow for expansion and contraction and linear movement of these items.
 - 3.8.3 Where there is a possibility of heat loss through ductwork or conduit which passes through the thermal and vapour barrier, extend insulation around the duct or conduit a distance of 1'-0" minimum on both sides of the barrier unless otherwise shown on the Drawings.
 - 3.8.4 After installation under other Sections of heating equipment and other construction adjacent to the work of this Section, inspect the work of this Section and perform such reasonable taping and patching of vapour barriers and replacing of insulation as necessitated by unavoidable minor damage caused in the course of the work of the other Sections.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and documents referred to therein.
- 1.1.2 Provide labour, materials, products, equipment and services required to complete the fire stopping and smoke seals work.

1.2 RELATED WORK SPECIFIED UNDER OTHER SECTIONS

- 1.2.1 Section 07 84 00 Fire Stopping and Smoke Seals.
- 1.2.2 Section 09 90 00 Caulking and Sealants
- 1.2.3 Division 21 – Fire Suppression: Coordination of pipes and pipe fittings and other materials penetrating fire resistance rated assemblies.
- 1.2.4 Division 22 – Plumbing: Coordination of pipes and pipe fittings and other materials penetrating fire resistance rated assemblies.
- 1.2.5 Division 23 – Heating, Ventilation and Air Conditioning: Coordination of ductwork and other materials penetrating fire resistance rated assemblies.
- 1.2.6 Division 25 – Integrated Automation: Coordination conduit, wiring, communications cabling, cable trays and other materials penetrating fire resistance rated assemblies.
- 1.2.7 Division 26 – Electrical: Coordination conduit, wiring, communications cabling, cable trays and other materials penetrating fire resistance rated assemblies.
- 1.2.8 Division 27 – Communications: Coordination conduit, wiring, communications cabling, cable trays and other materials penetrating fire resistance rated assemblies.
- 1.2.9 Division 28 – Electronic Safety and Security: Coordination conduit, wiring, communications cabling, cable trays and other materials penetrating fire resistance rated assemblies.

1.3 REFERENCES

- 1.3.1 ASTM A653/A653M-11 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- 1.3.2 ASTM A1008/A1008M-13 Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
- 1.3.3 ASTM E119-12a Standard Test Methods for Fire Tests of Building Construction and Materials
- 1.3.4 ASTM E814-11a Standard Test Method for Fire Tests of Penetration Firestop Systems
- 1.3.5 ASTM E1966-07(2011) Standard Test Method for Fire-Resistive Joint Systems

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| 1.3.6 | ASTM E2174-10ae1 | Standard Practice for On-Site Inspection of Installed Fire Stops |
| 1.3.7 | ASTM E2307-10 | Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus |
| 1.3.8 | ASTM E2393-10a | Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers |
| 1.3.9 | | ULC Firestop Systems and Components, 2013 Edition |
| 1.3.10 | CAN/ULC S101-07 | Fire Endurance Tests of Building Construction and Materials |
| 1.3.11 | CAN/ULC S114-05 | Test for Determination of Non-Combustibility in Building Materials |
| 1.3.12 | CAN/ULC S115-11 | Fire Tests of Firestop Systems |
| 1.3.13 | CAN/ULC S702-09 | Mineral Fibre Thermal Building Insulation |
| 1.3.14 | ANSI/UL 1479 May-2003 | Standard for Fire Tests of Through-Penetration Firestops |
| 1.3.15 | NFPA 251-2006 | Standard Methods of Tests of Fire Endurance Building Construction and Materials |

1.4 SYSTEM DESCRIPTION

- 1.4.1 Work of this Section comprises fire stopping and smoke seal materials and/or systems to provide closures to fire and smoke at openings around penetrations, at unpenetrated openings, at projecting or recessed items, and at openings and joints within fire separations and assemblies having a fire-resistance rating, including openings and spaces at perimeter edge conditions.
- 1.4.2 Provide seals to form draft tight barriers to retard the passage of flame and smoke.
- 1.4.3 The installed seal shall provide and maintain a fire resistance rating equivalent to the rating of the adjacent floor, wall or other fire separation assembly to the requirements of and as acceptable to the authorities having jurisdiction and the Consultant.
- 1.4.4 Fire stopping and smoke seals within mechanical (i.e. inside ducts, dampers) shall be provided as part of the work of Division 15. Fire stopping and smoke seals around the outside of such mechanical assemblies where they penetrate rated fire separations shall be part of the work of this Section.

1.5 QUALITY ASSURANCE

- 1.5.1 Provide the work of this Section using experienced and competent installers, approved, trained and licensed by the material or system manufacturer.
- 1.5.2 Fire stopping and smoke seal materials shall conform to the temperature and flame rating, and fire hose rating of CAN/ULC S115 and ASTM E814, and other requirements of authorities having jurisdiction.

1.6 SUBMITTALS

- 1.6.1 Submit shop drawings indicating the ULC assembly number, the required temperature and flame rating, thickness, installation methods and materials of fire stopping and smoke seals, damming materials, anchorages and fastenings.
- 1.6.2 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions sufficient for identification at the Project site. Include manufacturer's printed instructions for installation.
- 1.6.3 Submit samples of each type of fire stopping and smoke seal material.
- 1.6.4 Submit manufacturer's certification that installed fire stopping and smoke seal materials comply with specified requirements.
- 1.7 **MOCK-UP**
 - 1.7.1 Apply one sample installation on representative substrate of each type of installation and required fire rating.
 - 1.7.2 Sample shall comply with requirements as to thickness and density of application to achieve fire rating required.
 - 1.7.3 Acceptable mock-up may remain as part of completed work.
- 1.8 **DELIVERY, STORAGE AND HANDLING**
 - 1.8.1 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels intact. Protect from damage and environmental conditions in accordance with manufacturer's recommendations.
- 1.9 **SITE CONDITIONS**
 - 1.9.1 Comply with manufacturer's recommended requirements for temperature, relative humidity, and substrate moisture content during application and curing of materials.

PART 2 - PRODUCTS

- 2.1 **ACCEPTABLE MANUFACTURERS**
 - 2.1.1 Fire stopping and smoke seal materials of the following manufacturers complying with these specifications are acceptable:
 - .1 Canadian General Electric Company Limited.
 - .2 Electrovert Ltd.
 - .3 Firestop Systems Inc.
 - .4 M.W. McGill and Associates.
 - .5 Tremco Ltd.
 - .6 Hilti (Canada) Corporation.
 - .7 or other approved manufacture.
- 2.2 **MATERIALS**
 - 2.2.1 Fire stopping and smoke seals: Asbestos free materials and systems complying with standards specified herein, by one or more of the specified acceptable manufacturers, installed in

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

PART 3 - FABRICATION

- 3.1 FIRESTOPS
- 3.1.1 Supply and install mineral wool firestop material at all suspended slabs, between edge of slabs and exterior cladding and in vertical positions at air shafts. Place firestop material under permanent 35% compression. Use impaling clips or metal trims to hold insulation in place.
- 3.1.2 Supply and install stick clips at maximum [300 mm|1'-0"] o.c. secured to concrete in an approved manner, to support firestop material in place.
- 3.1.3 Supply and install continuous steel angles, hot dipped, galvanized, minimum [10 mm|3/8"] thick for firestopping where shown and as required.

PART 4 – EXECUTION

- 4.1 PREPARATION
- 4.1.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are dry and frost free.
- 4.1.2 Clean bonding surfaces to remove deleterious substances including dust, paint, rust, oil, grease and other foreign matter which may otherwise impair effective bonding.
- 4.1.3 Do not apply fire stopping and smoke seals to substrates and surfaces previously painted or

treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

- 4.1.4 Remove insulation from insulated pipe and duct where such pipes or ducts penetrate a fire separation unless ULC certified assembly permits such insulation to remain within the assembly.

- 4.1.5 Beginning of installation shall indicate acceptance of existing conditions.

- 4.1.6 Prepare surfaces and prime in accordance with manufacturer's directions.

- 4.1.7 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

4.2 MIXING

- 4.2.1 Mix components in a mixer clean and free of used and set materials and surface contaminants.

- 4.2.2 Thoroughly mix components in accurate proportions.

- 4.2.3 Apply mixed materials within time limit recommended by the manufacturer.

4.3 APPLICATIONS

- 4.3.1 Apply fire stopping and smoke seals in strict accordance with manufacturer's instructions and tested designs to provide the required temperature and flame rated seal, and to prevent the passage of smoke.

- 4.3.2 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

- 4.3.3 Completely fill and seal voids with fire stopping and smoke seal materials.

- 4.3.4 Tool or trowel exposed surfaces.

- 4.3.5 Remove excess compound promptly as work progresses and upon completion.

- 4.3.6 Allow materials to cure. Do not cover up materials until full curing has taken place.

- 4.3.7 Notify Consultant when completed installations are ready for inspection and prior to concealing or enclosing fire stopping and smoke seals.

4.4 SCHEDULE OF LOCATIONS

- 4.4.1 Provide fire stopping and smoke seal materials at openings and penetrations in fire resistance rated assemblies, including but not limited to, the following locations:

- .1 Penetrations through fire resistance rated masonry, concrete, and gypsum board partitions and walls.
- .2 Top of fire resistance rated masonry and gypsum board partitions.
- .3 Intersection of fire resistance rated masonry and gypsum board partitions.

4.5 CLEAN UP

- 4.5.1 Remove excess materials and debris and clean adjacent surfaces immediately after application.

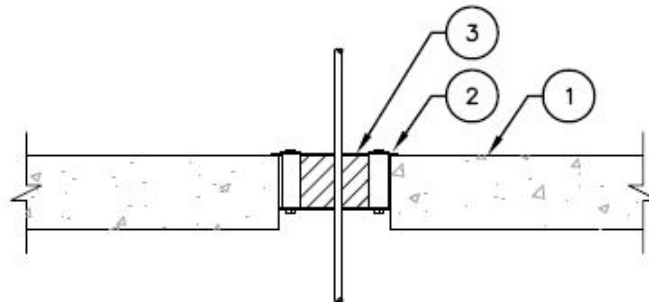
4.5.2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

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E-2 PREFORMED, RE-ENTERABLE CABLE PENETRATION FOR WALL OR FLOOR

(BASED ON MATERIALS MANUFACTURED BY ROXTEC)

TOP/FRONT VIEW



1. FIRE-RATED (1-HR. OR 2-HR) CONCRETE FLOOR OR WALL ASSEMBLY OR ULC FIRE-RATED CONCRETE BLOCK WALL ASSEMBLY.

2. PREFORMED, RE-ENTERABLE FIRE-RATED FRAME AND SEAL ASSEMBLY, MINIMUM 70mm DIAMETER, MAXIMUM 200mm DIAMETER; SIZED TO SUIT NUMBER OF CABLE PENETRATIONS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

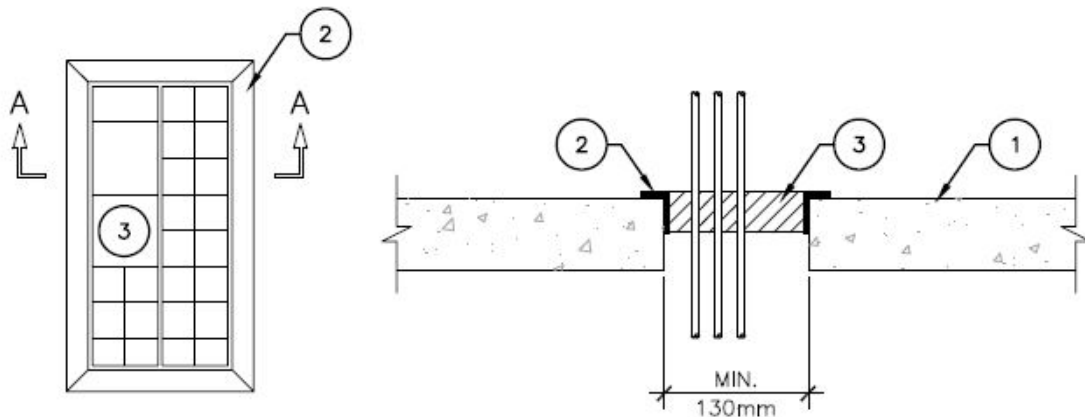
3. PREFORMED FIRE-RATED CABLE MODULES OR COMPENSATION BLOCKS SIZED TO SUIT NUMBER AND DIAMETER OF CABLE PENETRATIONS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

E-3 PREFORMED, RE-ENTERABLE CABLE PENETRATION FOR WALL OR FLOOR

(BASED ON MATERIALS MANUFACTURED BY ROXTEC)

TOP/FRONT VIEW

SECTION A-A



1. FIRE-RATED (1-HR. OR 2-HR) CONCRETE FLOOR OR WALL ASSEMBLY OR ULC FIRE-RATED CONCRETE BLOCK WALL ASSEMBLY.

2. WELDED, BOLTED OR CAST ANGLE FRAME MINIMUM 130 x 110mm OPENING SIZE; MAXIMUM 865 x 870mm OPENING SIZE; SIZED TO SUIT NUMBER OF CABLE PENETRATIONS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

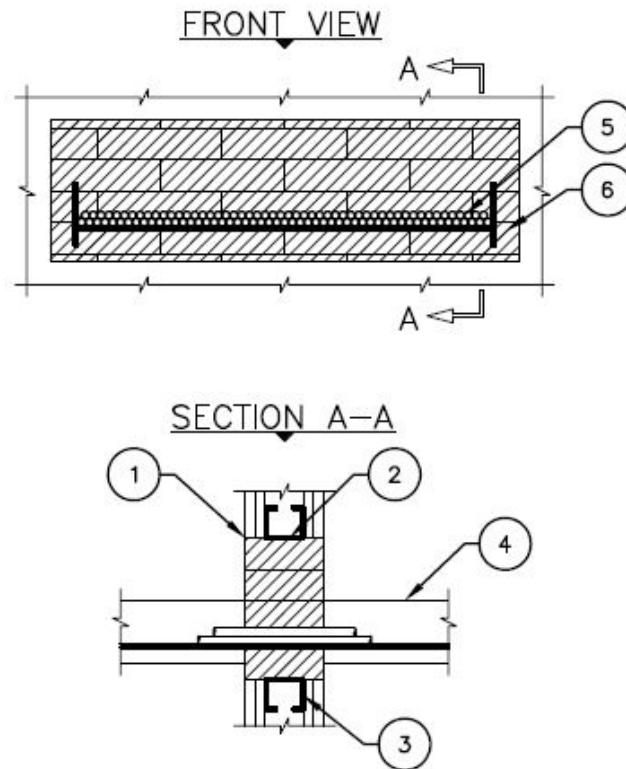
3. PREFORMED FIRE-RATED CABLE MODULES AND WEDGES SIZED TO SUIT NUMBER AND DIAMETER OF CABLE PENETRATIONS, HAVING 20% SPARE CAPACITY, ASSEMBLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

4. COORDINATE OPENING SIZES PRIOR TO PLACEMENT OF CONCRETE OR CONSTRUCTION OF CONCRETE BLOCK.

E-4 CABLE TRAY THROUGH 1-HR. OR 2-HR. GYPSUM WALL ASSEMBLY

F RATING = 1-HR. OR 2-HR.

T RATING = 0-HR.

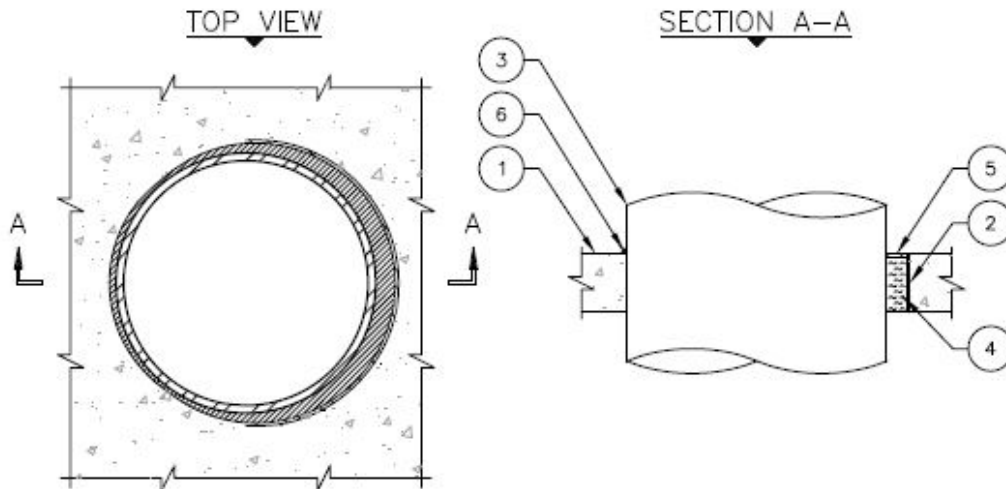


1. GYPSUM WALL ASSEMBLY: 1-HR. OR 2-HR. FIRE- RATING (2-HR. SHOWN).
2. WOOD STUDS NOMINAL 38 x 89mm OR MINIMUM 65mm STEEL STUDS.
3. FRAME OUT OPENING WITH METAL STUDS.
4. OPEN LADDER CABLE TRAY (MAXIMUM 610 x 100mm, STEEL OR ALUMINUM).
5. CABLES HAVING A COMBINATION NO GREATER THAN THE FOLLOWING :
 - A. MAXIMUM 300 PAIR NO. 24 AWG TELEPHONE CABLE.
 - B. MAXIMUM 500 KCMIL SINGLE CONDUCTOR POWER CABLE.
 - C. MAXIMUM 13mm DIAMETER FIBER-OPTIC CABLE (24 FIBER).
 - D. MAXIMUM 3/C NO. 12 AWG METAL CLAD CABLE.
6. FIRE BLOCKS AND SEALANT AS RECOMMENDED BY MANUFACTURER.

NOTES : 1. MAXIMUM SIZE OF OPENING = 225 x 760mm.
2. ANNULAR SPACE = MINIMUM 25mm, MAXIMUM 100mm.
3. MAXIMUM AREA OF CABLES EQUALS 40% OF CROSS-SECTIONAL AREA OF CABLE TRAY.
4. APPLY INTUMESCENT FIRE STOP INTO INTERSTICES OF CABLES, BETWEEN CABLES AND CABLE TRAY, AND ANY VOIDS TO MAXIMUM EXTENT POSSIBLE.

M-1 METAL PIPE THROUGH A SLEEVE IN CONCRETE FLOOR/WALL OR BLOCK WALL

F RATING = 3-HR.
T RATING = 0-HR.



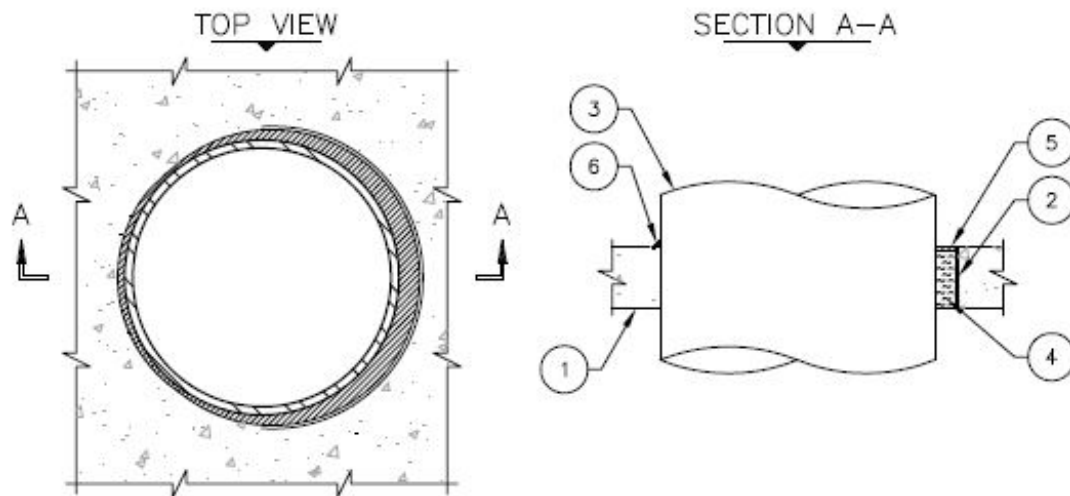
1. CONCRETE FLOOR OR WALL ASSEMBLY: 3-HR FIRE-RATING
 - A. LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE FLOOR OR WALL (MIN. 114mm THICK).
 - B. ANY ULC CLASSIFIED CONCRETE BLOCK WALL.
2. OPTIONAL: MAXIMUM 800mm NOMINAL DIAMETER STEEL PIPE SLEEVE (SCHEDULE 40 OR HEAVIER).
3. PENETRATING ITEM NO GREATER THAN ONE OF THE FOLLOWING:
 - A. MAXIMUM 760mm NOMINAL DIAMETER STEEL PIPE (SCHEDULE 10 OR HEAVIER).
 - B. MAXIMUM 760mm NOMINAL DIAMETER CAST IRON PIPE.
 - C. MAXIMUM 150mm NOMINAL DIAMETER COPPER PIPE.
 - D. MAXIMUM 150mm NOMINAL DIAMETER STEEL CONDUIT.
 - E. MAXIMUM 100mm NOMINAL DIAMETER EMT.
4. MINIMUM 100mm THICKNESS MINERAL WOOL (MIN. 64kg/m³ DENSITY) TIGHTLY PACKED.
5. INTUMESCENT FIRE STOP SEALANT AS RECOMMENDED BY MANUFACTURER FOR FIRE RATING INDICATED
6. INTUMESCENT FIRE STOP SEALANT APPLIED AT POINT OF CONTACT.

NOTES : 1. MAXIMUM DIAMETER OF OPENING = 800mm.
2. ANNULAR SPACE - MINIMUM 0mm, MAXIMUM 47mm.
3. MINIMUM INTUMESCENT FIRE STOP SEALANT IS REQUIRED ON BOTH SIDES OF A WALL ASSEMBLY IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATION.

E-6 METAL PIPE THROUGH A SLEEVE IN CONCRETE FLOOR/WALL OR BLOCK WALL

F RATING = 3-HR.

T RATING = 0-HR.



1. CONCRETE FLOOR OR WALL ASSEMBLY: 3-HR FIRE-RATING
 - A. LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE FLOOR OR WALL (MIN. 114mm THICK).
 - B. ANY ULC CLASSIFIED CONCRETE BLOCK WALL.
2. OPTIONAL: MAXIMUM 810mm NOMINAL DIAMETER STEEL PIPE SLEEVE (SCHEDULE 40 OR HEAVIER).
3. PENETRATING ITEM NO GREATER THAN ONE OF THE FOLLOWING:
 - A. MAXIMUM 760mm NOMINAL DIAMETER STEEL PIPE (SCHEDULE 10 OR HEAVIER).
 - B. MAXIMUM 760mm NOMINAL DIAMETER CAST IRON PIPE.
 - C. MAXIMUM 150mm NOMINAL DIAMETER COPPER PIPE.
 - D. MAXIMUM 150mm NOMINAL DIAMETER STEEL CONDUIT.
 - E. MAXIMUM 100mm NOMINAL DIAMETER EMT.
4. MINIMUM 100mm THICKNESS MINERAL WOOL (MIN. 64kg/m³ DENSITY) TIGHTLY PACKED.
5. INTUMESCENT FIRE STOP SEALANT AS RECOMMENDED BY MANUFACTURER FOR FIRE-RATING INDICATED.
6. INTUMESCENT FIRE STOP SEALANT APPLIED AT POINT OF CONTACT AS RECOMMENDED BY MANUFACTURER FOR FIRE-RATING INDICATED.

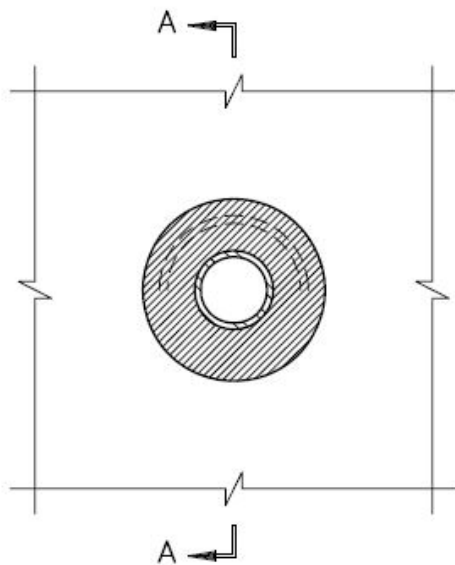
NOTES : 1. MAXIMUM DIAMETER OF OPENING = 810mm.
2. ANNULAR SPACE = MINIMUM 0mm, MAXIMUM 47mm.
3. INTUMESCENT FIRE STOP SEALANT IS REQUIRED ON BOTH SIDES OF A WALL ASSEMBLY AS RECOMMENDED BY MANUFACTURER FOR FIRE-RATING INDICATED.

E-7 ENT THROUGH 1-HR. OR 2-HR. GYPSUM WALL ASSEMBLY

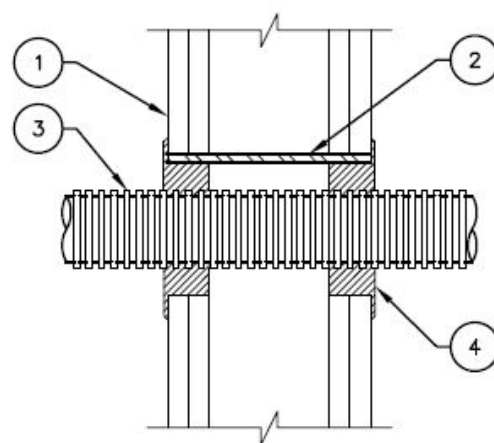
F AND FH RATING = 1-HR. AND 2-HR.

FT AND FTH RATING = 0-HR. AND 2-HR. (FOR 1-HR. AND 2-HR. WALLS, RESPECTIVELY)

FRONT VIEW



SECTION A-A



1. GYPSUM WALL ASSEMBLY: 1-HR OR 2-HR FIRE-RATING (2-HR SHOWN).
2. MAXIMUM 100mm NOMINAL DIAMETER STEEL PIPE SLEEVE (SCHEDULE 40 OR THINNER).
3. MAXIMUM 50mm NOMINAL DIAMETER ENT.
4. INTUMESCENT FIRE STOP SEALANT AS RECOMMENDED BY MANUFACTURER FOR FIRE-RATING INDICATED.

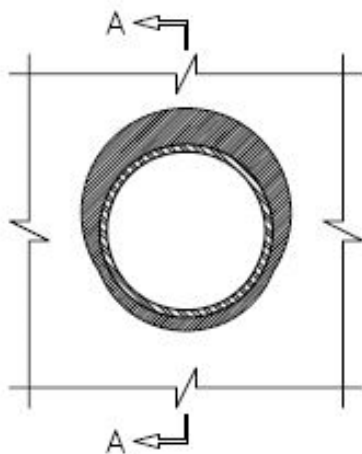
NOTES : 1. MAXIMUM DIAMETER OF OPENING = 100mm.
2. ANNULAR SPACE = 19mm.

E-8 METAL PIPE THROUGH 1-HR. OR 2-HR. GYPSUM WALL ASSEMBLY

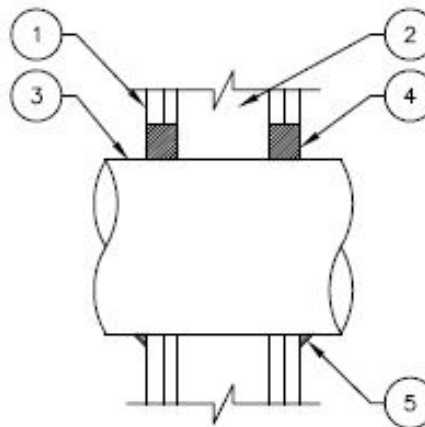
F RATING = 1-HR OR 2-HR.

T RATING = 0-HR.

FRONT VIEW



SECTION A-A

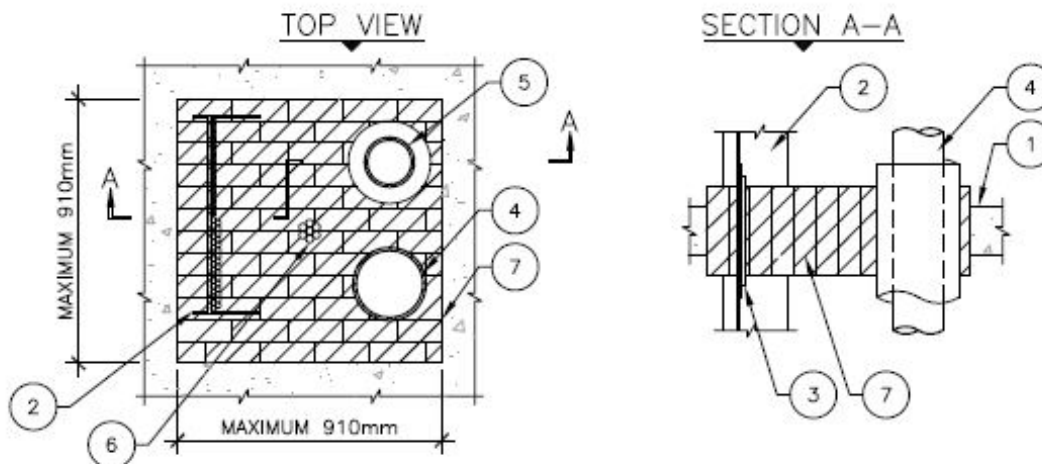


1. GYPSUM WALL ASSEMBLY: 1-HR. OR 2-HR. FIRE-RATING (2-HR. SHOWN).
2. WOOD STUDS NOMINAL 38 x 89mm OR MINIMUM 65mm STEEL STUDS.
3. PENETRATING ITEM NO GREATER THAN ONE OF THE FOLLOWING :
 - A. MAXIMUM 760mm DIAMETER STEEL PIPE (SCHEDULE 10 OR HEAVIER).
 - B. MAXIMUM 760mm DIAMETER CAST IRON PIPE.
 - C. MAXIMUM 150mm NOMINAL DIAMETER COPPER PIPE.
 - D. MAXIMUM 150mm NOMINAL DIAMETER STEEL CONDUIT.
 - E. MAXIMUM 100mm NOMINAL DIAMETER EMT.
4. INTUMESCENT FIRE STOP SEALANT AS RECOMMENDED BY MANUFACTURER FOR FIRE-RATING INDICATED.
5. INTUMESCENT FIRE STOP SEALANT AT POINT OF CONTACT AS RECOMMENDED BY MANUFACTURER FOR FIRE-RATING INDICATED.

NOTES : 1. MAXIMUM DIAMETER OF OPENING :
A. 820mm FOR STEEL STUD WALLS.
B. 370mm FOR WOOD STUD WALLS.
2. ANNULAR SPACE = MINIMUM 0mm, MAXIMUM 65mm.

E-10 MULTIPLE PENETRATING ITEMS THROUGH CONCRETE FLOOR/WALL OR BLOCK WALL

F RATING = 3-HR.
T RATING = 0-HR.



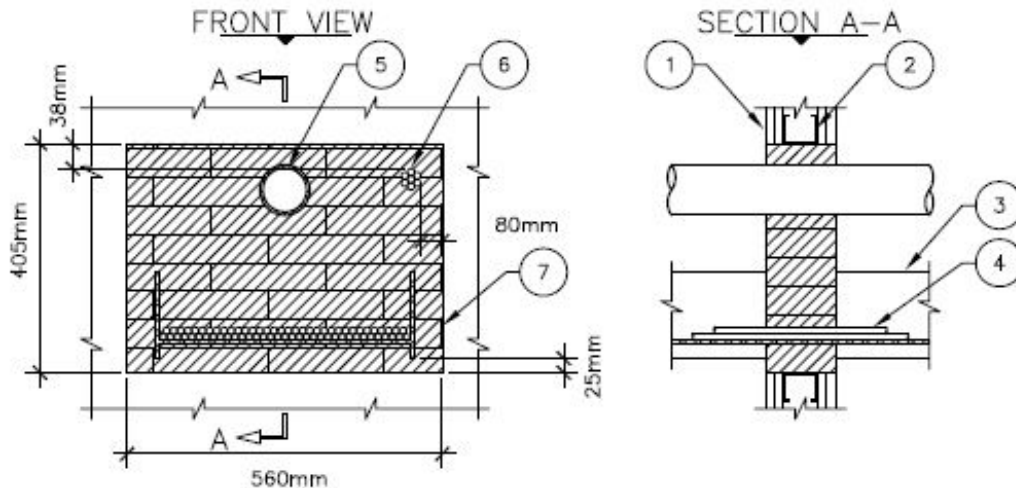
1. CONCRETE FLOOR OR WALL ASSEMBLY: 3-HR FIRE-RATING.
 - A. LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE FLOOR OR WALL (MIN. 114mm THICK).
 - B. ANY ULC CLASSIFIED CONCRETE BLOCK WALL.
2. MAXIMUM 450 x 150mm ALUMINUM OR STEEL OPEN LADDER CABLE TRAY.
3. ANY COMBINATION OF THE FOLLOWING CABLES MAY BE USED WITHIN THE CABLE TRAY (SEE NOTE NO. 4 BELOW):
 - A. 7/C NO. 12 AWG COPPER CONDUCTOR CABLE.
 - B. MAX. 500 KCMIL SINGLE CONDUCTOR CABLE.
 - C. MAX. 300 PAIR NO. 24 AWG TELEPHONE CABLE.
 - D. 24 FIBER-OPTIC CABLE (MAX. 13mm DIAMETER).
4. PENETRATING ITEMS MAY BE ANY OF THE FOLLOWING: MAXIMUM 6" NOMINAL DIAMETER STEEL PIPE OR STEEL CONDUIT; MAXIMUM 6" NOMINAL DIAMETER CAST IRON PIPE; OR MAXIMUM 4" NOMINAL DIAMETER COPPER PIPE OR EMT.
5. MAXIMUM 38mm GLASS FIBER INSULATION.
6. MAXIMUM 50mm CABLE BUNDLE TO BE A COMBINATION OF ANY OF THE FOLLOWING:
 - A. 7/C NO. 12 AWG CABLE.
 - B. 25 PAIR NO. 24 AWG TELEPHONE CABLE.
 - C. ROMEX (2/C NO. 10 +GRND).
 - D. 3/C NO. 8 ALUMINUM CLAD CABLE.
 - E. RG 62A COAXIAL CABLE.
 - F. 24 FIBER-OPTIC CABLE (MAX. 13mm DIA.).
7. FIRE BLOCK AS RECOMMENDED BY MANUFACTURER FOR FIRE-RATING INDICATED.

NOTES : 1. MAXIMUM AREA OF OPENING = 0.835m², WITH MAXIMUM DIMENSION OF 915mm.
2. ANNULAR SPACE FOR CABLE TRAY = MINIMUM 38mm, MAXIMUM 114mm.
3. ANNULAR SPACE FOR PIPE AND CABLE PENETRATIONS = MINIMUM 25mm, MAXIMUM 114mm.
4. MAXIMUM AREA OF CABLES EQUALS 30% OF CROSS-SECTIONAL AREA OF CABLE TRAY.
5. APPLY INTUMESCENT FIRE STOP SEALANT INTO INTERSTICES OF CABLES, BETWEEN CABLES AND CABLE TRAY, AND ANY VOIDS TO MAXIMUM EXTENT POSSIBLE.
6. WIRE MESH (NOT SHOWN). WHEN THE ANNULAR SPACE EXCEEDS 114mm, USE A NOMINAL 50mm SQ., NO. 16 SWG WIRE MESH TO KEEP THE FIRE BLOCKS IN PLACE.

E-11 MULTIPLE PENETRATIONS THROUGH 1-HR. OR 2-HR. GYPSUM WALL ASSEMBLY

F RATING = 1-HR OR 2-HR.

T RATING = 0-HR.

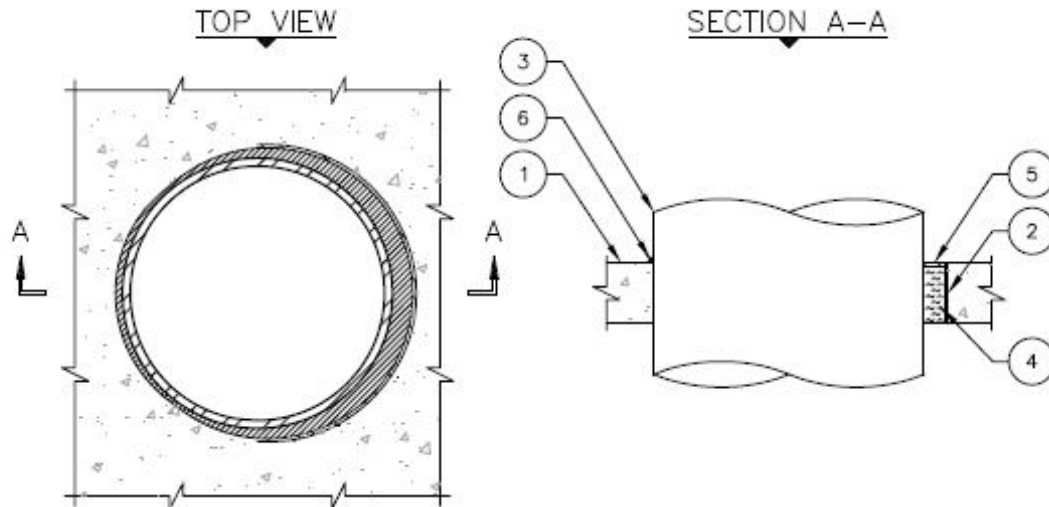


1. GYPSUM WALL ASSEMBLY: 1-HR. OR 2-HR. FIRE-RATING (2-HR. SHOWN).
2. WOOD STUDS NOMINAL 38 x 89mm OR MINIMUM 65mm STEEL STUDS.
3. OPEN LADDER CABLE TRAY (MAXIMUM 450 x 150mm, STEEL OR ALUMINUM).
4. ANY OF THE FOLLOWING CABLES MAY BE USED WITH MAXIMUM 30% FILL OF CABLE TRAY :
 - A. MAXIMUM 350 KCMIL SINGLE CONDUCTOR POWER CABLE.
 - B. MAXIMUM 7/C NO. 12 AWG COPPER CONDUCTOR CABLE.
 - C. MAXIMUM 100 PAIR NO. 24 AWG TELEPHONE CABLE.
5. MAX. 75mm NOMINAL DIAMETER PVC PLASTIC PIPE (SCHEDULE 40) (CLOSED OR VENTED PIPING SYSTEM) (SEE NOTE NO. 1 BELOW).
6. MAXIMUM 38mm DIAMETER CABLE BUNDLE CONSISTING OF ANY OF THE FOLLOWING :
 - A. FIBER-OPTIC CABLE (24 FIBER).
 - B. RG 59 COAXIAL CABLE.
 - C. MAX. 25 PAIR NO. 24 AWG TELEPHONE CABLE.
 - D. MAX. 7/C NO. 12 AWG COPPER CONDUCTOR.
7. FIRE BLOCKS AS RECOMMENDED BY MANUFACTURER FOR FIRE-RATING INDICATED.

NOTES: 1. PENETRATING ITEMS MAY ALSO INCLUDE A MAX. 150mm NOM. DIA. STEEL PIPE, MAX. 150mm NOM. DIA. STEEL CONDUIT; MAX. 100mm NOM. DIA. COPPER PIPE, OR MAX. 100mm NOM. DIA. EMT.
2. MAX. 38mm GLASS-FIBER INSULATION MAY BE USED ON ANY OR ALL METALLIC PIPES.
3. ANNULAR SPACE = MINIMUM 25mm, MAXIMUM 235mm.
4. APPLY INTUMESCENT FIRE STOP SEALANT IN ANY VOID THAT MAY EXIST (AROUND PENETRANTS, INTO INTERSTICES OF CABLES, BETWEEN CABLES AND CABLE TRAY, OR BETWEEN FIRE BLOCKS) TO MAXIMUM EXTENT POSSIBLE.

M-1 METAL PIPE THROUGH A SLEEVE IN CONCRETE FLOOR/WALL OR BLOCK WALL

F RATING = 3-HR.
T RATING = 0-HR.

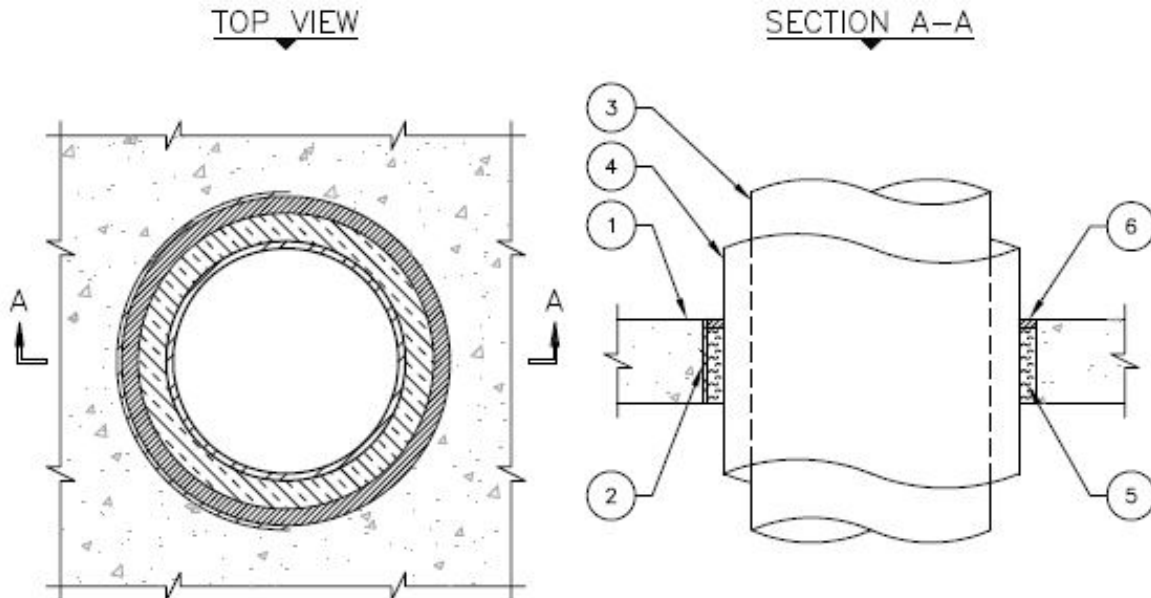


1. CONCRETE FLOOR OR WALL ASSEMBLY: 3-HR FIRE-RATING
 - A. LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE FLOOR OR WALL (MIN. 114mm THICK).
 - B. ANY ULC CLASSIFIED CONCRETE BLOCK WALL.
2. OPTIONAL: MAXIMUM 800mm NOMINAL DIAMETER STEEL PIPE SLEEVE (SCHEDULE 40 OR HEAVIER).
3. PENETRATING ITEM NO GREATER THAN ONE OF THE FOLLOWING:
 - A. MAXIMUM 760mm NOMINAL DIAMETER STEEL PIPE (SCHEDULE 10 OR HEAVIER).
 - B. MAXIMUM 760mm NOMINAL DIAMETER CAST IRON PIPE.
 - C. MAXIMUM 150mm NOMINAL DIAMETER COPPER PIPE.
 - D. MAXIMUM 150mm NOMINAL DIAMETER STEEL CONDUIT.
 - E. MAXIMUM 100mm NOMINAL DIAMETER EMT.
4. MINIMUM 100mm THICKNESS MINERAL WOOL (MIN. 64kg/m³ DENSITY) TIGHTLY PACKED.
5. INTUMESCENT FIRE STOP SEALANT AS RECOMMENDED BY MANUFACTURER FOR FIRE RATING INDICATED
6. INTUMESCENT FIRE STOP SEALANT APPLIED AT POINT OF CONTACT.

NOTES : 1. MAXIMUM DIAMETER OF OPENING = 800mm.
2. ANNULAR SPACE = MINIMUM 0mm, MAXIMUM 47mm.
3. MINIMUM INTUMESCENT FIRE STOP SEALANT IS REQUIRED ON BOTH SIDES OF A WALL ASSEMBLY IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATION.

M-2 INSULATED METAL PIPE THROUGH CONCRETE FLOOR/WALL OR BLOCK WALL

F RATING = 2-HR.
T RATING = 1-HR.



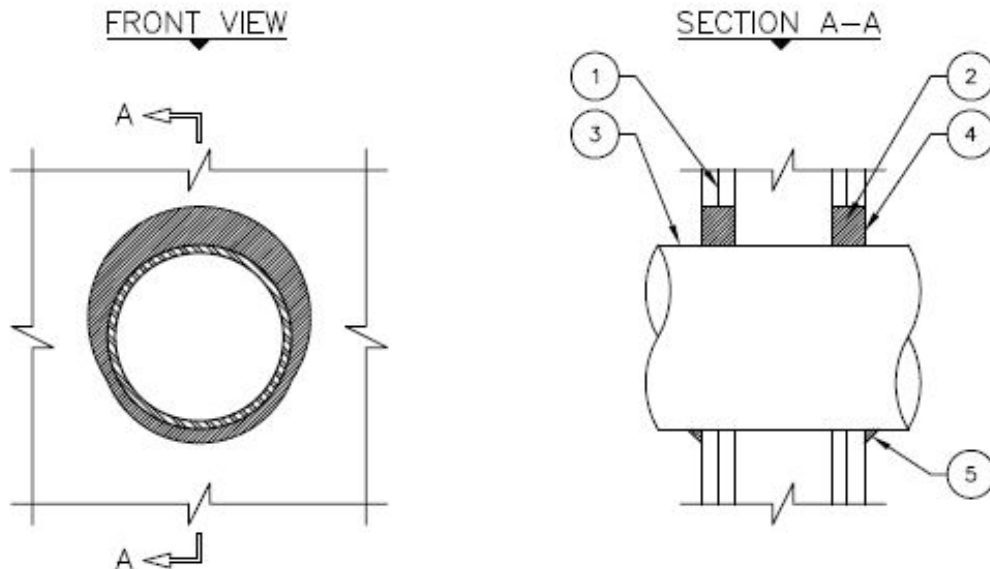
1. CONCRETE FLOOR OR WALL ASSEMBLY: 2-HR FIRE-RATING
 - A. LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE FLOOR OR WALL (MINIMUM 114mm THICK).
 - B. ANY ULC CLASSIFIED CONCRETE BLOCK WALL ASSEMBLY.
2. OPTIONAL: MAXIMUM 500mm NOMINAL DIAMETER STEEL PIPE SLEEVE (SCHEDULE 10 OR HEAVIER).
3. PENETRATING ITEM NOT GREATER THAN ONE OF THE FOLLOWING:
 - A. MAXIMUM 300mm NOMINAL DIAMETER STEEL PIPE (SCHEDULE 10 OR HEAVIER).
 - B. MAXIMUM 150mm NOMINAL DIAMETER COPPER PIPE.
4. MAXIMUM 50mm THICK GLASS FIBER INSULATION.
5. MINIMUM 100mm THICKNESS MINERAL WOOL (MIN. 64kg/m³ DENSITY) TIGHTLY PACKED.
6. INTUMESCENT FIRE STOP SEALANT AS RECOMMENDED BY MANUFACTURER.

NOTES : 1. MAXIMUM DIAMETER OF OPENING = 500mm.
2. ANNULAR SPACE = MINIMUM 13mm, MAXIMUM 57mm.
3. APPLY FIRE STOP SEALANT TO BOTH SIDES OF WALL ASSEMBLY.

M-3 METAL PIPE THROUGH 1-HR. OR 2-HR. GYPSUM WALL ASSEMBLY

F RATING = 1-HR. OR 2-HR.

T RATING = 0-HR.



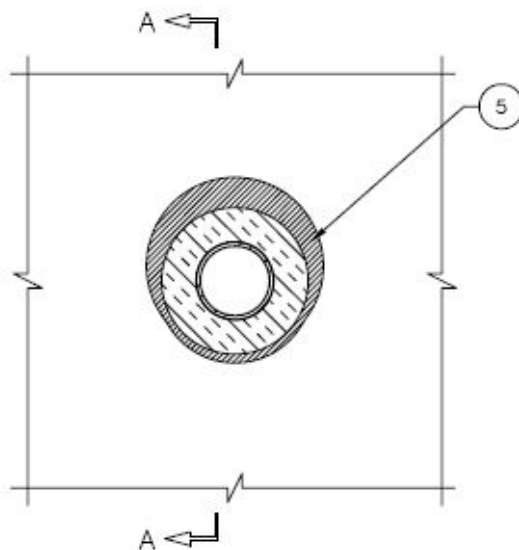
1. GYPSUM WALL: 1-HR. OR 2-HR. FIRE-RATING (2-HR. SHOWN).
2. WOOD STUDS NOMINAL 38 x 89mm OR MINIMUM 65mm WIDE STEEL STUDS.
3. PENETRATING ITEM NOT GREATER THAN ONE OF THE FOLLOWING :
 - A. MAXIMUM 760mm DIAMETER STEEL PIPE (SCHEDULE 10 OR HEAVIER).
 - B. MAXIMUM 760mm DIAMETER CAST IRON PIPE.
 - C. MAXIMUM 150mm NOMINAL DIAMETER COPPER PIPE.
 - D. MAXIMUM 150mm NOMINAL DIAMETER STEEL CONDUIT.
 - E. MAXIMUM 100mm NOMINAL DIAMETER EMT.
4. INTUMESCENT FIRE STOP SEALANT AS RECOMMENDED BY MANUFACTURER FOR FIRE RATING INDICATED
5. APPLY FIRE STOP SEALANT AT POINT OF CONTACT.

NOTES : 1. MAXIMUM DIAMETER OF OPENING :
A. 820mm FOR STEEL STUD WALLS.
B. 370mm FOR WOOD STUD WALLS.
2. ANNULAR SPACE = MINIMUM 0mm, MAXIMUM 65mm.

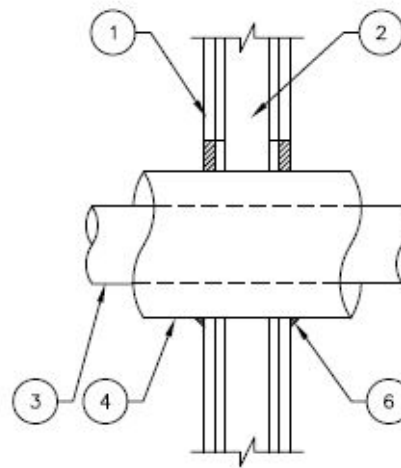
M-5 INSULATED METAL PIPE THROUGH 1-HR. OR 2-HR. GYPSUM WALL ASSEMBLY

F RATING = 1-HR. AND 2-HR.
T-RATING = 1/2-HR., 3/4-HR., 1-HR., AND 1-3/4 HR.

FRONT VIEW



SECTION A-A

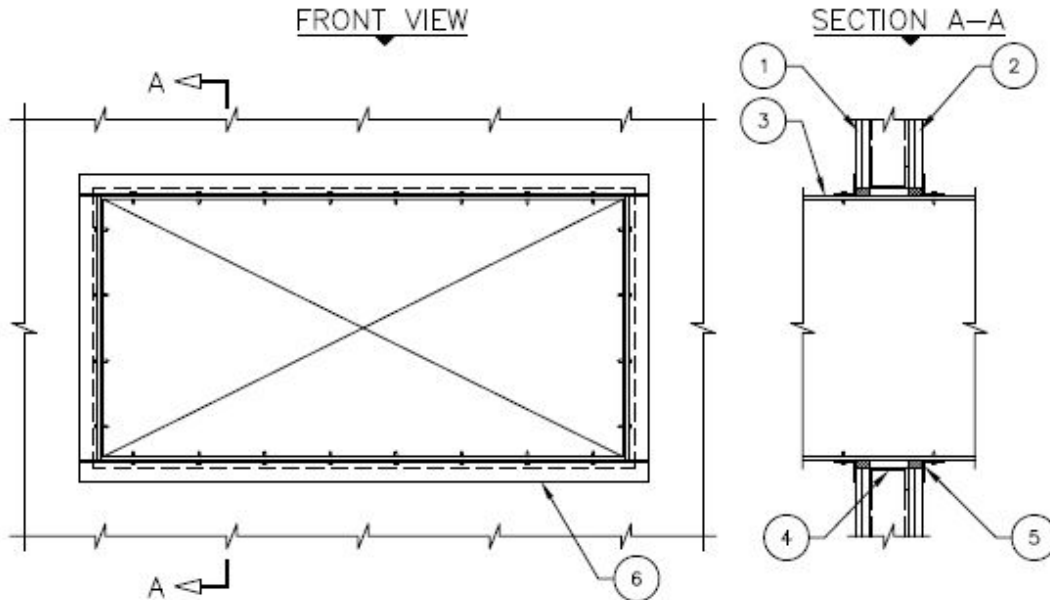


1. GYPSUM WALL ASSEMBLY: 1-HR. OR 2-HR. FIRE-RATING. (2-HR. SHOWN)
2. WOOD STUDS NOMINAL 38 x 89mm OR MINIMUM 65mm WIDE STEEL STUDS.
3. PENETRATING ITEM NO GREATER THAN ONE OF THE FOLLOWING :
 - A. MAXIMUM 300mm NOMINAL DIAMETER STEEL PIPE (SCHEDULE 20 OR HEAVIER).
 - B. MAXIMUM 150mm NOMINAL DIAMETER COPPER PIPE.
 - C. MAXIMUM 100mm NOMINAL DIAMETER STEEL CONDUIT.
 - D. MAXIMUM 100mm NOMINAL DIAMETER EMT.
4. MAXIMUM 50mm THICK GLASS-FIBER PIPE INSULATION.
5. INTUMESCENT FIRESTOP SEALANT AS RECOMMENDED BY MANUFACTURER FOR FIRE-RATING INDICATED
6. INTUMESCENT FIRE STOP SEALANT AT POINT OF CONTACT AS RECOMMENDED BY MANUFACTURER.

NOTES : 1. MAXIMUM DIAMETER OF OPENING = 450mm.
2. ANNULAR SPACE = MINIMUM 0mm, MAXIMUM 47mm.

M-6 METAL DUCT (WITHOUT DAMPER) THROUGH 1-HR. OR 2-HR. GYPSUM WALL ASSEMBLY

F RATING = 1-HR. OR 2-HR.
T RATING = 0-HR.

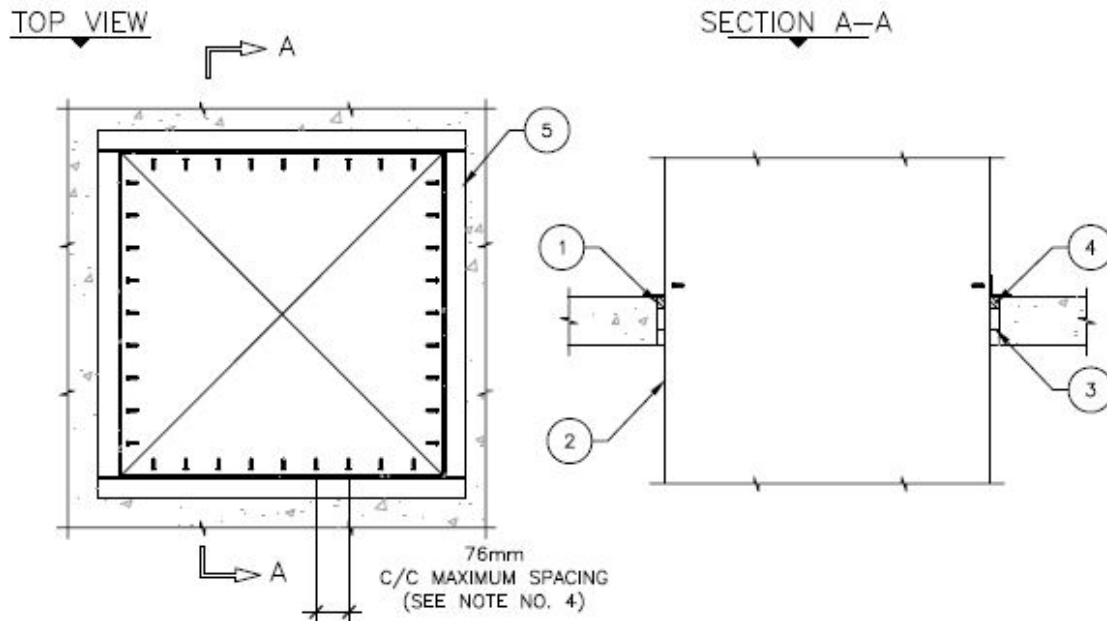


1. GYPSUM WALL ASSEMBLY: 1-HR. OR 2-HR. FIRE-RATING. (2-HR. SHOWN)
2. WOOD STUDS NOMINAL 38 x 89mm OR MINIMUM 65mm WIDE STEEL STUDS.
3. RECTANGULAR SHEET METAL DUCT (MAXIMUM SIZE : 610mm x 1220mm, MINIMUM 0.61mm. THICKNESS).
4. FRAMED OUT OPENING WITH METAL STUDS.
5. INTUMESCENT FIRE STOP SEALANT AS RECOMMENDED BY MANUFACTURER FOR FIRE-RATING INDICATED.
6. AFTER SEALING SPACE BETWEEN DUCT AND GYPSUM WALL ASSEMBLY WITH FIRE STOP SEALANT, FASTEN STEEL ANGLE (MINIMUM 38 x 38 x 1.5mm.) TO DUCT WITH MINIMUM NO. 8 x 19mm" LONG SHEET METAL SCREWS; ANGLE DOES NOT HAVE TO BE FASTENED TO THE WALL ASSEMBLY.

NOTES : 1. MAX. AREA OF OPENING = .800mm² WITH A MAXIMUM DIMENSION OF 1250mm.
2. ANNULAR SPACE = MINIMUM 6mm, MAXIMUM 25mm.
3. NOT FOR USE IN DUCT SYSTEMS CONTAINING A FIRE DAMPER.

M-7 METAL DUCT (WITHOUT DAMPER) THROUGH CONCRETE FLOOR/WALL OR BLOCK WALL

F RATING = 3-HR.
T RATING = 0-HR.



1. CONCRETE FLOOR OR WALL ASSEMBLY: 3-HR FIRE-RATING.
 - A. LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE FLOOR (MIN. 114mm THICK).
 - B. LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE WALL (MIN. 135mm THICK).
 - C. ANY ULC CLASSIFIED CONCRETE BLOCKWALL.
2. MAXIMUM 800 x 800mm RECTANGULAR STEEL DUCT (MINIMUM 0.61mm THICK).
3. MINIMUM 89mm THICKNESS MINERAL WOOL (MIN. 64kg/m³ DENSITY) TIGHTLY PACKED.
4. FIRE STOP SEALANT AS RECOMMENDED BY MANUFACTURER FOR FIRE-RATING INDICATED.
5. AFTER SEALING SPACE BETWEEN DUCT AND CONCRETE FLOOR/WALL ASSEMBLY WITH FIRE STOP SEALANT, FASTEN STEEL ANGLE (50 x 50 x 1.5mm THICK.) TO DUCT WITH NO. 8 (OR LARGER) STEEL SHEET METAL SCREWS; ANGLE DOES NOT HAVE TO BE FASTENED TO CONCRETE FLOOR/WALL ASSEMBLY.

NOTES : 1. MAXIMUM AREA OF OPENING = .735m² WITH A MAXIMUM DIMENSION OF 857mm.
2. ANNULAR SPACE = MINIMUM 6mm, MAXIMUM 38mm.
3. ELASTOMERIC FIRE STOP SEALANT IS REQUIRED ON BOTH SIDES OF A WALL ASSEMBLY.
4. NOT FOR USE IN DUCT SYSTEMS CONTAINING A DAMPER.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.
- 1.1.2 All labour, materials, products, equipment and services to complete the joint caulking and sealants work necessary and/or indicated on the Drawings and specified herein.
- 1.1.3 All caulking and sealing required to make the building sealed tightly from the exterior and caulked from the interior to withstand the action of the elements and to complete the building vapour barrier and not specified under other Sections, shall be the work of this Section.

1.2 WORK INCLUDED UNDER OTHER SECTIONS

- 1.2.1 Section 03 01 30 Rehabilitation of Cast-in-Place Concrete
- 1.2.2 Section 07 84 00 Fire stopping and smoke seals
- 1.2.3 Section 09 29 00 Gypsum Board

1.3 REFERENCES

1.3.1 AMERICAN SOCIETY FOR TESTING AND MATERIALS INTERNATIONAL, (ASTM)

- 1.3.1.1 ASTM C919-[02], Standard Practice for Use of Sealants in Acoustical Applications.

1.3.2 CANADIAN GENERAL STANDARDS BOARD (CGSB)

- 1.3.2.1 CGSB 19-GP-5M-[1984] Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
- 1.3.2.2 CAN/CGSB-19.13-[M87] Sealing Compound, One-component, Elastomeric, Chemical Curing.
- 1.3.2.3 CGSB 19-GP-5M-[1984] Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
- 1.3.2.4 CAN/CGSB-19.17-[M90] One-Component Acrylic Emulsion Base Sealing Compound.
- 1.3.2.5 CAN/CGSB-19.24-[M90] Multi-component, Chemical Curing Sealing Compound.

1.4 QUALITY ASSURANCE

- 1.4.1 Perform the work by a recognized established caulking and sealing contractor having at least five years experience and skilled mechanics thoroughly trained and competent in the use of caulking and sealing equipment and the specified materials.
- 1.4.2 Arrange with the caulking and sealant manufacturers for visit at the job site by one of their technical representatives before beginning the caulking and sealing installation to discuss with the Contractor and the Consultant the procedures to be adopted, to analyze site conditions and inspect the surfaces and joints to be sealed, in order that recommendations may be made.

1.4.3 Discuss the following items:

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

1.4.4 Technical representative shall randomly inspect preparation of substrate and perform random testing of installed work at at least ten(10) locations.

- 1. Cut tests locations to be 150mm long.
- 2. Certify thickness, hardness and surface finish conforms to intended design.
- 3. Report to consultant.

1.5 SUBMITTALS

1.5.1 Submit a signed letter from the sealant and caulking manufacturers prior to commencement of work of this Section which states:

- .1 Sealants and caulking materials selected for use from those specified;
- .2 Surface preparation requirements;
- .3 Priming and application procedures;
- .4 Verification that sealant and caulking are suitable for purposes intended and joint design;
- .5 Sealants and caulking are compatible with other materials and products with which they come in contact including but not limited to sealants provided under other Sections, insulation adhesives, bitumen, block, concrete, metals and metal finishes;
- .6 Verification that sealants and caulking are suitable for temperature and humidity conditions at time of application.

1.6 ENVIRONMENTAL CONDITIONS

1.6.1 Ambient and substrate surface temperatures shall be above 5°C during application and during the work of this Section.

1.7 WARRANTY

1.7.1 Submit a five year warranty of the materials and workmanship for the sealing work. Under the warranty, the materials shall not breakdown, decompose, lose their resiliency, crack, or lose bond with sides of joints.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 All caulking and sealants: Non-bleeding and capable of supporting their own weight except for the self-levelling type sealant for horizontal surfaces.

2.1.2 Caulking: One component acrylic base (solvent release type) complying with CGSB 19-GP-5M.

2.1.3 Caulking for horizontal surfaces: Self-levelling pourable grade, Shore "A" hardness of 25-35, fully water resistant for continuous wet conditions, grey in colour, Duoflex SL by Sika, or other approved manufacture.

2.1.4 Sealant: Multi-component chemical curing, complying with CAN/CGSB 19.24-M Type 2, Dymeric 240FC by Tremco Manufacturing Company (Canada) Ltd., or other approved manufacture.

- 2.1.5 Sealant for saw-cut horizontal surfaces: Multi-component, self-levelling, conforming to ASTM D2240 Tremco Control Joint Sealant, BASF Masterfill 300, or Sika Loadflex.
- 2.1.6 Sealant for Joints around Interior Door Frames, Windows and Under Exterior Thresholds: One-part, low or medium modulus, neutral curing 100% silicone joint sealant, conforming to ASTM C920-11, Type S, Grade NS, Class 35.
- .1 DC CWS by Dow Corning.
 - .2 SWS by GE
 - .3 SikaSil WS-305CN by Sika
- 2.1.7 Sealant for Exterior Wall Joints: Air-seal sealant: One part, silicone, shore A hardness 15-25, conforming to CGSB 19-GP-13M, classification C-1-40-B-N and C-1-25-B-N and ASTM C920-11, Type S, Grade NS, Class 25. Use NT, M, G, A and O:
- .1 DC 791 by Dow Corning
 - .2 UltraPruf II SCS 2902 by GE
 - .3 Spectrum 3 by Tremco
 - .4 SikaSil N-Plus by Sika
- 2.1.8 Sealant for vanity and kitchen counter splash-backs and washroom fixtures: Mould and mildew resistant, Shore A Hardness 15-25, conforming to ASTM C920, Type S, Grade NS, Class 25, use NT, G, and A:, colour white.
- .1 SCS1700 by GE
 - .2 DC 786 by Dow Corning
 - .3 Tremsil 200 by Tremco
 - .4 Omni Plus by Sonneborn
 - .5 SikaSil –GP by Sika
- 2.1.9 Exterior Metal To Wood, Masonry, Stone Or Porous Surfaces:
- 2.1.9.1 One-part elastomeric, non-sag urethane based sealant. Accepted products:
- .1 “Dymonic” as manufactured by Tremco
 - .2 “Sikaflex 1-A” as manufactured by Sika Canada
 - .3 “Vulkem 931” by Mameco as manufactured by Tremco
 - .4 “SK-1 Structural Sealant” as supplied by Chemlink
- 2.1.10 Exterior And Interior Metal To Metal And Metal To Glass Joints:
- 2.1.10.1 One-part Silicone based sealant. Accepted Products:
- .1 “Spectrum 2” as manufactured by Tremco
 - .2 “DC 786 by Dow Corning
 - .3 “Contractors SCS 1000 Sealant” as manufactured by GE Silicones Canada
 - .4 “DC 999-A Silicone Building & Glazing Sealant” as manufactured by Dow Corning Canada.
- 2.1.11 All caulking, sealants, cleaning solvents, fillers and primers: Compatible with each other.
- 2.1.12 Colours for caulking and sealants: As selected later by the Consultant and not necessarily standard colours.

- 2.1.13 Joint backing: White non-absorbent open cell foam polyethylene, Sof Rod, by Tremco, or other approved manufacture. Filler diameter shall be 50% greater than joint width before installation.
- 2.1.14 Bond breaker: Tape of type supplied or recommended by sealant or caulking manufacturer.
- 2.1.15 Primers: As recommended by the caulking and sealant manufacturer. Primers shall suit the various job conditions.
- 2.1.16 Cleaning material: Xylol, Methyl-ethyl-ketone, Toluol or as recommended by the caulking and sealant manufacturer.

PART 3 - EXECUTION

3.1 GENERAL

- 3.1.1 Apply in accordance with the drawings, specifications and requirements of the jurisdictional authorities and the Canadian Roofing Contractors Association's Roofing Manual.
- 3.1.2 Regard the manufacturer's printed recommendations and specifications as a minimum requirement for materials, methods and quality of work not otherwise specified herein.
- 3.1.3 Make adjustments to the specified procedures caused by weather and site conditions only with the Consultants approval.
- 3.1.4 Conform to the details.
- 3.1.5 Examine joints before caulking to ensure that the configuration, surface and widths are suitable for the sealant and service, and that the execution of caulking and performance of sealants will not be adversely affected.
- 3.1.6 Verify, before commencing the work, that the joint size, depth and substrate will not adversely affect the execution, performance or quality of the completed work; and that joints can be sealed in an acceptable condition by means of the preparation specified in this section. Verify the site conditions together with the sealant manufacturer's representative.
- 3.1.7 Defective work resulting from the application to unsatisfactory joint conditions will be rejected.

3.2 PREPARATION

- 3.2.1 Remove the existing sealant and backing material and all deleterious material from the joint. Use the method of surface preparation suitable for substrate that does not damage adjacent surfaces, as recommended by the sealant manufacturer.
- 3.2.2 Brush, scrub, scrape or grind the inner face surfaces to remove loose mortar, dust, oil, grease, oxidation, mill scale, and other materials which will affect the adhesion and integrity of the sealant.
- 3.2.3 Wipe down metal surfaces with clean cellulose sponges or rags soaked in solvent compatible with the sealant, and dry with clean cloths.
- 3.2.4 Ensure that surfaces have not been coated with release agents, coating or other treatments, or that, if present, they are entirely removed.
- 3.2.5 Protect adjacent finishes from damage, where heavy abrasive cleaning is required such as sandblasting, grinding or wire brushing.

3.2.6 Cleaning procedures:

- .1 Metal:
 - .1 Blast cleaning: Sandblast or iron shot blast surfaces requiring heavy cleaning to bright metal. Remove loose matter by compressed air or commercial vacuum cleaner.
 - .1 Power tool cleaning: Clean surfaces by wire brush, impact tools, abrasive wheels or by buffing. Remove loose matter by compressed air or vacuum cleaner.
 - .3 Solvent cleaning: Clean with solvent applied by spray or brush. Wipe with clean wiping cloth. Remove paints with paint remover and wipe with solvent. Remove residue.
- .2 Concrete and Masonry:
 - .1 Remove all friable material with wire brush or chipping, until surfaces are sound. Remove surface residue with a stiff brush, vacuum cleaner or compressed air.
 - .2 Concrete surfaces shall be cured for at least 28 days. Acid etch joint surfaces to remove alkaline salts and neutralize acid with a solution of trisodium phosphate, followed by rinsing with clean, cold water.
 - .3 Allow joints to dry thoroughly.
 - .4 Completely remove resinous products used as curing compounds and form release agents.
- .3 Glass, Ceramics and Porcelain:
 - .1 Brush with solvent and wipe with clean wiping cloths. Remove residue.
- .4 Wood:
 - .1 Remove foreign matter such as soil, paint, grease, asphalt, resin with solvents, abrasives and paint removers; make surfaces clean and dry.

3.2.7 Do not exceed shelf life, and pot life of the materials and installation times, as stated by the manufacturers.

3.2.8 Become familiar with the work life of the sealant to be used. Do not mix two part materials until required for use.

3.2.9 Mix sealants thoroughly with a mechanical mixer capable of mixing at 80-100 rpm without mixing air into the materials. Continue mixing until the material is a uniform colour and free from streaks of unmixed material.

3.2.10 Mask areas adjacent to the joints as required. Prevent contamination of adjacent surfaces. Remove masking promptly after the joint has been completed.

3.3 JOINT DEPTH

3.3.1 Provide the following Depth To Width Ratios:

- .1 Masonry:
 - .1 6mm (1/4") deep, up to 13mm (1/2") wide
 - .2 10mm (3/8") deep, up to 19mm (3/4") wide.
 - .3 13mm (1/2") deep, up to 25mm (1") wide
 - .4 19mm (3/4") deep, up to 51mm (2") wide.
- .2 Non Porous Materials:
 - .1 Joint depth and width to not be less than 6mm (1/4").
- .3 Maintain a minimum of a 2:1 width of depth ration or what is listed above in 3.3.1.1 and 3.3.1.2, whichever is more stringent.

3.4 PRIMING

3.4.1 Prime the inner face surfaces of joints as necessary for the substrate, in accordance with the sealant manufacturer's specification, to provide full adhesion and to prevent staining of the face surface at the joint.

3.4.2 Prime surfaces prior to installing the joint backing rod.

3.5 JOINT FILLING AND BACKING

3.5.1 Install joint backing where required to maintain the joint depth.

3.5.2 Pack joints tightly with sealant in accordance with the manufacturer's specifications using pressure guns. Fill joints completely to the required depths with sealant compound. Use sufficient pressure to fill all voids and joints. Sealant is to bond to both sides of the joint.

3.5.3 Finish joints smooth, free of wrinkles, ridges, air pockets and imbedded foreign materials. Tool joints to a slight concave surface using a soap/water mixture.

3.5.4 Cure sealants in accordance with the sealant manufacturer's instructions.

3.5.5 Do not cover up sealants until proper curing has taken place.

3.5.6 Do not allow sealants to cover or spot surfaces outside of joints. Use masking tape on all surfaces adjacent to joints which may become coated with sealant during the caulking process.

3.6 CLEAN UP

3.6.1 Cut out damaged caulking and sealing, re-prepare and prime joints and install new material as specified to the Consultant's satisfaction.

3.6.2 Clean surfaces soiled by work of this Section. Do not use chemicals, scrapers, or other tools in cleaning which will damage surfaces. Make good other work.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.
- 1.1.2 All labour, materials, equipment and services to supply the hollow metal door, and steel door and screen frame work necessary and/or indicated on the Drawings and specified herein.

1.2 RELATED WORK UNDER OTHER SECTION

- 1.2.1 Glass and glazing: Section 08 80 00.

1.3 REFERENCES

- | | | |
|--------|--------------------------|---|
| 1.3.1 | ASTM A794/A794M-12 | Standard Specification for Commercial Steel (CS), Sheet, Carbon, (0.16% Maximum to 0.25% Maximum), Cold-Rolled. |
| 1.3.2 | ASTM A653/A653M-15 | Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process. |
| 1.3.3 | ASTM A924/M924-14 | Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process |
| 1.3.4 | ASTM E413-04 | Classification for Rating Sound Insulation |
| 1.3.5 | ASTM E90-04 | Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements |
| 1.3.6 | CAN/CGSB 1.132-M90 | Zinc Chromate Primer, Low Moisture Sensitivity. |
| 1.3.7 | CGSB 31-GP-105M | Coating, Conversion, Zinc Phosphate, for Paint base. |
| 1.3.8 | CAN/ULC S702-14 | Standard for Thermal Insulation Mineral Fibre for Buildings. |
| 1.3.9 | CSA W47.1-09(2014) | Certification of Companies for Fusion Welding of Steel. |
| 1.3.10 | CSA W59-13 | Welded Steel Construction (Metal Arc Welding), Includes Update No. 1 (2014), Update No. 3 (2015), Update No. 4 (2015). |
| 1.3.11 | ANSI/DHI A115 | Installation Guide for Doors and Hardware. |
| 1.3.12 | CSDFMA | Canadian Steel Door and Frame Manufacturers Association. |
| 1.3.11 | WDMA Series I.S.1-A-2013 | Industry Standard for Interior Architectural Wood Flush Doors |

1.4 SUBMITTALS

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

1.5 WARRANTY

- 1.5.1 Upon Substantial Completion, provide Owner with a written Warranty, identifying both supplier and manufacturer, on materials and workmanship, for a period of one year following date of completion. Deficiency correction during the period of warranty is the mutual responsibility of the General Contractor and the supplier.

1.6 QUALITY ASSURANCE

- 1.6.1 Manufacturer: Obtain hollow metal doors and frames from single source of supply and from a single manufacturer, and as follows:
 - .1 Fabricate work of this Section to meet the requirements of the Canadian Steel Door and Frame Manufacturer's Association, Manufacturing Specification for Doors and Frames as a minimum, and as further modified in this section.
 - .2 Fabricator shall be a member in good standing of the Canadian Steel Door and Frame Manufacturer's Association.
- 1.6.2 Supplier: Obtain hollow metal doors and frames from single source of supply and from a single manufacturer.
- 1.6.3 Installer: Use installers who are experienced with the installation of hollow metal doors and frames of similar complexity and extent to that required for the Project.
- 1.6.4 Testing Agencies: Provide doors produced under label service program of a testing agency acceptable to Authorities Having Jurisdiction, and as follows:
 - .1 Steel Fire Rated Doors and Frames: Labelled and listed by an organization accredited by Standards Council of Canada for ratings specified or indicated.
 - .2 Provide fire labelled frame products for those openings requiring fire protection ratings, as scheduled:
 - .1 List by nationally recognized agency having factory inspection service and construct as detailed in Follow-up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

- .2 Fabricate all rated doors, frames and screens to labelling authority standard.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

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

1.8 SITE CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Sheet steel:

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

- 2.1.2 Wipe coat galvanized with a minimum zinc coating of 107 g/sq m (0.35 oz/sq.ft.) to ASTM A653/A653M Coating Class A01.
- 2.1.3 Hot dip galvanized: Minimum 183 g/sq m (0.60 oz/sq.ft.) and having a Rockwell B maximum of 65 and suitable for forming and bending without metal or coating fracture.
- 2.1.4 Minimum thicknesses (Gauges), uncoated and zinc wipe coat steel:

.1	Door frames	1.6 mm (16 ga.)
	Frames for doors over 1068 mm (3'-6") wide	2.0 mm (14 ga.)
.2	High Traffic Doors (hollow steel construction stiffened):	
	Door faces	1.6 mm (16 ga.)
	Top and bottom end channels	1.6 mm (16 ga.)
	Vertical stiffeners	0.9 mm (20 ga.)
.3	Doors (honeycomb core construction):	
	Door faces	1.2 mm (18 ga.)
	Top and bottom end channels	1.2 mm (18 ga.)
.4	Reinforcements:	
	Mortised template hinges	3.4 mm (10 ga.), with integral high-frequency angle, and integral field-conversion from standard-weight to heavy-weight hinges at all locations in both doors and frames.
.5	Continuous hinges	2.7 mm (12 ga.) continuous reinforcement in both doors and frames
	Lock and Strike reinforcement	1.6 mm (16 ga.)
	Flush bolt reinforcement and Jamb floor anchors	1.6 mm (16 ga.)
	Channel spreaders	1.6 mm (16 ga.)
	Guard boxes	0.8 mm (22 ga.)
	Hinge reinforcement	2.5 mm (12 ga.)
	Anchors	
	T anchors	1.6 mm (16 ga.)
	L anchors	1.2 mm (18 ga.)
	Closer	2.5 mm (12 ga.)
	Surface mounted hardware	2.5 mm (12 ga.)

- 2.1.5 Primer: CAN/CGSB 1.132-M, Zinc chromate rust inhibitive primer.
- 2.1.6 Zinc rich primer: Sherwin Williams "Zinc Clad III HS 100", Wasser Coatings "MC-Zinc 100" or Benjamin Moore Super Spec HP Primers, or other approved manufacture.
- 2.1.7 Phosphatizing: CGSB 31-GP-105M.
- 2.1.8 Double stud bumpers: Black #52, by Stanley Works of Canada Ltd., or other approved manufacture.
- 2.1.9 Glass stops: 0.037" C-shaped, 16 mm (5/8") high, flush screw applied.
- 2.1.10 Fasteners for stops: Cadmium plated, recessed, flat or oval head Phillips screws.
- 2.1.11 Honeycomb core: Resin impregnated kraft honeycomb, vermin and rot resistant.
- 2.1.12 Temperature Rise Rated (TRR): Solid slab core of non-combustible, inorganic composite to limit temperature rise on the unexposed side of door to [250 deg C for [30] [60] minutes] [no limit] rating, in accordance with CAN4 S104.
- 2.1.13 Anchors: As required to suit condition.
- 2.1.14 Rubber Bumpers: 3 per door.

2.1.15 Insulation: CAN/ULC S702, Type 1, minimum density 24 kg/cu m (1.5 lb/cu.ft.) consisting of durable fibrous material processed from rock, slag or glass, bound with deterioration resistant binders.

2.1.16 Materials for fire-rated doors and frames: Complying with ULC requirements.

2.1.17 Backpaint: Asphalt enamel, quick drying type. Ace of spades by Domtar Construction Materials Ltd., or other approved manufacturers.

2.1.18 ACCESSORIES FOR STC 45 – 56 DOOR:

.1 Hinges: McKinney **Cam Lift MKCL2500** (5" x 4 1/2", No of Holes 8, Lift (180° Opening: 5/16", Door Rating (1 1/2 Pairs): up to 900 lbs, Thickness: 0.25), Minimum 4 Hinges per door or other approved manufacturers.

.2 Electrified Door Hardware: **Securitron EL-EPT-SC Concealed Electrical Power Transfer** or other approved manufacturers.

.3 Surface Overhead Stop: **Norton Rixson surface overhead stop 9-X36** or other approved manufacturers.

.4 Gasket: **312_R Perimeter Gasket** with sponge neoprene insert, 25.5mm wide x 6.4mm high, length to match door size, 1 no. at each top and side jambs as shown in drawings, by Pemko or other approved manufacturers.

.5 Seal: **S88BL Siliconseal**, 12.7mm wide x 6.4mm high, length to match door size, 2 no. at top and 2 sides, and between double doors, as shown in drawings, by Pemko or other approved manufacturers.

.6 Drop Seal: **434 ARL Drop Seal** with sponge neoprene insert, 21.4mm wide x 34.13mm high, length to match door size, 1 no. at bottom of each door leaf, as shown in drawings, by Pemko or other approved manufacturers.

.7 Threshold: **2005AT Threshold**, 127.0mm wide x 12.7mm high, length to match door size, 1 no. at bottom of door, as shown in drawings, by Pemko or other approved manufacturers.

.8 Flat Metal Astragal: 13mm wide x 33mm long, height to match door size, as shown in drawings, by Pemko or other approved manufacturers.

.9 Door Lite Kit: All STC door lite kit to be supplier responsibility and must compatible and meet ASTM tested door assembly. The finish of the lite kit to match with door finish colour.

Note: It is the door supplier responsibility to ensure supply & install appropriate STC door accessories that are fully compatible with their STC & fire rated tested door assembly and door weight requirements.

2.2 FABRICATION - GENERAL

2.2.1 Assemble units by arc welding in accordance with CSA W59 to produce a finished unit square, true and free of distortion. Welding shall be continuous unless specified otherwise. Welding shall be undertaken only by a fabricator fully approved by the Canadian Welding Bureau to the requirements of CSA W47.1.

- 2.2.2 Permit access to an approved inspection and testing company for the purpose of inspecting at random, doors under construction for this project.
- 2.2.3 Make provisions in doors and frames to suit requirements of trade or Section providing security devices. Provide removable plates or knock-outs for electrical contacts. Provide conduit and fish wire to location of electric strike on concealed face of frames.
- 2.2.4 Provide all function holes for all latching and locking hardware, including those for through-bolted lever trim. (CSDFMA-08100, Article 2.3.5).
- 2.2.5 Factory mortise, reinforce, drill, and tap all preparations for mortise template hardware. Site-drill and tap for installation of surface-applied hardware, in accordance with hardware manufacturer's installation templates. (CSDFMA-08100, Article 2.3.4).

2.3 FABRICATION - FRAMES AND SCREENS

- 2.3.1 Form frames accurately to profiles indicated. Construct frames straight and free from twist or warp.
- 2.3.2 Blank, drill, reinforce and tap frames to receive templated hardware. Reinforce frames for installation of closers. Install stiffener plates or two angle spreaders where required to prevent bending of frame and to maintain alignment when setting. Weld reinforcement in place.
- 2.3.3 Cut frame mitres accurately and weld on inside of frame profile. Fill frame corners, exposed surface depressions and butted joints with air-drying paste filler. Sand to a smooth uniform finish. Apply one coat of primer.
- 2.3.4 Supply jamb and mullion extensions and anchors required to secure screens to the structure. Fabricate anchorage to prevent transfer of load from support framing to the screens when deflection of structure occurs.
- 2.3.5 Where frames terminate at finished floor, supply floor plates for anchorage to slab. Check depth of extension of finished floor to structural slab and provide jamb extension anchorage as required. Provide 50 mm (2") minimum adjustment.
- 2.3.6 Provide three adjustable "T" anchors per jamb or six "L" anchors per jamb for frames up to 2300 mm (7'-6"). Add one "T" anchor or two "L" anchors per jamb for additional 600 mm (2'-0") or fraction thereof in frame height.
- 2.3.7 Supply removable stop and frame, where required for the overhead concealed door closers, properly connected to frame and prepared for attachment to closer, prior to shipment.
- 2.3.8 Provide three double stud bumpers per single door, four bumpers per double door, except for exterior doors. Lowest bumper shall be 230 mm (9") minimum above bottom of door.
- 2.3.9 Reinforce door frame head if opening is wider than 1500 mm (5'-0"). Reinforce jambs and mullions at junction of heads.
- 2.3.10 Fabricate metal screens to sizes shown.
- 2.3.11 Knock-down frames will not be permitted unless it can be shown that preassembled frames are impossible to install.
- 2.3.12 Back paint exterior frames where in contact with concrete or masonry or dissimilar metals.

- 2.3.13 Install gaskets into 6 mm x 6 mm (1/4" x 1/4") deep groove in jambs and head of door frames, as shown. Apply with approved adhesive.
- 2.3.14 Where openings to receive hollow metal frames have already been built, supply reverse channel bucks, one for each 600 mm (2'-0") or fraction thereof. Reinforce bucks where frame is to be fire rated.
- 2.3.15 Fire rated frames in fire separations: Constructed to ULC approval and bearing ULC, ULI or Warnock Hersey Professional Services label, as acceptable to authorities having jurisdiction and as specified for doors. Locate label on inside of hinge jamb, midway between top hinge and head of door frame, so that it is concealed when door is closed.
 - .1 Frame System: Proprietary TRR framing system meeting the specified fire and resistive ratings and acceptable to fire rated glass systems installed under Section 08 80 00.

2.4 FABRICATION - HOLLOW METAL DOORS

- 2.4.1 Fabricate doors refer item 2.6 for door thickness and STC, flush face, seamless and to conform to details and schedules.
- 2.4.2 Provide honeycomb core construction for interior doors. except doors noted as high traffic doors are indicated. Laminate honeycomb core material to both inside faces of door, completely fill the inside hollow of the door with core material. Join door faces at vertical door edges by tack welding every 150mm (6"), filling, grinding and dressing smooth.
- 2.4.3 Provide insulated hollow steel construction for exterior doors. Edge seams, continuously welded, filled and sanded flush. Weld recessed end channel closures to close top and bottom of door. Weld vertical stiffeners to face sheets at a maximum of 150 mm (6") o.c. Fill voids with insulation.
- 2.4.4 Equip fire labelled exterior doors with factory installed flush steel top caps.
- 2.4.5 Top and bottom of doors shall be provided with inverted, recessed, nominal 1.60 mm steel end channels [nominal 2.74 mm steel end channels for acoustic doors], welded to each face sheet at 150mm on centre.
- 2.4.6 Mortise, reinforce, drill and tap doors to receive templated hardware and reinforce for surface mounted hardware. Check hardware list for details.
- 2.4.7 Provide both stiles of single doors bevelled 3 mm in 50 mm (1/8" in 2"). Fabricate doors with clearance of 3 mm (1/8") to the frame and 19 mm (3/4") to finished floor.
- 2.4.8 Provide flush top edge on exterior doors, with drip on exterior side.
- 2.4.9 Fill voids in stile and rail type doors, including stiles, transom head and bottom rail in glazed doors, with core material.
- 2.4.10 Where glass openings are indicated, provide integrally formed cutouts with steel framed glass mouldings. Aluminum mouldings will not be permitted.
- 2.4.11 Thermally broken doors shall be constructed in two sections, joined rigidly with thermal break material. Fabricate anchors for thermally broken frames to suit wall conditions; avoid cold transfer from exterior frame section to interior frame section.

2.4.12 Provide insulated sealed glazing kits to all exterior door with sidelight or glazed transom.

2.5 FABRICATION - FIRE RATED HOLLOW METAL DOORS

2.5.1 Construct fire rated doors to ULC requirements, bearing ULC, ULI, or Warnock-Hersey International Ltd., label, and acceptable to authorities having jurisdiction. Provide fire protection ratings indicated and time/ temperature rise label to requirements or authorities having jurisdiction.

2.5.2 Face sheets: Minimum nominal 1.60 mm base steel sheet thickness.

2.5.3 Stiffened and sound deadened with honeycomb core laminated under pressure to each face sheet.

2.5.4 Locate labels on the inside of door at hinge jamb midway between the top hinge and door head.

2.5.5 Construct and reinforce for hardware, fire-rated doors similar to standard units.

2.6 FABRICATION - ACOUSTICAL DOORS AND FRAMES

STC	Door Thickness	Weight Lbs/Sq.ft	Test report
STC 45	1.75"	7.9	RAL TL96-51
STC 50	1.75"	9.5	RAL TL96-42
STC 52	1.75"	15	NRC TLA - 19- 113
STC 55	2.75"	19.1	NRC A1- 007542-4
STC 56	2.75"	19.1	NRC A1- 007542-3

Complete with steel door frame and accessories listed in 2.1.18

2.7 INSULATED EXTERIOR STEEL DOOR FRAMES

2.7.1 Thermally broken frames shall be constructed in two sections, joined rigidly with thermal break material. Fabricate anchors for thermally broken frames to suit wall conditions; avoid cold transfer from exterior frame section to interior frame section.

2.7.2 Fabricate jambs, heads, sills centre rails and mullions from 1.6 mm (16 gauge) wipe coated galvanized steel, "Therma-Frame" by S.W. Fleming & Co. Ltd., "Maco-therm" by Macotta Company of Canada Limited, or other approved manufacture.

2.7.3 Separate interior and exterior frame sections by a polyvinyl chloride (PVC) thermal break. Do not connect sections to each other by screws welds, grommets or other fastening devices.

2.7.4 Design wall and floor anchors to suit wall conditions and not to permit thermal transfer from exterior to interior surfaces of frame sections.

2.8 HARDWARE PREPARATION

2.8.1 Prepare for template hardware in accordance with ANSI/DHI A115 Standards, unless noted otherwise herein. Locate hardware preparations vertically in accordance with CSDFMA Recommended Dimensional Standards, unless noted otherwise herein.

2.9 FINISHING

- 2.9.1 Doors and frames manufactured from zinc wipe coated steel or hot dipped galvanized: Factory-applied touch-up primer to areas where coating has been removed or abraded due to grinding or handling.
- 2.9.2 Doors and frames to exterior: Hot dipped galvanized.
- 2.9.3 Doors and frames to all other areas: Wipe coat galvanized.

PART 3 - EXECUTION

3.1 EXAMINATION

- 3.1.1 Examine substrates, door swing arcs, areas of installation and conditions affecting installation for compliance with requirements for manufacturers installation tolerances and other conditions affecting performance of work of this Section.
- 3.1.2 Verify roughing-in for embedded and built-in anchor locations before installing frames.
- 3.1.3 Verify door and frame size, door swing and ratings with door opening number before installing frames.
- 3.1.4 Installation of hollow metal doors and frames will denote acceptance of site conditions.

3.2 INSTALLATION

- 3.2.1 Supply doors and frames to Sections responsible for installation.

3.2.2 Door Frames:

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

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

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

3.2.4 Doors:

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

- .4 Install glazing materials and door silencers where required.
- .5 Install fire rated doors within clearances specified in NFPA 80.
- .6 Install louvers and vents.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.
- 1.1.2 All labour, materials, products, equipment and services to supply factory finished wood doors required and/or shown on the Drawings and specified herein.

1.2 REFERENCES

- 1.2.1 AWMAC Architectural Woodwork Manufacturers Association of Canada.
- 1.2.2 CAN/CSA O132.2-90(R1998) Wood Doors.
- 1.2.3 CAN3-O188.1-M78 Interior Mat-Formed Wood Particleboard.
- 1.2.4 CSA O115-M1982(R2001) Hardwood and Decorative Plywood.
- 1.2.5 ASTM E413-04 Classification for Rating Sound Insulation
- 1.2.6 ASTM E90-04 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
- 1.2.7 WDMA Series I.S.1-A-2013 Industry Standard for Interior Architectural Wood Flush Doors
- 1.2.8 CAN/CSA-O132.2 SERIES-90 Wood Flush Doors

1.3 QUALITY ASSURANCE

- 1.3.1 Conform to Quality Standards for Architectural Woodwork (QSAW) produced by the Architectural Woodwork Manufacturer's Association of Canada (AWMAC) for Architectural Grade Doors.
- 1.4 Doors shall be manufactured by a Canadian company having five years experience in the manufacture of the doors specified.
- 1.4.1 Prior to fabrication of work of this Section, submit a list of new projects in the vicinity of the place of building for which the manufacturer has supplied doors during the past two years. List shall show the name of the Consultant associated with the project.

1.5 SUBMITTALS

- 1.5.1 Submit three 210 mm x 300 mm (8-1/2" x 11") samples of each type and colour of door facing material.
- 1.5.2 Submit a cut away section sample of each type of door showing its construction.
- 1.5.3 Shop Drawings: Submit shop drawings showing types of cores and construction details, glazing and stops, openings required, material designation and door schedules.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- 1.6.1 Carefully wrap and crate units, and ensure complete protection of edges and finishes during shipment to the job site.
- 1.6.2 Store units inside the building in the order in which they will be required for installation, in such a way that no damage occurs and so that their identification of intended location is readily visible. Protect units from dust accumulation and moisture.
- 1.7 DELIVERY, STORAGE, HANDLING AND PROTECTION
 - 1.7.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location.
 - 1.7.2 Do not permit delivery of work to job site until building is sufficiently dry, wet trades are completed and the moisture readings of surfaces in proposed storage area is less than 18%.
 - 1.7.3 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Store doors flat on level surface. Protect materials with suitable non-staining waterproof coverings, but allow air circulation at sides.
 - 1.7.4 Label each door with manufacturers' name, product identification, door size and type.
- 1.8 WARRANTY
 - 1.8.1 Submit a 3 year warranty, commencing from date of Substantial Performance, against defects in the materials and workmanship of the work of this Section, including but not limited to warping, cupping, twisting, shrinkage, swelling, delamination and splitting.
 - 1.8.2 Warranty shall include the prompt remedy of defects upon written notification from the Consultant that defects exist. Remedy shall include labour, materials, products, equipment and services required to remove defective units and to supply and install new units including removal and replacement of hardware, fitting and hanging new unit and finishing to match original unit all at no cost to the Owner and at times convenient to the Owner.
 - 1.8.3 Warranty shall also include making good other building parts and finishes and other property of the Owner damaged or disturbed in the course of remedying defects. Warranty periods shall recommence on remedied work.

PART 2 - PRODUCTS

- 2.1 ACCEPTABLE MANUFACTURERS
 - 2.1.1 The following manufacturers are acceptable provided they comply with the requirements of this section:
 - .1 Lambton Doors
 - .2 Ambico
 - .3 Brenlo
 - .4 Weyerhaeuser Canada Ltd.
 - .5 Algoma Hardwoods Inc.
 - .6 Baillargeon
 - .7 Mowhawk Flush Doors
 - .8 VT Industries

2.2 MATERIALS

- 2.2.1 Conform to Quality Standards for Architectural Woodwork published by Architectural Woodwork Manufacturers Association of Canada (AWMAC) for Architectural Grade Doors, except where specified otherwise.
- 2.2.2 Unless otherwise specified herein, materials shall comply with requirements of CAN/CSA O132.2.
- 2.2.3 Wood for cores: White Pine, Western Red Cedar or other approved low density species, kiln dried to 5% to 8% moisture content.
- 2.2.4 Particle board for cores: CAN3-O188.1-M, extruded particle board having spruce particles in melamine based binder, minimum density of 480 kg/cu.m. (30 pcf).
- 2.2.5 Mineral Cores (for fire-rated doors): Comply with the requirements of the label issuing authority for the scheduled fire ratings, as acceptable to the authorities having jurisdiction.
- 2.2.6 Hardwood Face Veneer for Flush Wood Doors Scheduled to have Transparent/Stained Finish:
- .1 Minimum 1/8" thick AWMAC Architectural Quality Grade, selected "Red Oak - Rift Cut, Grade A face and No. 1 back", conforming to requirements of AWMAC Custom Grade and NHLA Select Grade.
 - .2 Hardwood face veneers shall be selected for architectural quality, uniformity of colour, figure, grain, character, all sheets slip matched in sequence, parallel clipped, jointed by tapeless splicer and edge glued.
 - .3 Face veneers shall also have a high standard of finished appearance, including being free of, but not limited to the following; mineral streaks, discolouration, grain ruptures, loose texture, shakes, open joints, face depressions, glue stains, patches, plastic wood repairs, and any other manufacturing defects or irregularities.
- 2.2.7 Crossbanding: 1/16" thick hardwood veneer, both faces of core.
- 2.2.8 Edge Bands: Laminated to core with adhesive:
- .1 Stiles: Laminated softwood and 5/8" thick hardwood edge, total width 4-1/2", at wood veneer faced doors provide hardwood edge matching wood veneer, at plastic laminate faced doors provide hardwood edge, between plastic laminate faces.
 - .2 Rails: 2-3/4" softwood.
- 2.2.9 Wood Stiles, Rails and Hardware Reinforcement: Low density hardwood species, kiln dried to 8% moisture content.
- 2.2.10 Stiles and Rails: Hardwood. Stile thickness minimum 1-1/2" and rail thickness minimum 1-1/8".
- 2.2.11 Adhesive: Conforms to CAN/CSA-0132.2 Series, Type II.
- 2.2.12 Vision panel stops: Machined to approved profile and smoothed, approximately 10 mm x 20 mm (1/2" x 3/4"), with all edges eased. Install with face flush with finished door surface. Stain finish to match face veneer.

2.2.13 ACCESSORIES FOR STC 45 - 56 DOOR:

.1 Hinges: McKinney **Cam Lift MKCL2500** (5" x 4 1/2", No of Holes 8, Lift (180° Opening: 5/16", Door Rating (1 1/2 Pairs): up to 900 lbs, Thickness: 0.25), Minimum 4 Hinges per door or other approved manufacturers.

.2 Electrified Door Hardware: **Securitron CEPT Concealed Electrical Power Transfer** or other approved manufacturers.

.3 Surface Overhead Stop: **Norton Rixson surface overhead stop 9-X36** or other approved manufacturers.

.4 Gasket: **312_R Perimeter Gasket** with sponge neoprene insert, 25.5mm wide x 6.4mm high, length to match door size, 1 no. at each top and side jambs as shown in drawings, by Pemko or other approved manufacturers.

.5 Seal: **S88BL Silicone seal**, 12.7mm wide x 6.4mm high, length to match door size, 2 no. at top and 2 sides, and between double doors, as shown in drawings, by Pemko or other approved manufacturers.

.6 Drop Seal: **434 ARL Drop Seal** with sponge neoprene insert, 21.4mm wide x 34.13mm high, length to match door size, 1 no. at bottom of each door leaf, as shown in drawings, by Pemko or other approved manufacturers.

.7 Threshold: **2005AT Threshold**, 127.0mm wide x 12.7mm high, length to match door size, 1 no. at bottom of door, as shown in drawings, by Pemko or other approved manufacturers.

.8 Flat Wood Astragal: 13mm wide x 33mm long, height to match door size, as shown in drawings, by Pemko or other approved manufacturers.

.9 Door Lite Kit: All STC door lite kit to be supplier responsibility and must compatible and meet ASTM tested door assembly. The finish of the lite kit to match with door finish colour.

Note: It is the door supplier responsibility to ensure supply & install appropriate STC door accessories that are fully compatible with their STC & fire rated tested door assembly and door weight requirements.

2.3 FABRICATION - GENERAL

2.3.1 Door sizes shown on the Door Schedule are nominal sizes. Actual sizes shall fit openings.

2.3.2 Unless otherwise or more specifically required herein, door construction and tolerances shall comply with requirements of CAN/CSA O132.2, for flush doors.

2.3.3 Completely seal wood top, bottom and edges and edges of cut-outs, before units are shipped from the manufacturer's mill or are placed in the open air or unheated storage areas at the mill which would allow change in the specified moisture content of the wood. Apply sealer in accordance with the manufacturer's printed instructions without dilution or alteration of any kind. Give particular attention to finish. Obtain approval of Consultant of the finishes before proceeding with sealing. Should this procedure not be followed replace all doors which have been improperly sealed.

- 2.3.4 Provide blocking for closers, panic hardware, locksets and other door hardware as required.
- 2.3.5 Bevel edges of single acting doors 3 mm (1/8") on lock side and 1.5 mm (1/16") on hinge side.
- 2.3.6 Undercut doors for carpet in the plant.

2.4 FABRICATION - SOLID CORE DOORS

2.4.1 Flush wood doors: solid core to AWMAC Standard.

- .1 Solid Wood Core: glued block core with wood edge band and as follows:
 - 1. Construction: 7-ply.
 - 2. Use: interior.
- .2 Door Thickness: See below chart.

2.5 FABRICATION - ACOUSTICAL DOORS AND FRAMES

STC	Door Thickness	Weight Lbs/Sq.ft	Test report
STC 45	1.75"	5.5	WEAL TL10- 658
STC 50	1.75"	10.3	RAL TL99-55
STC 52	2.25	12.7	WEAL TL06- 151
STC 55	2.75"	19.1	NRC TLA-18- 132
STC 56	3.125"	23.3	NRC TLA-18- 130

Complete with steel door frame and accessories listed in 2.2.13

2.6 FABRICATION - DOORS FOR NATURAL OR STAIN FINISH

- 2.6.1 Fabricate doors for natural or stain finish with solid cores.
- 2.6.2 Provide solid wood cross banding at right angles to door face, minimum 2.5 mm (1/10") thick.
- 2.6.3 Face veneer: complying with CAN/CSA O132.2, refer to part 2.2.8. of this Section.

2.7 FINISHES

2.7.1 Coloured stain finish, coordinate with section 06 20 00:

- .1 Sand
- .2 1 coat coloured stain to match sample provided by the Consultant.
- .3 1 coat sealer allow to dry
- .4 Sand
- .5 1 coat gloss varnish allowed to dry
- .6 Sand
- .7 1 coat satin varnish.

PART 3 - EXECUTION

3.1 EXAMINATION

- 3.1.1 Verify that frames are in accordance with indicated requirements for type, size, location, and swing characteristics and are installed with level heads and plumb jambs.

3.1.2 Exam all doors thoroughly before installation or finishing; reject any defective doors and obtain replacements from manufacturer at no additional cost to the Owner or Project.

3.1.3 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

3.2.1 Deliver doors to site for installation under Section 06 20 00.

3.2.2 Trim doors as required for proper fit and function; refinish all cut or planed surfaces immediately to match finish.

3.2.3 Set and secure frame and trim components in place, plumb and level.

3.2.4 Place jamb lumber to floor surface. Install components with fasteners set below frame or trim surface.

3.2.5 Do not impair structural strength of door by the application of hardware, cutting and altering the door for lights, louvres or other special details.

3.2.6 Install mineral core fire doors in accordance with NFPA 80; install metal fire rating label to door, do not cover over with subsequent finishes; do not trim fire rated doors any greater than 1/8" in width from lock side only and 3/4" from bottom of door.

3.2.7 Install stops and louvers ready to receive finish.

3.2.8 Glaze doors at site with glass of type and thickness indicated, in accordance with Section 08 81 00 using elastomeric glazing sealant as specified in Section 07 92 00; secure glass in place with removable wood stops.

3.3 ERECTION TOLERANCES

3.3.1 Squareness: Maximum 0.8mm (1/32") measured across opening between hinge jamb and strike jamb.

3.3.2 Plumbness: Maximum 0.8mm (1/32") measured from bottom of frame to head level.

3.3.3 Alignment: Maximum 0.8mm (1/32") measured offset between face of hinge jamb and strike jamb relative to wall construction.

3.3.4 Twist: Maximum 0.8mm (1/32") measured from leading edge of outside frame rabbet to leading edge of inside frame rabbet.

3.4 CLOSEOUT ACTIVITIES

3.4.1 Deficient Work: Replace, rework or refinish work that does not meet AWS requirements as directed by Consultant.

3.4.2 Adjusting and Cleaning: Readjust doors and hardware just prior to completion of building to function freely and properly and as follows:

- .1 Re-hang or replace doors that do not swing or operate freely.

- .2 Replace doors that are damaged or that do not comply with requirements of this Section; doors may be repaired or refinished where work complies with requirements and shows no evidence of repair or refinishing in completed work.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

1.1.1 This Section includes requirements for supply and installation of the following:

- .1 Non-rated wall access doors and frames
- .2 Fire rated wall access doors and frames
- .3 Non-rated Ceiling access doors and frames
- .4 Fire rated ceiling access doors and frames

1.2 RELATED WORK UNDER OTHER SECTION

- 1.2.1 Section 06 10 00 Rough Carpentry.
- 1.2.2 Section 07 90 00 Caulking and Sealants.
- 1.2.3 Section 08 71 00 Finishing Hardware.
- 1.2.4 Division 21 – Plumbing: Shut-off and control valves for heating and plumbing systems; clean-outs for drainage systems.
- 1.2.5 Division 21– Heating, Ventilating and Air Conditioning: Duct accessories for heating and air-conditioning duct access doors.
- 1.2.6 Division 26 – Electrical: Transformers and access doors for points and other electrical accessories.

1.3 REFERENCES

- 1.3.1 ASTM A568/A568M-17a Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
- 1.3.2 ASTM A653/A653M-19 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- 1.3.3 ASTM A780/A790M-20 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- 1.3.4 ASTM A1008/A1008M-15 Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Harden-able.
- 1.3.5 ASTM B221/B221M-12a Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
- 1.3.6 NFPA 80-2022 Standard for Fire Doors and Fire Windows.
- 1.3.7 ISO 14021:1999 Environmental labels and declarations -- Self-declared environmental claims (Type II environmental labelling)
- 1.3.8 CAN4/ULC-S104-1980-15 Fire Tests of Door Assemblies.

1.4 ADMINISTRATION REQUIREMENTS

1.4.1 Preconstruction Meeting: Arrange a pre-construction meeting in accordance with Section 01 31 19 – Project Meetings, and as follows:

- .1 Attendance will be required by the Contractor, major Mechanical and Electrical Subcontractors, and other subcontractors affected by work of this Section; purpose of meeting will be to discuss placement and type of access doors and panels and obtain Consultant's acceptance of locations before completing any permanent work of this Project.

1.4.2 Coordination: Determine specific locations and sizes for access doors needed to gain access to concealed equipment, and indicate on schedule:

- .1 Coordinate locations of all access panels in gypsum board ceilings with Consultant for size and location prior to installation, making every effort to locate outside of gypsum board ceilings.
- .2 Coordinate acceptable locations and sizes with Architectural Reflected Ceiling Plans; no access panels are allowed in public corridors or feature ceilings.
- .3 Coordinate closely with mechanical and electrical sections for size and locations of access panels in walls and ceilings; provide access doors and panels required for project.

1.5 SUBMITTALS

1.5.1 Provide required information in accordance with Section 01 33 00 – Submittal Procedures.

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

- .1 Product Data: Provide product data for each type of door and frame indicated, including construction details relative to materials, individual components and profiles, finishes, and fire ratings (if required) for access doors and frames
- .2 Shop Drawings: Provide coordination drawings and reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items with concealed framing, suspension systems, piping, ductwork, and other construction. Show the following:
 - Method of attaching door frames to surrounding construction.
 - Ceiling mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim.
- .3 Samples: Provide complete door and frame schedule, including types, general locations,

1.6 QUALITY ASSURANCE

1.6.1 Regulatory Requirements: Provide fire rated access doors and frames in accordance with NFPA 80 or ULC S104, and labelled and listed by UL, ULC or ITS/Warnock Hersey, or another testing and inspecting agency acceptable to Authority Having Jurisdiction and Section 07 05 53.

PART 2 - PRODUCTS

2.1 NON-RATED ARCHITECTURAL ACCESS PANELS

2.1.1 Flush doors and trimless frames, fabricated as follows:

- .1 Aluminum Extrusions : ASTM B221, Alloy 6063-T6.
- .2 Door: Extruded aluminum frame with gypsum board inlay and structural nylon corner elements:
 - Gypsum Board: to ASTM C36, 13 mm and 16 mm thickness to match adjacent construction.

- Size: Square sized to suit access requirements if not indicated on Drawings.

- 2.1.2 Latch: Tamper-resistant torx drive.
- 2.1.3 Hinge: Concealed, two point pin hinge, non-corroding, allowing door to open 120° and allowing door to be removed.
- 2.1.4 Edge Bead: Recessed extruded aluminum frame edge bead providing surface that can be finished to adjacent gypsum board.
- 2.1.5 Accessories: Fibreglass reinforced nylon, zinc plated screws, stainless steel springs and retaining wire to manufacturer's standard.
- 2.1.6 Finish: Aluminum frames, gypsum board, nylon and aluminum cam latch to receive the same finish and paint as the surrounding surface.
- 2.1.7 Basis-of-Design Materials:

- .1 Access Panel Solutions, BaucoPlus-II Architectural Access Panel.

2.2 FIRE RATED ACCESS PANELS IN GYPSUM BOARD

- 2.2.1 Flush, fire rated access doors and trimless frames, fabricated from zinc coated steel sheet, and as follows:

- .1 Cold-Rolled Steel Sheets: ASTM A1008/A1008M, Commercial Steel (CS), or ASTM A1008/A1008M, Drawing Steel (DS), Type B; stretcher-levelled standard of flatness; with minimum thickness indicated representing specified nominal thickness according to ASTM A568/A568M.
 - .2 Galvanizing: Electrolytic zinc-coated steel sheet, complying with ASTM A591/A591M, Class C coating or ASTM A653/A653M Z180 (G60) mill phosphatized zinc coating, at fabricator's option.
 - .3 Door: Flush panel, minimum thickness of 0.95 mm.
 - .4 Latch: Self-latching bolt operated by tamper-resistant torx drive with interior release.
 - .5 Hinge: Concealed, two point pin hinge, non-corroding, allowing door to open 120° and allowing door to be removed.
 - .6 Automatic Closer: Spring type.

- 2.2.2 Edge Beads: Edge trim formed from 0.80 mm nominal thickness zinc coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.

- 2.2.3 Door Frame: Minimum 1.6 mm thick sheet metal with gypsum board bead.

- .1 Acceptable Materials: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- Acudor Products, Inc., FB-5050-DW
 - Nystrom Building Products Co., UW Series

2.3 FIRE RATED ACCESS PANELS IN MASONRY OR CONCRETE

- 2.3.1 Flush, fire rated access doors and trimless frames, fabricated from zinc coated steel sheet, and as follows:

- .1 Cold-Rolled Steel Sheets: ASTM A1008/A1008M, Commercial Steel (CS), or ASTM

- A1008/A1008M, Drawing Steel (DS), Type B; stretcher-levelled standard of flatness; with minimum thickness indicated representing specified nominal thickness according to ASTM A568/A568M.
- .2 Galvanizing: Electrolytic zinc-coated steel sheet, complying with ASTM A591/A591M, Class C coating or ASTM A653/A653M Z180 (G60) mill phosphatized zinc coating, at fabricator's option.
 - .3 Door: Flush panel, minimum thickness of 0.95 mm.
 - .4 Latch: Self-latching bolt operated by tamper-resistant torx drive with interior release.
 - .5 Hinge: Concealed, two point pin hinge, non-corroding, allowing door to open 120° and allowing door to be removed.
 - .6 Automatic Closer: Spring type.
 - .7 Edge Trim: All purpose exposed flange formed from 1.98 mm nominal thickness zinc coated steel sheet.
 - .8 Door Frame: Minimum 1.6 mm thick sheet metal with gypsum board bead.
 - .9 Acceptable Materials:
 - Acudor Products, Inc., FB-5050
 - Nystrom Building Products Co., UT Series
 - Milcor Limited., UNIFRAD Universal Fire Rated Access Door

2.4 FABRICATION

- 2.4.1 Provide access door assemblies manufactured as integral units ready for installation.
- 2.4.2 Provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness for metal surfaces exposed to view in the completed Work.
- 2.4.3 Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
- 2.4.4 Latching Mechanisms: Supply number required to hold doors in flush, smooth plane when closed based on size of door or panel opening.
- 2.4.5 Apply manufacturer's standard protective coating on aluminum that will come in contact with concrete after fabrication.

2.5 FINISHES

- 2.5.1 Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- 2.5.2 Finish metal fabrications after assembly.
- 2.5.3 Aluminum Finishes:
 - .1 Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 - .2 As-Fabricated Finish: AA-M10 Mechanical Finish: as fabricated, unspecified (mill finish).
- 2.5.4 Steel Finishes:
 - .1 Surface Preparation: Clean surfaces with non-petroleum solvent so surfaces are free of oil and other contaminants. For galvanized surfaces, apply, after cleaning a conversion coating suited to the organic coating to be applied over it. For zinc coated surfaces, clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A780.

- .2 Factory Priming for Site Painted Finish: Apply shop primer immediately after cleaning and pre-treating, as follows:
- Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate free, universal modified alkyd primer selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems and capability to provide a sound foundation for site-applied topcoats despite prolonged exposure.
 - Shop Primer for Zinc Coated Steel: Organic zinc-rich primer complying with SSPC-Paint 20 and compatible with topcoat.
 - Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

PART 3 - EXECUTION

3.1 PREPARATION

- 3.1.1 Advise installers of other work about specific requirements relating to access door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices.

3.2 INSTALLATION

- 3.2.1 Installation shall be completed by Section 09 21 16.
- 3.2.2 Comply with manufacturer's written instructions for installing access doors and frames.
- 3.2.3 Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
- 3.2.4 Install access doors with trim-less frames flush with adjacent finish surfaces or recessed to receive finish material.
- 3.2.5 Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

3.3 ADJUSTING

- 3.3.1 Adjust doors and hardware after installation for proper operation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

1. This Section includes commercial door hardware for the following:
 1. Swinging doors.
 2. Other doors to the extent indicated.
2. Door hardware includes, but is not necessarily limited to, the following:
 1. Mechanical door hardware.
 2. Electromechanical door hardware.
 3. Automatic operators.
 4. Cylinders specified for doors in other sections.
3. Related Sections:
 1. Division 01 Section "General Conditions".
 2. Division 01 Section "Cash Allowances".
 3. Division 01 Section "Product Allowances".
 4. Division 01 Section "Closeout Procedures".
 5. Division 06 Section "Rough Carpentry".
 6. Division 06 Section "Finish Carpentry".
 7. Division 08 Section "Operations and Maintenance".
 8. Division 08 Section "Door Hardware Schedule".
 9. Division 08 Section "Hollow Metal Doors and Frames".
 10. Division 08 Section "Metal Sound Control Hollow Door Assemblies".
 11. Division 08 Section "Wood Sound Control Door Assemblies".
 12. Division 08 Section "Automatic Door Operators".
 13. Division 26 Section "Electrical".
 14. Division 28 Section "Intercom Entry Systems".
4. Codes and References: Comply with the version adopted by the Authority Having Jurisdiction.
 1. OBC – Ontario Building Code
 2. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 3. ICC/IBC - International Building Code.
 4. NFPA 70 - National Electrical Code.
 5. NFPA 80 - Fire Doors and Windows.
 6. NFPA 101 - Life Safety Code.

7. NFPA 105 - Installation of Smoke Door Assemblies.
 8. UL/ULC and CSA C22.2 - Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
 9. Local Building Codes, Local Amendments.
5. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
1. ANSI/BHMA Certified Product Standards - A156 Series.
 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
 3. ANSI/UL 294 - Access Control System Units.
 4. UL 305 - Panic Hardware.

1.3 SUBMITTALS

1. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
2. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 1. Type, style, function, size, label, hand, and finish of each door hardware item.
 2. Manufacturer of each item.
 3. Fastenings and other pertinent information.
 4. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 5. Explanation of abbreviations, symbols, and codes contained in schedule.
 6. Mounting locations for door hardware.
 7. Door and frame sizes and materials.
 8. Warranty information for each product.
 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected

by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

3. Shop Drawings: Details of electrified access control hardware indicating the following:
 1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
 1. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
 2. Complete (risers, point-to-point) access control system block wiring diagrams.
 3. Wiring instructions for each electronic component scheduled herein.
 2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
4. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
5. Informational Submittals:
 1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.4 CLOSEOUT SUBMITTALS

1. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.
2. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.5 QUALITY ASSURANCE

1. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

2. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
3. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
4. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
5. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
6. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.
7. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
 1. Function of building, purpose of each area and degree of security required.
 2. Plans for existing and future key system expansion.
 3. Requirements for key control storage and software.
 4. Installation of permanent keys, cylinder cores and software.
 5. Address and requirements for delivery of keys.
8. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation

- manuals, hardware schedules, templates and physical product samples as required.
 - 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 - 3. Review sequence of operation narratives for each unique access controlled opening.
 - 4. Review and finalize construction schedule and verify availability of materials.
 - 5. Review the required inspecting, testing, commissioning, and demonstration procedures
9. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.6 DELIVERY, STORAGE AND HANDLING

- 1. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- 2. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- 3. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.7 COORDINATION

- 1. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- 2. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- 3. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.8 WARRANTY

1. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
2. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 1. Structural failures including excessive deflection, cracking, or breakage.
 2. Faulty operation of the hardware.
 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 4. Electrical component defects and failures within the systems operation.
3. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

1. Hardware shall not have any visible manufacturer names on exposed materials, except cylinders, when the door is in a closed position.

2.2 BUTT HINGES

1. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
 1. Quantity: Provide the following hinge quantity:
 1. Two Hinges: For doors with heights up to 60 inches.
 2. Three Hinges: For doors with heights 61 to 90 inches.
 3. Four Hinges: For doors with heights 91 to 120 inches.
 4. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 1. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 2. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 1. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 2. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
4. Hinge Options: Comply with the following:
 1. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.
5. Manufacturers:
 1. McKinney (MK) - TA/T4A Series, 5-knuckle.

2.3 POWER TRANSFER DEVICES

1. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets with a 1-year warranty. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
 1. Manufacturers:
 1. McKinney (MK) - QC (# wires) Option.
 2. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
 1. Manufacturers:
 1. Securitron (SU) - EL-EPT Series.
 3. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-

door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:

1. McKinney (MK) - Electrical Connecting Kit: QC-R001.
2. McKinney (MK) - Connector Hand Tool: QC-R003.

2. Manufacturers:

1. McKinney (MK) - QC-C Series.

2.4 DOOR OPERATING TRIM

1. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:

1. Rockwood (RO).

2. Coordinators: ANSI/BHMA A156.3 door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.

1. Manufacturers:

1. Rockwood (RO).

3. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.

4. Pulls shall be provided with a 10" clearance from the finished floor on the push side to accommodate wheelchair accessibility.
5. Leather: Where specified English bridle and Italian Upholstery shall be 10 ounce with hand sewn saddle stiches and hand sewn end line stiches.
6. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
7. Manufacturers:
 1. Rockwood (RO).

2.5 CYLINDERS AND KEYING

1. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
 1. Manufacturers:
 1. Match Existing, Field Verify.
2. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
 1. Threaded mortise cylinders with rings and cams to suit hardware application.
 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 3. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 4. Keyway: Manufacturer's Standard.
3. Keying System: Each type of lock and cylinders to be factory keyed.
 1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 3. Existing System: Field verify and key cylinders per Owner's requirements.
4. Key Quantity: Provide the following minimum number of keys:
 1. Change Keys per Cylinder: Two (2)
 2. Master Keys (per Master Key Level/Group): Five (5).
 3. Construction Keys (where required): Ten (10).
5. Construction Keying: Provide construction master keyed cylinders.
6. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.
3. Furnish a list of opening numbers with locking devices, showing cylinder types and quantities required when cylinders or cores are to be owner furnished.

2.6 MORTISE LOCKS AND LATCHING DEVICES

1. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Electromechanical locksets shall have the following functions and features:

1. Universal Molex plug-in connectors that have standardized color-coded wiring and are available in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
2. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
3. Motorized electric latch retraction where the latchbolt retracts in 0.5 seconds of power being applied; removing power allows the latch to project back to the extended position. Motorized latch retraction force exceeds ANSI/BHMA 50 lbs. warped door test.
4. Options to be available for request-to-exit or enter signaling, latchbolt and deadbolt monitoring.
5. Optional high security monitoring with internal end-of-line monitoring alongside deadbolt privacy and integrated door position monitoring.
6. Two-year limited warranty on electrified functions.

2. Manufacturers:

1. Corbin Russwin Hardware (RU) - ML2000 Series.
2. Sargent Manufacturing (SA) - 8200 Series.
3. Schlage (SC) – L9000 Series.

2.7 LOCK AND LATCH STRIKES

1. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
 4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

2. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.8 ELECTROMAGNETIC LOCKING DEVICES

1. Surface Electromagnetic Locks (Heavy Duty): Electromagnetic locks to be surface mounted type conforming to ANSI A156.23, Grade 2 with minimum holding force strength of 1,200 pounds. Locks to be capable of either 12 or 24 voltage and be UL listed for use on fire rated door assemblies. Electronics are to be fully sealed against tampering and allow exterior weatherproof applications. As indicated in Hardware Sets, provide specified mounting brackets and housings. Power supply to be by the same manufacturer as the lock with combined products having a lifetime replacement warranty. Provide monitoring as scheduled in the hardware sets.

1. Manufacturers:

1. Securitron (SU) - M62 Series.

2.9 CONVENTIONAL EXIT DEVICES

1. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
 1. Exit devices shall have a five-year warranty.
 2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
 3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
 4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
 5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
 6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
 1. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
 2. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
 8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
 9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
2. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.
 1. Electromechanical exit devices shall have the following functions and features:
 1. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
 2. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
 3. Options to be available for request-to-exit or enter signaling, latchbolt and touchbar monitoring.
 4. Field configurable electrified trim to fail-safe or fail-secure that operates from 12-24VDC.
 5. Five-year limited warranty for electromechanical features.
 2. Manufacturers:
 1. Sargent Manufacturing (SA) - 80 Series.
 2. Von Duprin (VD) – 98 Series

2.10 SURFACE DOOR CLOSERS

1. All door closers specified herein shall meet or exceed the following criteria:
 1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
 2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.

4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
 6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
2. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
1. Heavy duty surface mounted door closers shall have a 30-year warranty.
 2. Manufacturers:
 1. Norton Rixson (NO) - 7500 Series.
 2. Sargent Manufacturing (SA) - 351 Series.

2.11 ELECTROMECHANICAL DOOR OPERATORS

1. Electromechanical Door Operators (High Traffic): Provide ANSI/BHMA A156.19 Certified Products Directory (CPD) listed low energy operators that are UL325/991 and UL10C certified and comply with requirements for the Americans with Disabilities Act (ADA). Operators shall accommodate openings up to 250 pounds and 48" wide. Provide accessories such as custom templates, special mounting brackets, spacers and drop plates as needed for proper installation. Operators shall accommodate openings up to 200 pounds and 48" wide. Listed manufacturers shall meet all functions and features as specified herein.
 1. Provide operators with features as follows:
 1. Non-handed with push and pull side mounting.
 2. Activation by push button, hands-free or radio frequency devices.
 3. Adjustable opening force and closing power.
 4. Two-year limited warranty.
 5. Wi-Fi interface where the operator is a secure, password protected WiFi hot spot with no connection to building's IT required.
 - 1) Simple setup with no app required.
 - 2) View status and make adjustments without removing the cover.
 - 3) Built-in logic to support single use restroom applications with no external relay boards, logic modules, position switches required.
 6. Mounting backplate to simplify and speed up installation.
 7. Integration with access control systems.

2. Operators shall have the following functionality:
 1. Adjustable Hold Open: Amount of time a door will stay in the full open position after an activation.
 2. Blow Open for Smoke Ventilation: Door opens when signal is received from alarm system allowing air or smoke to flow through opening. Door will stay open until signal from alarm system is stopped.
 3. Emergency Interface Relay: Door closes and ignores any activation input until signal is discontinued.
 4. Infinite Hold Open: Door will hold open at set position until power is turned off.
 5. Latch Assist: At closed position, after an activation, the door is pulled in. After the door has closed, the door is pulled in to assist with latch release/engagement.
 6. Obstruction Detection: Door closes if it hits an obstruction while opening; door will reverse to open position if it hits an obstruction while closing. Door will stop once it hits an obstruction and will rest against the obstruction until removed.
 7. Open Delay: Delays operator opening for locking hardware.
 8. Outside Wall Switch Disable: When contact is closed, outside wall switch is disabled.
 9. Power Assist: Senses the door is being opened manually and applies small amount of power to assist the user in opening the door with force less than 5 lbs. The door opens only as far as it is moved manually, then closes once released.
 10. Power Close: Additional force to assist door closing between 7° and 2°.
 11. Presence Detector Input: Input for external sensor to detect presence at door open or close position only.
 12. Push & Go: As the door is manually opened, the operator "senses" movement and opens door to the full-open position.
 13. Selector Mode Switch: Off disables the signal inputs unless Blow Open is activated, on activates the signal inputs, hold open activates the unit (unless Blow Closed is activated) to the hold open position.
 14. Vestibule Delay: When the wall switch is pressed, first door in vestibule will open. Second door will open once vestibule door delay has expired. Delay is adjustable.
 15. Executive Mode Feature: When the door receives an activation signal it opens and remains open until either a second signal is received, or the door is manually moved in closing direction.
3. Manufacturers:
 1. ASSA ABLOY Entrance Systems (BE) - SW200 Series.
 2. Record

2.12 ARCHITECTURAL TRIM AND ACCESSORIES

1. Door, Frame and Wall Protective Trim: ANSI/BHMA A156.6, protective products as specified in the hardware sets. Door protection plates shall be not more than 2" less

than door width on stop side and 1" less door width on the pull side or on stop side of pairs of doors. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide protective trim with functions and features as follows:
 1. Meets ADA requirements for smooth bottom door surfaces.
 2. UL Classified options for use on fire-rated doors up to 3 hours.
 3. Fabricated from stainless steel, brass, bronze, aluminum, or high-impact plastic.
 4. Available in a variety of sizes, finishes, and profiles to suit aesthetic and functional requirements.
 5. Designed to protect doors, frames, and adjacent walls from damage due to impact, abrasion, or traffic.
 6. Fasteners included; adhesive-backed options available for select models.
 7. Ten-year limited warranty.
2. Manufacturers:
 1. Rockwood (RO).

2.13 DOOR STOPS AND HOLDERS

1. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 1. Manufacturers:
 1. Rockwood (RO).
 2. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
 1. Manufacturers:
 1. Norton Rixson (NO).
 2. Rockwood (RO).
 3. Sargent Manufacturing (SA).

2.14 ARCHITECTURAL SEALS

1. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on

exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

2. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
3. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.
4. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
5. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
6. Manufacturers:
 1. Pemko (PE).

2.15 ELECTRONIC ACCESSORIES

1. Touchless Switches: FCC certified microwave sensing switch used for REX or activation of various access control devices in place of a traditional wired switch. Unit to have an adjustable sensing zone from 4" to 24". At exterior locations furnish foam gaskets and weather covers. Provide single gang or double gang unit as specified in the hardware sets.
 1. Manufacturers:
 1. Alarm Controls (AK) - NTS Series.
 2. Norton Rixson (NO) - 700 Series.
 3. Securitron (SU) - WSS Series.
2. Switching Power Supplies: Provide the least number of power supplies at the appropriate amperage level sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
 1. Power supplies shall meet all functions and features as specified herein.
 1. UL listed dual voltage 12 or 24 VDC field selectable continuous output.

2. Tolerates brownout or overvoltage input $\pm 15\%$ of nominal voltage.
3. Thermal shutdown protection with auto restart.
4. Circuit breaker protection against overcurrent and reverse battery faults.
5. Integrated battery charging circuit to prevent overvoltage on locking devices.
6. Available with a single relay fire trigger or individually triggered relayed outputs.
7. Monitoring options as specified.

2. Manufacturers:

1. Securitron (SU) - AQD Series.

2.16 FABRICATION

1. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.17 FINISHES

1. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
2. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
3. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

1. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
2. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

1. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

2. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

1. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
2. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
3. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
4. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
5. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
6. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

1. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.
2. Fire Door Assembly Inspection: Reference Division 01 Sections "Closeout Procedures". Conduct an initial fire door assembly inspection, including documentation reporting, upon completion of door hardware installation according to NFPA 80 Standard for Fire Doors and Other Opening Protectives, paragraph 5.2.4, requirements.

3.5 ADJUSTING

1. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

1. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
2. Clean adjacent surfaces soiled by door hardware installation.
3. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

1. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

1. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
 1. Quantities listed are for each pair of doors, or for each single door.
 2. The supplier is responsible for handing and sizing all products.
 3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.
2. Manufacturer's Abbreviations:
 1. MK - McKinney
 2. OT - Other
 3. SU - Securitron
 4. RO - Rockwood
 5. SA - SARGENT
 6. NO - Norton Rixson
 7. BM - Besam
 8. PE - Pemko

Hardware Schedule

Set: 1.0

Doors: D-G-01b, D-G-20a

Description: Pair x Fail Secure x CPS x Seals

5	Hinge, Full Mortise, Hvy Wt	T4A3386 114 x 114 (NRP AT OUTSWING SECURE DOORS)	US32D	MK
1	Hinge, Full Mortise, Hvy Wt	T4A3386 QC12 114 X 114	US32D	MK
1	Flush Bolt (auto)	2842	US32D	RO
1	Dust Proof Strike	570	US26D	RO
1	Fail Secure Lock	LC RX 8271-XXV LNL	US32D	SA
1	Cylinder	ASSA CYLINDER & CONSTRUCTION CORE TO MATCH EXISTING x CAM/TAILPIECE TO SUIT		OT
1	Permanent Core	BY OWNER		OT
1	Coordinator	1700	US28	RO
2	Surface Closer	CPS7500 DROP PLATE TO SUIT	689	NO
2	Kick Plate	K1050 200 x WIDTH CSK	US32D	RO
1	Astragal	S772BL HEIGHT		PE
1	Gasketing	S773BL 1WIDTH x 2HEIGHT		PE
2	Sweep	18100CNB WIDTH		PE
1	ElectroLynx Harness (in frame)	QC-CXXXXP LENGTH		MK
1	ElectroLynx Harness (in door)	QC-CXXX LENGTH		MK

2	Door Contact	3287	SA
1	Card Reader	BY SECURITY CONTRACTOR	OT
1	Power Supply	AQD1	SU

Operational Narrative:

1. Door normally closed and secure.
2. Authorized access by card reader unlocking lever trim for a predetermined time limit. Trim can remain unlocked for open access.
3. Egress free for immediate exit.
4. Mortise lock REX switch allows authorized exit without alarm condition.
5. Lever remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 2.0

Doors: D-3-26

Description: Single x ED Passage ELR Mag x DO x Seals

2	Hinge, Full Mortise, Hvy Wt	T4A3386 127 x 114 (NRP AT OUTSWING SECURE DOORS)	US32D	MK
1	Hinge, Full Mortise, Hvy Wt	T4A3386 QC12 127 x 114	US32D	MK
1	Magnetic Lock	M62BD		SU
1	Rim Exit Device, Passage	(12) 56 8815 ETL	US32D	SA
1	Door Operator	SW200i		BM
1	Kick Plate	K1050 200 x WIDTH CSK	US32D	RO
1	Gasketing	S773BL 1WIDTH x 2HEIGHT		PE
1	Sweep	18100CNB WIDTH		PE
1	ElectroLynx Harness (in frame)	QC-CXXXXP LENGTH		MK
1	ElectroLynx Harness (in door)	QC-CXXX LENGTH		MK
2	Actuator (wave)	CM331-42R-SGLR		OT
1	Advanced Logic Relay	CX-33		OT
1	Door Contact	3287		SA
2	Card Reader	BY SECURITY CONTRACTOR		OT
1	Power Supply	AQD1		SU

DIVISION 26 TO PROVIDE 120VAC POWER TO FRAME HEADER, FINAL CONNECTION TO AUTO DOOR OPERATOR, ALL BACK BOXES, AND CONDUIT WITH LOW-VOLTAGE WIRING.

Note - Maglock tied to fire alarm. Provide pull station close to the opening by life safety/electrical.

Operational Narrative:

1. Doors normally closed and secure.
2. Authorized access and egress by card reader unlocking maglock for predetermined time limit.
3. ADA access by actuator switch. In locked condition, actuator energized only upon valid card reader presentation.
4. Door contact monitors door open/close status.
5. Upon loss of power fail safe function. Free entry and exit.

Set: 3.0

Doors: D-3-29

Description: Single x ED Passage ELR x DO x Seals

2	Hinge, Full Mortise, Hvy Wt	T4A3386 127 x 114 (NRP AT OUTSWING SECURE DOORS)	US32D	MK
1	Hinge, Full Mortise, Hvy Wt	T4A3386 QC12 127 x 114	US32D	MK
1	Rim Exit Device, Passage	(12) 56 8815 ETL	US32D	SA
1	Door Operator	SW200i		BM

1	Kick Plate	K1050 200 x WIDTH CSK	US32D	RO
1	Gasketing	S773BL 1WIDTH x 2HEIGHT		PE
1	Sweep	18100CNB WIDTH		PE
1	ElectroLynx Harness (in frame)	QC-CXXXXP LENGTH		MK
1	ElectroLynx Harness (in door)	QC-CXXX LENGTH		MK
2	Actuator (wave)	CM331-42R-SGLR		OT
1	Advanced Logic Relay	CX-33		OT
1	Power Supply	AQD1		SU

DIVISION 26 TO PROVIDE 120VAC POWER TO FRAME HEADER, FINAL CONNECTION TO AUTO DOOR OPERATOR, ALL BACK BOXES, AND CONDUIT WITH LOW-VOLTAGE WIRING.

Operational Narrative:

1. Doors normally closed and unsecure.
2. ADA access by actuator switch. Latch can be electrically held retracted for open access.
3. Egress free for immediate exit. ADA egress by actuator switch.
4. Upon loss of power, free entry and exit.

Set: 4.0

Doors: D-3-03a, D-3-13, D-3-22, D-3-26a, D-G-09

Description: Single x Storeroom MELR x DO OHS x Seals

2	Hinge, Full Mortise, Hvy Wt	T4A3386 127 x 114 (NRP AT OUTSWING SECURE DOORS)	US32D	MK
1	Hinge, Full Mortise, Hvy Wt	T4A3386 QC12 127 x 114	US32D	MK
1	Storeroom/Closet Lock (MELR)	LC RX 56 8204 LNL	US32D	SA
1	Cylinder	ASSA CYLINDER & CONSTRUCTION CORE TO MATCH EXISTING x CAM/TAILPIECE TO SUIT		OT
1	Permanent Core	BY OWNER		OT
1	Concealed Overhead Holder/Stop	1-X36	689	NO
1	Door Operator	SW200i		BM
1	Kick Plate	K1050 200 x WIDTH CSK	US32D	RO
1	Gasketing	S773BL 1WIDTH x 2HEIGHT		PE
1	Sweep	18100CNB WIDTH		PE
1	ElectroLynx Harness (in frame)	QC-CXXXXP LENGTH		MK
1	ElectroLynx Harness (in door)	QC-CXXX LENGTH		MK
2	Actuator (wave)	CM331-42R-SGLR		OT
1	Advanced Logic Relay	CX-33		OT
1	Door Contact	3287		SA
1	Card Reader	BY SECURITY CONTRACTOR		OT
1	Power Supply	AQD1		SU

DIVISION 26 TO PROVIDE 120VAC POWER TO FRAME HEADER, FINAL CONNECTION TO AUTO DOOR OPERATOR, ALL BACK BOXES, AND CONDUIT WITH LOW-VOLTAGE WIRING.

Operational Narrative:

1. Doors normally closed and secure.
2. Authorized access by card reader retracting latch for predetermined time limit. Latch can be electrically held retracted for open access.
3. ADA access by actuator switch. In locked condition, actuator energized only upon valid card reader presentation.
4. Egress free for immediate exit. ADA egress by actuator switch.
5. REX switch allows authorized exit without alarm condition.

6. Latch releases (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 5.0

Doors: D-3-18, D-3-18a, D-3-36

Description: Single x Storeroom MELR x DO x STC49/55

3	Hinge	BY DOOR SUPPLIER - REFER TO ARCHITECTURAL SPECIFICATIONS FOR MODEL & TYPE		OT
1	Electric Power Transfer	EL-EPT-SC		SU
1	Storeroom/Closet Lock (MELR)	LC RX 56 8204 LNL	US32D	SA
1	Cylinder	ASSA CYLINDER & CONSTRUCTION CORE TO MATCH EXISTING x CAM/TAILPIECE TO SUIT		OT
1	Permanent Core	BY OWNER		OT
1	Door Operator	SW200i		BM
1	Kick Plate	K1050 200 x WIDTH CSK	US32D	RO
1	Floor / Wall Stop	441H / 403 TO SUIT	US26D	RO
1	Gasketing STC	BY DOOR SUPPLIER		OT
1	Door Bottom STC	BY DOOR SUPPLIER		OT
1	Threshold STC	BY DOOR SUPPLIER		OT
1	ElectroLynx Harness (in frame)	QC-CXXXXP LENGTH		MK
1	ElectroLynx Harness (in door)	QC-CXXX LENGTH		MK
2	Actuator (wave)	CM331-42R-SGLR		OT
1	Advanced Logic Relay	CX-33		OT
1	Door Contact	3287		SA
1	Card Reader	BY SECURITY CONTRACTOR		OT
1	Power Supply	AQD1		SU

DIVISION 26 TO PROVIDE 120VAC POWER TO FRAME HEADER, FINAL CONNECTION TO AUTO DOOR OPERATOR, ALL BACK BOXES, AND CONDUIT WITH LOW-VOLTAGE WIRING.

Note - Door supplier to verify hardware compatibility.

Operational Narrative:

- Doors normally closed and secure.
- Authorized access by card reader retracting latch for predetermined time limit. Latch can be electrically held retracted for open access.
- ADA access by actuator switch. In locked condition, actuator energized only upon valid card reader presentation.
- Egress free for immediate exit. ADA egress by actuator switch.
- REX switch allows authorized exit without alarm condition.
- Latch releases (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 6.0

Doors: D-3-06, D-3-3056, D-G-09a

Description: Single x Fail Secure x CL x Seals

2	Hinge, Full Mortise, Hvy Wt	T4A3386 127 x 114 (NRP AT OUTSWING SECURE DOORS)	US32D	MK
1	Hinge, Full Mortise, Hvy Wt	T4A3386 QC12 127 x 114	US32D	MK
1	Fail Secure Lock	LC RX 8271-XXV LNL	US32D	SA
1	Cylinder	ASSA CYLINDER & CONSTRUCTION CORE TO MATCH EXISTING x CAM/TAILPIECE TO		OT

		SUIT		
1	Permanent Core	BY OWNER		OT
1	Surface Closer	7500 DROP PLATE TO SUIT	689	NO
1	Kick Plate	K1050 200 x WIDTH CSK	US32D	RO
1	Floor / Wall Stop	441H / 403 TO SUIT	US26D	RO
1	Gasketing	S773BL 1WIDTH x 2HEIGHT		PE
1	Sweep	18100CNB WIDTH		PE
1	ElectroLynx Harness (in frame)	QC-CXXXXP LENGTH		MK
1	ElectroLynx Harness (in door)	QC-CXXX LENGTH		MK
1	Door Contact	3287		SA
1	Card Reader	BY SECURITY CONTRACTOR		OT
1	Power Supply	AQD1		SU

Operational Narrative:

1. Door normally closed and secure.
2. Authorized access by card reader unlocking lever trim for a predetermined time limit. Trim can remain unlocked for open access.
3. Egress free for immediate exit.
4. Mortise lock REX switch allows authorized exit without alarm condition.
5. Lever remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 7.0

Doors:

Description: Single x Fail Secure x CL OHS x Seals

2	Hinge, Full Mortise, Hvy Wt	T4A3386 127 x 114 (NRP AT OUTSWING SECURE DOORS)	US32D	MK
1	Hinge, Full Mortise, Hvy Wt	T4A3386 QC12 127 x 114	US32D	MK
1	Fail Secure Lock	LC RX 8271-XXV LNL	US32D	SA
1	Cylinder	ASSA CYLINDER & CONSTRUCTION CORE TO MATCH EXISTING x CAM/TAILPIECE TO SUIT		OT
1	Permanent Core	BY OWNER		OT
1	Concealed Overhead Holder/Stop	1-X36	689	NO
1	Drop Plate	7786OH	689	NO
1	Surface Closer	7500	689	NO
1	Kick Plate	K1050 200 x WIDTH CSK	US32D	RO
1	Floor / Wall Stop	441H / 403 TO SUIT	US26D	RO
1	Gasketing	S773BL 1WIDTH x 2HEIGHT		PE
1	Sweep	18100CNB WIDTH		PE
1	ElectroLynx Harness (in frame)	QC-CXXXXP LENGTH		MK
1	ElectroLynx Harness (in door)	QC-CXXX LENGTH		MK
1	Door Contact	3287		SA
1	Card Reader	BY SECURITY CONTRACTOR		OT
1	Power Supply	AQD1		SU

Operational Narrative:

1. Door normally closed and secure.
2. Authorized access by card reader unlocking lever trim for a predetermined time limit. Trim can remain unlocked for open access.
3. Egress free for immediate exit.
4. Mortise lock REX switch allows authorized exit without alarm condition.
5. Lever remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 8.0

Doors: D-2-01, D-3-01, D-3-02, D-3-15, D-3-17, D-3-19, D-3-20, D-3-21, D-3-23, D-3-28, D-3-30, D-3-32, D-3-33, D-3-34, D-3-38, D-3-38a, D-3-40, D-G-01, D-G-01a, D-G-01c, D-G-18, D-G-20, D-G-22, D-G-23, D-G-23a, D-G-24, D-G-24a

Description: Single x Fail Secure x CL x STC55

3	Hinge	BY DOOR SUPPLIER - REFER TO ARCHITECTURAL SPECIFICATIONS FOR MODEL & TYPE		OT
1	Electric Power Transfer	EL-EPT-SC		SU
1	Fail Secure Lock	LC RX 8271-XXV LNL	US32D	SA
1	Cylinder	ASSA CYLINDER & CONSTRUCTION CORE TO MATCH EXISTING x CAM/TAILPIECE TO SUIT		OT
1	Permanent Core	BY OWNER		OT
1	Door Operator	SW200i W/INBUILT STOP - TO FUNCTION AS A DOOR CLOSER		BM
1	Kick Plate	K1050 200 x WIDTH CSK	US32D	RO
1	Gasketing STC	BY DOOR SUPPLIER		OT
1	Door Bottom STC	BY DOOR SUPPLIER		OT
1	Threshold STC	BY DOOR SUPPLIER		OT
1	ElectroLynx Harness (in frame)	QC-CXXXXP LENGTH		MK
1	ElectroLynx Harness (in door)	QC-CXXX LENGTH		MK
1	Door Contact	3287		SA
1	Card Reader	BY SECURITY CONTRACTOR		OT
1	Power Supply	AQD1		SU

Note - Door supplier to verify hardware compatibility.

Operational Narrative:

1. Door normally closed and secure.
2. Authorized access by card reader unlocking lever trim for a predetermined time limit. Trim can remain unlocked for open access.
3. Egress free for immediate exit.
4. Mortise lock REX switch allows authorized exit without alarm condition.
5. Lever remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 9.0

Doors: D-G-15

Description: Single x Fail Secure IND x CL x STC55

3	Hinge	BY DOOR SUPPLIER - REFER TO ARCHITECTURAL SPECIFICATIONS FOR MODEL & TYPE		OT
1	Electric Power Transfer	EL-EPT-SC		SU
1	Electrified Mortise Lock (w/ind)	V20 PHR NAC-82281-XXV LNL	US32D	SA
1	Cylinder	ASSA CYLINDER & CONSTRUCTION CORE TO MATCH EXISTING x CAM/TAILPIECE TO SUIT		OT
1	Permanent Core	BY OWNER		OT
1	Door Operator	SW200i W/INBUILT STOP - TO FUNCTION AS A DOOR CLOSER		BM
1	Kick Plate	K1050 200 x WIDTH CSK	US32D	RO

1	Gasketing STC	BY DOOR SUPPLIER	OT
1	Door Bottom STC	BY DOOR SUPPLIER	OT
1	Threshold STC	BY DOOR SUPPLIER	OT
1	ElectroLynx Harness (in frame)	QC-CXXXXP LENGTH	MK
1	ElectroLynx Harness (in door)	QC-CXXX LENGTH	MK
1	Door Contact	3287	SA
1	Card Reader	BY SECURITY CONTRACTOR	OT
1	Power Supply	AQD1	SU

Operational Narrative:

1. Door normally closed and secure.
2. Authorized access by card reader unlocking lever trim for a predetermined time limit. Trim can remain unlocked for open access.
3. Egress free for immediate exit.
4. Mortise lock REX switch allows authorized exit without alarm condition. Door contact monitors door open/close status.
5. Lever remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 10.0

Doors: D-2-02, D-3-04, D-3-05, D-3-07, D-3-08, D-3-09, D-3-10, D-3-11, D-3-16, D-3-31, D-3-35, D-G-02, D-G-03, D-G-04, D-G-10, D-G-11, D-G-12, D-G-13, D-G-17, D-G-19

Description: Single x Office x STC55

3	Hinge	BY DOOR SUPPLIER - REFER TO ARCHITECTURAL SPECIFICATIONS FOR MODEL & TYPE	OT
1	Office/Entry Lock	LC 8205 LNL	SA
1	Cylinder	ASSA CYLINDER & CONSTRUCTION CORE TO MATCH EXISTING x CAM/TAILPIECE TO SUIT	OT
1	Permanent Core	BY OWNER	OT
1	Kick Plate	K1050 200 x WIDTH CSK	RO
1	Floor / Wall Stop	441H / 403 TO SUIT	RO
1	Gasketing STC	BY DOOR SUPPLIER	OT
1	Door Bottom STC	BY DOOR SUPPLIER	OT
1	Threshold STC	BY DOOR SUPPLIER	OT

Note - Door supplier to verify hardware compatibility.

Set: 10.1

Doors: D-3-24

Description: Single x Office x CL x STC55

3	Hinge	BY DOOR SUPPLIER - REFER TO ARCHITECTURAL SPECIFICATIONS FOR MODEL & TYPE	OT
1	Office/Entry Lock	LC 8205 LNL	SA
1	Cylinder	ASSA CYLINDER & CONSTRUCTION CORE TO MATCH EXISTING x CAM/TAILPIECE TO SUIT	OT
1	Permanent Core	BY OWNER	OT
1	Door Operator	SW200i W/INBUILT STOP - TO FUNCTION AS A DOOR CLOSER	BM

1	Kick Plate	K1050 200 x WIDTH CSK	US32D	RO
1	Floor / Wall Stop	441H / 403 TO SUIT	US26D	RO
1	Gasketing STC	BY DOOR SUPPLIER		OT
1	Door Bottom STC	BY DOOR SUPPLIER		OT
1	Threshold STC	BY DOOR SUPPLIER		OT

Note - Door supplier to verify hardware compatibility.

Set: 11.0

Doors: D-2-2125, D-2-2125a, D-2-2126, D-2-2126a, D-2-2136, D-2-2136a, D-2-2137, D-2-2137a, D-3-3082, D-3-3083, D-3-3085, D-3-3086, D-3-3090, D-3-3091, D-3-3092, D-3-3093, D-G-1137, D-G-1137A, D-G-1138, D-G-1138A

Description: Single x PP x DO x Seals

3	Hinge, Full Mortise, Hvy Wt	T4A3386 127 x 114 (NRP AT OUTSWING SECURE DOORS)	US32D	MK
1	Push Plate	70C-RKW	US32D	RO
1	Door Pull	BF 112	US32D	RO
1	Door Operator	SW200i		BM
1	Kick Plate	K1050 200 x WIDTH CSK	US32D	RO
1	Floor / Wall Stop	441H / 403 TO SUIT	US26D	RO
1	Gasketing	S773BL 1WIDTH x 2HEIGHT		PE
1	Sweep	18100CNB WIDTH		PE
2	Actuator (wave)	CM331-42R-SGLR		OT

DIVISION 26 TO PROVIDE 120VAC POWER TO FRAME HEADER, FINAL CONNECTION TO AUTO DOOR OPERATOR, ALL BACK BOXES, AND CONDUIT WITH LOW-VOLTAGE WIRING.

Set: 12.0

Doors: D-G-1092, D-G-1092a, D-G-1093, D-G-1093a

Description: Single x Passage MELR x DO x Seals

2	Hinge, Full Mortise, Hvy Wt	T4A3386 127 x 114 (NRP AT OUTSWING SECURE DOORS)	US32D	MK
1	Hinge, Full Mortise, Hvy Wt	T4A3386 QC12 127 x 114	US32D	MK
1	Passage Latch	56 8215 LNL	US32D	SA
1	Door Operator	SW200i		BM
1	Kick Plate	K1050 200 x WIDTH CSK	US32D	RO
1	Floor / Wall Stop	441H / 403 TO SUIT	US26D	RO
1	Gasketing	S773BL 1WIDTH x 2HEIGHT		PE
1	Sweep	18100CNB WIDTH		PE
1	ElectroLynx Harness (in frame)	QC-CXXXXP LENGTH		MK
1	ElectroLynx Harness (in door)	QC-CXXX LENGTH		MK
2	Actuator (wave)	CM331-42R-SGLR		OT
1	Advanced Logic Relay	CX-33		OT
1	Power Supply	AQD1		SU

DIVISION 26 TO PROVIDE 120VAC POWER TO FRAME HEADER, FINAL CONNECTION TO AUTO DOOR OPERATOR, ALL BACK BOXES, AND CONDUIT WITH LOW-VOLTAGE WIRING.

PART 1 - GENERAL

1.1 WORK INCLUDED

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

1.2 RELATED WORK SPECIFIED UNDER OTHER SECTIONS

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

1.3 REFERENCES

- | | | |
|--------|---------------------|---|
| 1.3.1 | ASTM A167-99(2009) | Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip (Withdrawn 2014). |
| 1.3.2 | ASTM B117-11 | Standard Practice for Operating Salt Spray (Fog) Apparatus. |
| 1.3.3 | ASTM D395-14 | Standard Test Methods for Rubber Property - Compression Set. |
| 1.3.4 | ASTM D412-06a(2013) | Standard Test Methods for Vulcanized Rubber And Thermoplastic Rubbers and Thermoplastic Elastomers – Tension. |
| 1.3.5 | ASTM D1149-07(2012) | Standard Test Method for Rubber Deterioration - Cracking in an Ozone Controlled Environment. |
| 1.3.6 | CAN/CGSB 12.1-M90 | Tempered or Laminated Safety Glass. |
| 1.3.7 | CAN/CGSB 12.2-M91 | Flat Clear Sheet Glass. |
| 1.3.8 | CAN/CGSB 12.3-M91 | Flat, Clear Float Glass. |
| 1.3.9 | CAN/CGSB 12.5-M86 | Mirrors, Silvered. |
| 1.3.10 | CAN/CGSB 12.20-M89 | Structural Design of Glass for Buildings. |
| 1.3.11 | CAN/CGSB 19.24-M90 | Multicomponent, Chemical-Curing Sealing Compound. |
| 1.3.12 | CAN/ULC S104 | Standard Method for Fire Tests of Door Assemblies |
| 1.3.13 | CAN/ULC-S106 | Standard Method for Fire Testing of Window and Glass Block Assemblies |

1.4 SUBMITTALS

- 1.4.1 Samples: Duplicate 12" x 12" samples of each type and thickness of glass and 12" long mirror frame.
- 1.4.2 Product Data: Submit manufacturer's product data for each type of product specified. Data shall indicate compliance with specification and installation recommendations of manufacturer of products being used.
- 1.4.3 Maintenance data: Written instructions for protection of completed work, for re-glazing, and for proper methods and materials to be used in cleaning.

1.5 DELIVERY, STORAGE AND HANDLING

- 1.5.1 Delivery and Acceptance Requirements: Deliver packaged materials in their original containers with manufacturer's labels and seals intact.
- 1.5.2 Storage and Handling Requirements: Store vertically, blocked off the floor in a weatherproof enclosure in original containers with manufacturers labels and seals intact until read for installation, and as follows:
 - .1 Install glass as soon as possible after delivery to site.
 - .2 Handle glass carefully to its place of installation.
 - .3 Prevent damage to glass, adjacent materials and surfaces.

1.6 SITE CONDITIONS

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

1.7 WARRANTIES

- 1.7.1 Submit a five year warranty, commencing from date of Substantial Performance, against defects in the workmanship and materials, including and not necessarily limited to the following:
 - .1 Cracked or scratched glass, shrinking, cracking, staining, hardening, sagging of glazing materials, loosening or rattling of glass.
 - .2 Glazing work is water and weather tight and free from distortion, that glazing materials will not deteriorate due to exposure to atmosphere and weather, will not be displaced, and will be free from permanent deformation under load.
 - .3 Glass breakage due to thermal shock or change occurring within weather extremes stated for the place of building under OBC, and an inside temperature range of 5°C and 42°C.
 - .4 Loosening of mirror frame fastenings.
- 1.7.2 Submit a five warranty, commencing from date of Substantial Performance, against deterioration of mirror silver backing and cracking of mirrors.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Except where more specifically specified herein, glass shall meet or exceed requirements of CAN/CGSB 12.20.

2.1.2 Glass: Each unit shall bear manufacturer's label indicating quality, and thickness.

2.1.3 Thickness of glass as shown on Drawings except as specified herein.

2.1.4 Sheet glass: CAN/CGSB 12.2, B quality or better.

2.1.5 Float glass: CAN/CGSB 12.3, glazing quality, annealed.

2.1.6 Safety glass: CAN/CGSB 12.1, Type 2, Class B, heat treated float glass, Category I Heat Strengthened, Category II Tempered. Tong and roller marks free.

2.1.7 GLASS

.1 Insulating Vision Glass Units for door vision panel and sidelight:

- .1 6mm clear tempered glass
- .2 13mm argon filled space with acoustical foam
- .3 6mm clear tempered glass by AGC Glass or equivalent.
* Supplier is responsible for the integrity of STC rating

.2 Exterior Door Insulating Glass Light Diffusing Units

- .1 6mm clear tempered glass
- .2 13mm argon filled space
- .3 6mm clear tempered glass with low-emissivity coating on surface facing cavity by AGC Glass or equivalent.

.3 Fire rated FireLite glass for use in doors and wall applications with fire rating requirements of 20-180 minutes with hose stream test in locations where fire safety is of prime importance.

- .1 FireLite Glass: In accordance with CAN/ULC-S104 and CAN/ULC-S106.

2.1.8 GLASS PRIVACY FILM

- 1. DF-01 Frosted Film by Decozi or equivalent on the interior side. Refer Architectural drawings for location, sizes and design.

2.1.9 Glazing compound: CAN/CGSB 19.24, multi component, chemical curing.

2.1.10 Heel bead: Dymonic by Tremco, or other approved manufacture.

2.1.11 Glazing tape: Extruded, ribbon shaped, non-drying, non-skinning, non-oxidizing polyisobutylene tape with continuous synthetic rubber spacer rod, sufficiently wide and thick as to completely cover bite area of the glazing unit when the unit is pushed into place, Polyshim 2, by Tremco Ltd.,

or other approved manufacture.

- 2.1.12 Mirrors: CAN/CGSB 12.5, Type 1A, polished float glass 1/4" (6mm) thick and withstanding a 72 hour exposure in accordance with ASTM B117, by PPG Industries Ltd., AFG Glass, Pilkington Glass Limited, or other approved manufacture. Mirror backing shall be resistant to sulphur and hydrogen sulphide fumes. Polish and round all corners of mirrors.
- 2.1.13 Mirror trim: Formed to approved profile from 0.050" thick, ASTM A167, Type 302 stainless steel in No. 4 finish. Vandal-proof mounting fastenings to suit type of substrate and fully concealed in the finished work.
- 2.1.14 Adhesive for mirrors: Special mirror mastic, "Mirro-Mastic" by Palmer Products Corporation, or other approved manufacture.
- 2.1.15 Backpaint and sealer for mirrors to be adhesive applied: "Mirro-Bac" paint for back painting mirror and "Mirro-Mastic Bond" for sealing substrate surfaces by Palmer Products Corporation or other approved manufacture.
- 2.1.16 Shims (for wet glazing): Pressure sensitive resilient extruded synthetic rubber and as recommended by insulating glass unit manufacturer.
- 2.1.17 Spacers and setting blocks, 80 Durometer: Neoprene rubber or EPDM, A hardness ± 5 respectively, resistant to oxidation and permanent deformation under load.
- 2.1.18 One part glazing gaskets: Extruded neoprene or EPDM of approved profile. Gaskets properties - tensile strength, ASTM D412, 1500 psi; Durometer A hardness, 50 ± 5 ; resistance to permanent set, ASTM D395, Method D, 25 % maximum set; minimum elongation at break, ASTM D412, 300%; resistance to ozone, ASTM D1149, showing no cracks.
- 2.1.19 All glazing materials, products, primers and cleaning solvents: Mutually compatible.
- 2.1.20 Colours for glazing materials: As selected later from standard colours.

2.2 FABRICATION

- 2.2.1 Minimum thicknesses of glass shall be in accordance with CAN/CGSB 12.20, except as specified herein.
- 2.2.2 Accurately size glass to fit openings allowing the clearance recommended by the glass manufacturer, and in accordance with the following tables:

.1 Minimum Glass Clearances

Thickness	Edge Clearance	Face Clearance
18 oz. or 3/32"	1/8"	1/16"
24 oz. or 1/8"	1/8"	1/8"
32 oz.	1/8"	1/8"
3/16"	1/8"	1/8"
7/32"	3/16"	1/8"
1/4"	1/4"	1/8"
over 1/4"	1/4" or 3/4 times the glass thickness, whichever is the greater.	

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

.2 Bite of glass edge on stop:

1. Up to 50" united size: 1/4" minimum.
2. Over 50" united size: 1/2" minimum.

PART 3 - EXECUTION

3.1 INSPECTION

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

3.2 PREPARATION

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

3.3 INSTALLATION – GENERAL

- 3.3.1 Install work in accordance with manufacturer's instructions. Handle and install glass in accordance with manufacturer's directions. Prevent nicks, abrasion and other damage likely to develop stress on edges.
- 3.3.2 Remove and replace glazing stops in original locations using original fasteners, securely set and undamaged.
- 3.3.3 Use setting blocks and spacers as required to properly support the glass, centred in place in glazing space independent of the materials and to uniformly distribute its load.
- 3.3.4 Use a minimum of 2 setting blocks, located at the quarter points. Locate spacers at jamb edges of glass, uniformly spaced at 2'-0" o.c. maximum, and 1'-0" maximum from top and bottom.
- 3.3.5 Set glass properly centred with uniform bite and face and edge clearance, free from twist, warp or other distortion likely to develop stress.
- 3.3.6 Leave labels on glass until it has been set and inspected and approved. Leave glass whole and without cracks, scratches or other defects and with settings in perfect condition at completion, to

approval of Consultant.

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

3.4 INTERIOR GLAZING

- 3.4.1 Unless otherwise specified, all interior glazing shall be dry glazing.
- 3.4.2 Install extruded glazing gasket around entire perimeter of glass. Make tight butt joint at corners of lights. Place neoprene setting blocks at sill and spacers at both jambs as required to centre the unit in the frame. Place the unit into the frames and apply the stops against the gaskets. Tighten the screws or clips to obtain positive uniform pressure avoiding excessive pressure.
- 3.4.3 Ensure rattle-free cushioning.

3.5 INSTALLATION - EXTERIOR GLAZING

- 3.5.1 Install glass with labels facing the interior. Ensure that sufficient space is left within the glazing space to allow thermal movement of glass without imposing stress on the glass.
- 3.5.2 Install heat treated safety glass with convex side facing the exterior.
- 3.5.3 Install wet glazing materials to obtain complete contact and adhesion over the full bite area of the unit and to be free from gaps, air bubbles, and embedded foreign matter. Use primers when recommended by the glazing material manufacturer. Use sufficient bedding compound so that when glass is pushed into place, excess compound is forced out around the entire margin. Use shims to ensure maintenance of uniform face clearance. Where required on both sides of a unit, make shims coincident.
- 3.5.4 Install glazing tape to ensure complete contact and adhesion over the full bit area of the unit. Make joints only at corners of the unit. Where tape has no integral shim, cut it to fit close around applied shims. Fit tape accurately with tight joints, free from tension, gaps, and cracks. After installation of glass, the tape shall not extend more than 1/8" above the line of the fixed stop. Remove and re-glaze units where the tape exceeds this tolerance.
- 3.5.5 Where specified or shown on the Drawings, gun in a heel bead of glazing compound to ensure a continuous seal between glazed element and frame.
- 3.5.6 Where visible or exposed to weather, finish gunned bead surface to slope away from glass for shedding water. Ensure a weather tight seal.

3.6 INSTALLATION - MIRRORS

- 3.6.1 Thoroughly seal and prime substrate with sealer and primer as recommended by mirror manufacturer.
- 3.6.2 Adhesive apply mirror to plywood backing, and fasten plywood to structure with concealed fastenings.
- 3.6.3 Install mirrors using dollops of mirror mastic spaced as recommended by the manufacturer of the mirror mastic for 60% coverage. Brace mirrors in place until mastic has set. Butt-edged mirrors shall give an un-warped image.

3.6.4 Provide mirror trim at mirrors, using concealed fastening.

3.7 INSTALLATION - WIRED GLASS

3.7.1 Install wired glass to locations indicated.

3.7.2 Install wired glass where glazing is indicated in fire resistant closures (e.g. fire doors, steel framed openings in fire rated walls).

3.7.3 Install wired glass with wires parallel to frame opening.

3.8 CLEANING

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

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

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCES

- | | | |
|--------|----------------------------|---|
| 1.2.1 | ANSI A118.9-1992 | Test Methods and Specification for Cementitious Backer Units. |
| 1.2.2 | ASTM A153/A153M-16 | Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware. |
| 1.2.3 | ASTM A307-14 | Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength. |
| 1.2.4 | ASTM A510/A510M-13 | Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel. |
| 1.2.5 | ASTM A641/A641M-09a (2014) | Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire. |
| 1.2.6 | ASTM A653/A653M-15e1 | Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process. |
| 1.2.7 | ASTM B221-14 | Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes. |
| 1.2.8 | ASTM C11-15a | Standard Terminology Relating to Gypsum and Related Building Materials and Systems. |
| 1.2.9 | ASTM C423-09a | Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method. |
| 1.2.10 | ASTM C473-15 | Standard Test Methods for Physical Testing of Gypsum Panel Products. |
| 1.2.11 | ASTM C475/C475M-15 | Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board. |
| 1.2.12 | ASTM C635/C635M-13a | Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings. |
| 1.2.13 | ASTM C636/C636M-13 | Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustic Tile and Lay-In Panels. |
| 1.2.14 | ASTM C645-14e1 | Standard Specification for Non-structural Steel Framing Members. |

1.2.15	ASTM C754-15	Standard Specification for Installation of Steel Framing Members to Receive Screw Attached Gypsum Panel Products.
1.2.16	ASTM C834-14	Standard Specification for Latex Sealants.
1.2.17	ASTM C840-13	Standard Specification for Application and Finishing of Gypsum Board.
1.2.18	ASTM C919-12	Standard Practice for Use of Sealants in Acoustical Applications.
1.2.19	ASTM C954-15	Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.75 mm) to 0.112 in. (2.84 mm) in Thickness.
1.2.20	ASTM C1002-14	Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
1.2.21	ASTM C1047-14a	Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
1.2.22	ASTM C1178/C1178M-13	Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.
1.2.23	ASTM C1278/C1278M-07a (2015)	Standard Specification for Fiber-Reinforced Gypsum Panel.
1.2.24	ASTM C1325-14	Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units.
1.2.25	ASTM C1396/C1396M-14a	Standard Specification for Gypsum Board.
1.2.26	ASTM C754-15	Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels
1.2.27	ASTM C1658/C1658M-13	Standard Specification for Glass Mat Gypsum Panels.
1.2.28	ASTM D3273-12e1	Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
1.2.29	ASTM E90-09	Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
1.2.30	ASTM E413-16	Classification for Rating Sound Insulation.
1.2.31	ASTM E488/E488M-15	Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.
1.2.32	ASTM E580/E580M-14	Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.
1.2.33	ASTM E695-03e1 (2015)	Standard Method for Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading.

- | | | |
|------------------------|---|---|
| 1.2.34 | CAN/CGSB-1.181-99 | Ready-Mixed organic Zinc-Rich Coating. |
| 1.2.35 | CAN/CGSB-19.21-M87 | Sealing and Bedding Compound for Acoustic Purposes (withdrawn). |
| 1.2.36 | CSSBI 57-02 | Lightweight Steel Framing Architectural Design Guide. |
| 1.2.37 | CSA S136-12 | North American Specification for the Design of Cold-Formed Steel Structural Members and Commentary. |
| 1.2.38 | GA-214 | Recommended Levels of Gypsum Board Finish. |
| 1.2.39 | GA-216 | Application and Finishing of Gypsum Panel Products. |
| 1.2.40 | GA-530 | Design Data - Gypsum Board. |
| 1.2.41 | GA-600 | Fire Resistance Design Manual. |
| 1.2.42 | CAN/ULC S101-07 | Fire Endurance Tests of Building Construction and Materials. |
| 1.2.43 | CAN/ULC S102-10 | Surface Burning Characteristics of Building Materials and Assemblies. |
| 1.2.44 | CAN/ULC S114-05 | Test for Determination of Non-Combustibility in Building Materials. |
| 1.2.45 | CAN/ULC S702-09-AM1 | Mineral Fibre Thermal Building Insulation. |
| 1.2.46 | ASTM C1325-14 | Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units. |
| 1.2.47 | | Underwriters' Laboratories of Canada (ULC), List of Equipment and Materials |
|
1.3 DESIGN | | |
| 1.3.1 | Fire Rated Construction: Construct to approved ULC design for fire resistance ratings indicated. Submit written proof of construction meeting ULC design. | |
| 1.3.2 | Sound rated construction: STC tested in accordance with ASTM E90. | |
|
1.4 SUBMITTALS | | |
| 1.4.1 | Submit shop drawings showing pertinent construction details for fire and sound rated construction in large scale detail. | |
| 1.4.2 | Product Data: Submit manufacturer's current technical literature for each component. | |
| 1.4.3 | Samples: Supply for Consultant's review, if requested, samples of the following: | |
| | .1 | Board: Submit sample of each panel product specified, 150mm (6") square. |
| | .2 | Trim: Submit sample of each type of trim specified, 305mm (12") long. |
| | .3 | Texture: Submit sample, 305mm (12") square, of textured coated gypsum board. |
| 1.4.4 | Quality Assurance Submittals: | |

- .1 Design Data, Test Reports: Provide manufacturer's test reports indicating product compliance with indicated requirements.
- .2 Manufacturer's Instructions: Provide manufacturer's written installation instructions.

1.5 QUALITY ASSURANCE

- 1.5.1 Contractor executing work of this Section shall have a minimum of five (5) years continuous Canadian experience in successful installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- 1.6.1 Deliver materials in original, unopened containers or bundles stored in a place providing protection from damage and exposure to elements.
- 1.6.2 Store board on flat, smooth and dry base.
- 1.6.3 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, enclosed, under cover storage location. Do not load any area beyond the design limits.
- 1.6.4 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.
- 1.6.5 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact, in accordance with GA-238 and manufacturer's recommendations.
- 1.6.6 Protect bagged products from excessive moisture or wetting. Store metal component sections in crates to prevent damage to material. Do not use bent or deformed material.

1.7 ENVIRONMENTAL REQUIREMENTS

- 1.7.1 Temperature within the building shall be maintained uniformly within the range of 12°C to 21°C, 24 hours before installation and until joint cement has dried.
- 1.7.2 Provide adequate ventilation to eliminate excessive moisture within the building before commencement of the work of this Section.

PART 2 - PRODUCTS

2.1 MATERIALS - GENERAL

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

2.2 MATERIALS - GYPSUM BOARD

- 2.2.1 Gypsum board: Conforming to ASTM C1396, ivory paper faced, tapered edges, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, thickness as indicated on drawings.

- .1 Sheetrock Brand Gypsum Panels by CGC Inc.
- .2 ProRoc Regular by CertainTeed.
- .3 ToughRock Gypsum Wallboard by Georgia-Pacific Canada.

- 2.2.2 Fire-Rated Gypsum Board 'Type X': Conforming to ASTM C1396, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, tapered edges, thickness as indicated on drawing.
- .1 Sheetrock Brand Gypsum Panels, Firecode Core by CGC Inc.
 - .2 ProRoc Type X by CertainTeed.
 - .3 ToughRock Fireguard Gypsum Board by Georgia-Pacific Canada.
 - .4 Or Approved Equivalent
- 2.2.3 Gypsum Ceiling Board: Sag Resistant Gypsum Board: Meeting requirements of ASTM C1396M, ceiling board manufactured to have more sag resistance than regular type gypsum board with long edges tapered, and as follows:
- .1 Location: Ceiling surfaces.
 - .2 Acceptable Materials:
 - .1 Sheetrock Interior Ceiling Board by CGC Inc.
 - .2 Tough Rock CD Ceiling Board by Georgia Pacific Canada.
 - .3 ProRoc Interior Ceiling Board by CertainTeed.
 - .4 Or Approved Equivalent
- 2.2.4 Tile Backer Board: Glass Mat Water Resistant Gypsum Backer Board: Manufactured in accordance with ASTM C1178 and C1658 to produce greater resistance to water penetration and to provide improved surface bonding characteristics for ceramic tile than standard gypsum board:
- .1 Location: Substrate for ceramic tile.
 - .2 Acceptable Materials:
 - .1 Fiberock Aqua Tough Tile Backerboard by CGC Inc.
 - .2 Diamondback Tile Backer by CertainTeed.
 - .3 GlasRoc Tile Backer by Georgia-Pacific Canada.
 - .4 Or Approved Equivalent
- 2.2.5 Cement Board: Cementitious Backer Board: Reinforced portland cement board, reinforcing mesh embedded near both faces in accordance with ASTM C1325 or ANSI A118.9:
- .1 Substrate for high impact areas.
 - .2 Acceptable Materials:
 - .1 Durock by CGC Inc.
 - .2 PanaRoc by CertainTeed.
 - .3 Or Approved Equivalent
- 2.2.6 Abuse Resistant Gypsum Board: Manufactured to produce greater resistance to surface indentation and impact penetration resistance than standard gypsum panels:
- .1 Gypsum panels with glass fibre reinforced core, tapered edges, minimum 5/8" thickness, [Type X ULC fire rating], conforming to ASTM C1396M and tested to the following performance ratings.
 - .2 Acceptable Materials:
 - .1 Sheetrock Abuse Resistant [Firecode] by CGC Inc.
 - .2 Abuse Resistant [Type X] by CertainTeed.
 - .3 ToughRock Abuse Resistant [Fireguard] by Georgia Pacific Canada.
 - .4 Or Approved Equivalent

- 2.2.7 Water (Moisture) and Mould Resistant Wallboard: Conforming to ASTM C1396 or ASTM C1278, 1220mm (48") wide panels of maximum practical lengths to minimize end joints, tapered edges, 13mm (1/2") thick, with water (moisture) and mould resistant core. Mould resistant panel score of 10 when tested in accordance with ASTM D3273 and evaluated to ASTM D3274. Less than 5% water absorption by weight after 2-hour immersion, as per ASTM C473.
- .1 Acceptable Materials: Paperless, coated fibreglass mat on face, back and long edges, water-resistant treated core gypsum board. Conforming to ASTM C1658:
 - .1 DensArmour Plus High Performance Interior Panels by Georgia Pacific Canada.
 - .2 Fiberock Brand Aqua-Tough Interior Panels, by CGC Inc.
 - .3 Or Approved Equivalent
- 2.2.8 Exterior Sheathing Board: Glass mat faced, water-resistant treated core gypsum board, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, 13mm (1/2") thick, silicone treated gypsum core, front and back faces penetrated with inorganic glass fibre mats, square edge, conforming to ASTM C1177. Mould resistant panel score of 10 when tested in accordance with ASTM D3273 and evaluated to ASTM D3274.
- .1 Acceptable Materials:
 - .1 Securock Glass-Mat Sheathing by CGC Inc.
 - .2 Dens-Glass Gold by Georgia-Pacific Canada.
 - .3 GlasRoc Sheathing by CertainTeed.
 - .4 Or Approved Equivalent
- 2.2.9 Exterior Soffit Board: Mould and moisture resistant cement board, non-combustible, 48" wide sheets of maximum practical lengths to minimize end joints, 1/2" thick, aggregated portland cement core wrapped in polymer-coated, glass-fiber mesh. panel score of 10 when tested in accordance with ASTM D3273:
- .1 Acceptable Materials:
 - .1 Durock by CGC Inc.
 - .2 PermaBase Cement Board by CertainTeed
 - .3 ToughRock Fireguard Soffit Board by Georgia-Pacific Canada.
 - .4 Or Approved Equivalent
- 2.3 MATERIALS - FRAMING MEMBERS
- 2.3.1 Metal track: CAN/CGSB 7.1, 26 ga. galvanized steel, roll formed of width to suit metal studs.
- 2.3.2 Metal studs: CAN/CGSB 7.1, 26 ga. galvanized steel, cold-rolled formed face at least 1-5/8" wide, depth as indicated on Drawings. Provide knock-outs in studs to facilitate pipe, and conduit installation.
- 2.3.3 Hangers: 9 lwg minimum soft annealed and galvanized wire for 1/2" thick gypsum board; 3/16" diameter galvanized mild steel pencil rods for thicker gypsum board.
- 2.3.4 Ceiling runner or carrying channels: Cold formed 18 ga. mild steel channels, weighing not less than 0.60 lbs/ft., coated with a rust inhibitive paint or galvanized.
- 2.3.5 Ceiling furring channels: 26 ga. cold formed galvanized steel hat-shaped section.
- 2.3.6 Metal furring clips: 10 IW ga. minimum.
- 2.3.7 Wall furring channel: 26 ga. cold rolled galvanized steel hat-shaped section, 1-3/8" wide at crown, 2-3/4" wide at brim, 7/8" deep.

- 2.3.8 Resilient channels: RC-1 by CGC, or other approved manufacture.
- 2.3.9 Tie wire: 16 ga. extra pliable, soft, annealed, galvanized wire of high strength.
- 2.3.10 Hanger wire anchors: "RedHead TW-1614" anchors, by Phillips Drill Company, Division of ITT Industries of Canada Ltd., or other approved manufacture.
- 2.4 MATERIALS - ACCESSORIES
 - 2.4.1 Accessories shall comply with ASTM C1047.
 - 2.4.2 Joint treatment: 2" wide perforated tape reinforcement, joint filler or compound, and topping compound. Joint compound and tape shall be of the same manufacturer as gypsum board and comply with ASTM C475/C475M.
 - .1 Joint Compound for Tile Backing Panels: Gypsum based tile backing board: Use setting type taping and setting type, sandable topping compounds.
 - .2 Joint Compound for Exterior Sheathing Boards [and Soffit Panels]: Fibreglass mesh tape.
 - .3 Joint Compound for Abuse-Resistant Panels:
 - .1 ToughRock™ Sandable Joint Compound, by Georgia-Pacific.
 - .2 Durabond/Sheetrock Setting-Type Joint Compound, by CGC Canada Inc.
 - 2.4.3 Laminating adhesive: Sheetrock brand laminating compound by Canadian Gypsum Co. Ltd., or other approved manufacture.
 - 2.4.4 Tape for use with water resistant gypsum board: 2" wide 10 x 10 glass mesh tape.
 - 2.4.5 Water: Clean, fresh, potable, free from deleterious materials.
 - 2.4.6 Fasteners: Galvanized or aluminum, #6 x 1", 1-1/4", 1-5/8" drywall screws, flat head Phillips or recessed square socket type. 3/8" pan head door frame screws, (Type S12), and complying with ASTM C1002.
 - 2.4.7 Fasteners for exterior soffit boards: 1-1/4", Type S-12, Wafer Head, Climaseal finished, screws.
 - 2.4.8 Casing bead: Galvanized steel J-shaped trim, maximum lengths x thickness to suit gypsum board, concealed in the finish work by joint tape and joint compound, 200-A by CGC or other approved manufacture.
 - 2.4.9 Control joint trim: Casing bead as specified above.
 - 2.4.10 Corner bead and reveal trim: Galvanized steel L-shaped trim, maximum lengths, concealed in the finish work by joint tape and joint compound, 200-B by CGC or other approved manufacture.
 - 2.4.11 Use No. 200-A trim or appropriate Beadex trim at reveals.
 - or
 - 2.4.12 Reveal trim: No.200-B by Canadian Gypsum Company.
 - 2.4.13 Acoustic sealant: CAN/CGSB 19.21, Acoustical Sealant by Tremco Ltd., or other approved manufacture.
 - 2.4.14 Sealant for water-resistant gypsum board cut edges: Sheetrock Brand W/R sealant by Canadian Gypsum Co. Ltd., or other approved manufacture.

- 2.4.15 Sealant at ducts and frames and similar locations: Mono 555 as by Tremco Ltd., or other approved manufacture.
- 2.4.16 Sound insulation: Complying with CAN/ULC S702, "AFB" by Roxul Inc., "Noise Stop" sound attenuation blankets "Thermafibre" by CGC, or other approved manufacture.
- 2.4.17 Neoprene sponge strip: Moisture resistant closed cell insulating material.
- 2.4.18 Thermal break material: Neoprene sponge.
- 2.4.19 Asphalt felt: CAN/CSA A123.2-03(2008)
- 2.4.20 Mineral wool safig insulation: Firebarrier Firestopping by Double A/D Distributors Limited, Fire-Bloc Firestopping by M. W. McGill and Associates Ltd., Thermafibre by United States Gypsum Co., or other approved manufacture.
- 2.4.21 Access Panels: As indicated in Section 10 99 00.

PART 3 - EXECUTION

3.1 INSPECTION

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

3.2 INSTALLATION - GENERAL

- 3.2.1 Install all materials in accordance with the latest printed directions of the manufacturer and in accordance with CAN/CSA A82.31-M.
- 3.2.2 Perform all work by skilled craftsmen.
- 3.2.3 Provide partitions of thickness indicated on the Drawings.
- 3.2.4 Comply with CAN/CSA A82.31-M, except to its clauses referring to nailing.
- 3.2.5 Extend gypsum board to the underside of the structure above unless otherwise indicated.
- 3.2.6 Provide gypsum board baffles above ceilings, to underside of structure above, where indicated for sound barriers.
- 3.2.7 Install access doors supplied by respective Sections. Gypsum board infill at access panels shall have taped edges. Apply gypsum board with adhesive. Ensure finish of access panel is suitable

for board, prime for adhesion if required. Fill and sand smooth perimeter edges as specified for joint finishing.

- 3.2.8 Locate vertical joints at least 12" from jamb lines of openings.
- 3.2.9 Where vapour barrier carries over metal framing members ensure that installation of insulation and vapour barrier and perimeter seals is complete before applying gypsum board finish.
- 3.2.10 Co-ordinate work of this Section with the Sections installing equipment above or in the suspended ceiling areas so as to produce a layout of hangers, carrying channels and furring channels suitable to accommodate fittings and units of equipment in a proper manner. This shall apply especially to flush mounted lighting fixtures, outlet boxes, diffusers and similar material. Failure to follow this procedure will require that the hangers and channels be revised to suit as necessary without extra cost to the Owner.
- 3.2.11 Provide bulkhead framing and gypsum board, were required, whether shown or not, for ductwork and plumbing. Coordinate with Mechanical Division.

3.3 INSTALLATION - PARTITION FRAMING

- 3.3.1 Accurately layout partitions as indicated on drawings. Securely attach floor and ceiling runners at 24" o.c. to the structure.
- 3.3.2 Position studs vertically in runners at 16" o.c. maximum unless otherwise indicated. Locate studs not more than 2" from all abutting partitions, partition corners and other construction.
- 3.3.3 Anchor studs located adjacent to door and window frames, partition intersections and corners to runner flanges with lock fasteners or by positive screw arrangement through each stud flange and runner flange.
- 3.3.4 When necessary, splice studs by nesting two studs with a minimum lap of 8" and attaching flanges together with two screws in each flange.
- 3.3.5 Make allowances for deflection at top of partitions to avoid transmission of structural loads to framing system.
- 3.3.6 Locate 2 framing members on each side of framed openings. Frame over and below openings with runner sections at least 6" longer than the rough openings. Cut ends to fit and bend web up and screw anchor to adjacent studs. Install cut to length intermediate vertical studs in same manner and spacing as wall studs over such framed openings. Securely anchor studs to head and jamb anchor of door frames by bolt or screw attachment. Insert intermediate studs above and below channels to support gypsum board.
- 3.3.7 Provide adequate reinforcing for framing to receive wall mounted counters and vanities.
- 3.3.8 Provide double studs or wood blocking and bolts in stud partitions for fastening of handrails, grab bars, to be capable of supporting 230 kg (500 lb) downward pull. Provide double studs and blocking for anchoring of door frames, and other items anchored to stud partitions.
- 3.3.9 At duct openings pack space between framing members and ducts with mineral wool safing insulation and seal with sealant.
- 3.3.10 Provide double stud partitions where indicated.
- 3.3.11 Provide asphalt felt under runners for partitions on slabs on grade.

- 3.3.12 Provide resilient channels at right angles to studs where indicated on special sound proof partitions. Space channels at 16" o.c.
- 3.3.13 Provide thermal break material to isolate metal studs and furring from steel framing, to eliminate cold bridges.
- 3.4 INSTALLATION - CEILING FRAMING
 - 3.4.1 Space hangers at centres not exceeding 4'-0" each way, in rows parallel with the walls. Area between hangers shall not exceed 16 sq.ft. Supply hanger inserts or tabs in ample time and with instructions for their proper placement.
 - 3.4.2 Use hangers of length required to assure secure anchorage and correct ceiling heights, straight and with a 90° bend at the lower end to engage the runner channels.
 - 3.4.3 Do not secure hangers to pipes, ducts or any electrical or mechanical items.
 - 3.4.4 Provide a row of hangers adjacent to and parallel with the walls for the support of the ends of runner channels at not more than 6" from the ends of runner channels.
 - 3.4.5 Provide hangers to suspend gypsum board ceilings independent of partitions.
 - 3.4.6 Start runners or carrying channels parallel to and not more than 6" away from edge of the ceiling. Ends of channels shall not contact vertical surfaces. Securely wire channels in parallel rows at not more than 4'-0" o.c. to hangers with double strand of tie wire. Twist tie wires up tight without slack.
 - 3.4.7 Channels shall be level and true to a tolerance of 1/8" in 12'-0" in all directions.
 - 3.4.8 Provide 12" lap at runner channel splice. Secure splice with double strand of tie wire at each end. Clustering or lining up of splices will not be permitted.
 - 3.4.9 Frame around fixtures, grilles and other openings. Where ducts, or where a combination of ducts and other items interfere so that hanger spacing exceeds 4'-0" increase the size of the main runners and hanger wire accordingly, to sustain increased loading and span. Provide additional hangers as required to support the weight of lighting fixtures, diffusers, grilles and other built-in items occurring in ceilings.
 - 3.4.10 Securely install furring channels at right angles to the runner channels and at 24" o.c. using furring clips or a double strand of tie wire. Fur around ducts, bulkheads and the like.
- 3.5 INSTALLATION - METAL FURRING DIRECT ATTACHMENT TO MASONRY OR CONCRETE
 - 3.5.1 Secure metal furring runners to masonry or concrete vertically, spaced 24" o.c. Fasten runners 24" o.c. through alternate flanges of runners. Shim runners as required to present a true, plumb line for application of gypsum board.
 - 3.5.2 At windows, doors or similar openings having returns, install lengths of notched and 90°bent pieces of channel horizontally at the returns spaced approximately 24" o.c. Locate runners not more than 2" away from all openings, interior corners, intersections, frames, jambs, control joints and the like.
 - 3.5.3 Mitre furring around all corners. Form mitres by cutting the flanges and bending the web. Do not cut the web to form corners.
- 3.6 APPLICATION - GYPSUM BOARD

- 3.6.1 Take all measurements accurately. Cut boards by scoring the face paper, snapping the core of the board and then cutting the back paper. Smooth the cut edges with a rasp or coarse sandpaper.
- 3.6.2 Erect gypsum board vertically or horizontally whichever results in fewer end joints. Butt joints loosely with maximum gap of 1/4". Do not force boards into position. Place tapered edges next to one another. All end joints shall occur over framing members.
- 3.6.3 Minimize end joints. Align joints with edge of wall openings.
- 3.6.4 Provide approved thermal break material at edges of gypsum board in contact with non-thermally broken metal windows and at exterior door frames.
- 3.6.5 At curved surfaces, score back of gypsum board and wet boards, bend to required radius, and block in position until dry. Apply joint compound and trowel smooth to provide continuous, smooth radius, free from flat spots, facets or trowel marks.
- 3.6.6 Where gypsum board baffle occurs over door or glazed opening, extend baffle across door or glazing opening.
- 3.6.7 Provide special trim as specified at reveals.
- 3.6.8 Apply thermal break material to metal studs, where indicated, before applying gypsum board.
- 3.6.9 In areas where opposite side of partition is open to space below, provide metal lath on concealed side. Install lath with long dimension across the studs. Secure with tie wires at 6" o.c.
- 3.7 APPLICATION - GYPSUM BOARD LAMINATED TO CONCRETE AND/OR CONCRETE BLOCK MASONRY
 - 3.7.1 Ensure base is straight, dry, uncoated, clean and free from efflorescence. Mix laminating adhesive in accordance with manufacturer's directions. Allow to stand 30 minutes before using.
 - 3.7.2 Apply adhesive with a notched trowel to leave 3/8" x 1/2" ribbons, 1-1/4" apart over entire back side of face layer.
 - 3.7.3 Erect gypsum board immediately after spreading adhesive. Use moderate pressure to develop full adhesive contact with substrate.
 - 3.7.4 Temporarily secure gypsum board in place with concrete nails or bracing. Ensure that joints are accurately aligned. Avoid impact or movement of boards until adhesive sets firmly. Remove temporary support when adhesive has set.
- 3.8 APPLICATION - GYPSUM BOARD (MULTIPLE LAYERS)
 - 3.8.1 Use square edged gypsum board for base layer and tapered edge for face layer. Place face layer at right angles to preceding layer. Apply base layer to framing members so that there will be a minimum number of end joints in the face layer. Offset the joints between the two layers a minimum of 10".
 - 3.8.2 Apply base layer to framing members with 1" screws at 12" o.c. in the field and 8" o.c. at the end and edges. End joints may occur on or between framing members provided back blocking with supporting strips is used to assure alignment.
 - 3.8.3 Mix laminating adhesive in accordance with manufacturer's written specifications. Allow to slake.

- 3.8.4 Cut and fit face layer and spread adhesive over back side with a metal spreader blade that has "V" shaped notches 1/2" deep, 5/16" wide and spaced 1-1/2" to 2" o.c.
- 3.8.5 Apply face layer, loosely butting all joints and temporarily hold in place with fasteners of sufficient length to penetrate framing member 3/4". Wipe off any adhesive forced out along the edges. Place temporary fasteners at 16" o.c.
- 3.9 APPLICATION - WATER RESISTANT GYPSUM BOARD
 - 3.9.1 Provide water resistant gypsum board to walls in washrooms.
 - 3.9.2 Apply water resistant gypsum board where ceramic tile is scheduled.
 - 3.9.3 Provide water resistant gypsum board behind mirrors.
 - 3.9.4 Apply water resistant gypsum board in strict accordance with manufacturers' written instructions.
 - 3.9.5 Do not apply water resistant board to ceilings.
 - 3.9.6 Apply coated water resistant gypsum board with black side out.
 - 3.9.7 Give particular attention to sealing of cut edges, utility holes and joints, with approved sealant material. Seal all openings with sealant.
 - 3.9.8 Apply tape over joints and angles.
 - 3.9.9 Apply full bodied coat of sealer prior to application of fixtures and trim.
- 3.10 APPLICATION - CEILING
 - 3.10.1 Unless otherwise noted, construct ceilings in 1/2" thick gypsum board, screw attached at 8" o.c. maximum.
 - 3.10.2 Suspended gypsum board ceilings with joints taped shall be level, to within 1/8" in 12'-0" in all directions.
 - 3.10.3 Make allowance for air-transfer openings in above ceiling partition construction. Review Mechanical Drawings to establish locations. Provide openings in gypsum board baffle (in plenum space) to accommodate all cross-talk silencer ducts. Refer to Mechanical Drawings and specifications for type and location. Co-ordinate with Partition Type and partition Location Plans.
 - 3.10.4 Where slab to slab or baffle above ceiling partitions occur and large mechanical ducts prevent installation of such, a lead blanket is to be used as an alternate. Ensure complete continuous sound seal is provided.
 - 3.10.5 At all gypsum board ceiling areas, air supply and return shall be via continuous slim-line linear diffusers. Locations as indicated on Mechanical Drawings.
 - 3.10.6 Provide all openings in gypsum board ceilings to accommodate sprinklers, exit lights, access panels, pot lights, air diffusers and speakers.
 - 3.10.7 Caulk perimeter of gypsum board ceilings where suspended with sound isolation hangers.
- 3.11 TILE BACKING PANELS

- 3.11.1 Install standard gypsum board panels in areas not subject to wetting to produce a flat surface.
- 3.11.2 Install water resistant gypsum board in locations requiring tile applications in washrooms, and as indicated on the Drawings.
- 3.11.3 Shim surfaces to produce a uniform plane across panel surfaces where tile backing panels abut other types of panels in the same plane.
- 3.12 EXTERIOR SHEATHING BOARD
 - 3.12.1 Install exterior sheathing board to exterior walls in accordance with manufacturer's written instructions. Seal all cut edges, ends, utility holes and fastener heads, as recommended by manufacturer.
 - 3.12.2 Receive masonry veneer anchors from Section 04200 - Masonry and install the masonry veneer anchor to the structural studs. Spacing of the masonry veneer anchor system must be maximum 406mm (16") vertically O.C. and stud spacing horizontally. Sufficient anchors must be provided on each structural stud prior to erection of stud. Sequentially lift anchors as exterior sheathing board is being installed such that each anchor rests on edge of the exterior sheathing board.
 - 3.12.3 Tape and fill all joints and fastener heads using materials recommended by exterior sheathing board manufacturer.
- 3.13 FIRE RESISTANT ASSEMBLIES
 - 3.13.1 Fire resistance rating of gypsum board assemblies and framing shall be as called for on drawings or schedules, and as required to conform with applicable codes and requirements of authorities having jurisdiction.
 - 3.13.2 Appropriate ULC designs as listed in current ULC list of equipment and materials, Volume II, Building Construction, shall be placed when applicable. Extend partitions full height through ceiling space to underside of deck or slab unless otherwise noted on drawings.
 - 3.13.3 Vertical bulkheads in ceiling spaces over fire rated glazed partitions, doors and the like shall have same fire rating as the door or partition over which they occur. All such bulkheads shall be of drywall construction unless otherwise noted.
 - 3.13.4 Use fire rated gypsum board as specified.
 - 3.13.5 Where lighting fixtures, diffusers, and the like are recessed into fire rated ceilings or bulkheads, provide enclosure to maintain required fire rating. Form removable panel to give access to fixture outlet box.
 - 3.13.6 Where fire hose cabinets or other fixtures or equipment are recessed in fire rated walls or partitions, provide drywall enclosure or backing to maintain required fire rating, unless otherwise detailed.
- 3.14 INSTALLATION - FASTENERS AND FASTENING
 - 3.14.1 Apply gypsum board to metal furring, studs, runner channels, angles and other framing with approved screws. Use 1" long screws for fastening gypsum board up to 5/8" thickness to metal and wood furring and framing, and 1-1/4" long screws for fastening gypsum board up to 1" thickness to metal angle and channel runners.

- 3.14.2 Space screws 12" o.c. in field of board and 8" o.c. staggered along abutting edges. Start securing the board in the central portion and work toward the edges and ends. Drive all screws so screw heads provide a slight depression below the surface of the gypsum board without puncturing the face paper. Do not drive screws closer than 3/8" from edges and ends of gypsum board.
- 3.14.3 Use adhesive application for laminating gypsum board direct to other gypsum board in two or more layer construction and direct to concrete and masonry as specified herein before.
- 3.15 FINISHING
 - 3.15.1 Finish gypsum board in conformance to CAN/CSA A82.31-M, except as herein specified.
 - 3.15.2 Apply corner beads to all external vertical and horizontal corners and edges. Apply casing beads where the gypsum board butts against a surface having no trim concealing the juncture.
 - 3.15.3 Erect corner beads and casing beads plumb and level with a minimum number of joints and secured at 6" o.c. with screws in each flange. Stagger fasteners in each flange.
 - 3.15.4 Do not treat joints of laminated gypsum board for at least 24 hours after lamination.
 - 3.15.5 Mix joint compound in accordance with manufacturer's specifications and allow to stand a minimum of thirty minutes before using.
 - 3.15.6 Fill all gaps and screw nail depressions with three coats of joint compound. Allow preceding coat to set before applying subsequent coats.
 - 3.15.7 On all corners apply joint compound to one side of corner and allow to set before applying compound to the other side of corner.
 - 3.15.8 Apply a thin coat of joint compound over the board on each side of joints and embed the reinforcing tape and roll firmly into place. Cover all edges of tape with a thin coat of joint compound. Neatly crease tape at all internal corners. Allow to dry for 24 hours.
 - 3.15.9 Apply joint compound over flanges of all corner beads and casing beads flush with nose of bead and extending at least 3" onto the surface of the board.
 - 3.15.10 After bedding coat has set, apply second coat of joint compound feathered at least 6" on each side of butt joints and 4" past flanges of all beads.
 - 3.15.11 After second coat has set, apply third coat of joint compound and feather to 8" on each side of butt joints and 5" past flanges of all beads.
 - 3.15.12 Feather all coats of joint compound onto adjoining surfaces so that all joints, tape holes and flanges of beads are invisible.
 - 3.15.13 After complete treatment has thoroughly set and after at least 24 hours, sand lightly with fine grit sandpaper to leave it smooth and ready for decoration.
 - 3.15.14 Make the finished work smooth, seamless, plumb, true, flush and with square, plumb, neat corners and edges.
 - 3.15.15 Do not finish joints of non-fire-rated walls in mechanical rooms, above finished ceilings or where acoustic tiles are scheduled.

3.15.16 Provide casing beads to edge of gypsum board on demising partitions where board meets ceiling, and convactor cabinet enclosures, and at gypsum board terminations at recesses to accept carpet base and gypsum board terminations at coffered ceilings and to perimeter of gypsum board panels.

3.15.17 Tape joints in preparation for liquid applied vapour barrier.

3.15.18 Prepare surfaces ready for paint. Correct imperfections appearing after application of prime coat of paint.

3.16 CONTROL JOINTS

3.16.1 Install control joints in gypsum board where it is applied to concrete or masonry, either on furring or by adhesion, in the following locations; at masonry control joints and at junction of dissimilar wall materials.

3.16.2 Provide Control Joints at door panels, at each side of jamb, extending above door head.

3.16.3 Provide control joints in continuous runs of gypsum board at locations indicated or, if not indicated, spaced 30'-0" o.c. maximum at locations as directed by the Consultant.

3.16.4 Install double casing beads, back to back, fitted tightly together, on gypsum board edges at control joints. Finish casing beads but not joint between them.

3.16.5 Where application is on studs, double up studs at control and expansion joints, place one stud on each side of joint.

3.17 SOUND INSULATION

3.17.1 Provide sound attenuation blankets where indicated or required to attain sound attenuation, minimum STC 45 or as otherwise indicated.

3.17.2 Completely fill all spaces between studs laterally with blankets, run continuously from floor to ceiling or structure, over door frames and opening and around corners.

3.17.3 Provide sound attenuation blankets above ceilings as shown, completely covering ceiling to thickness indicated.

3.17.4 Pack sound insulation around cut openings in gypsum board walls and ceilings, behind outlet boxes around plumbing, heating or structural items passing through the system.

3.17.5 Pack sound insulation around openings in floors.

3.17.6 Secure blankets by adhesive or staples to one interior face of gypsum board.

3.17.7 Provide neoprene strips at perimeter of sound partitions as shown.

3.17.8 Provide batt insulation at air transfer ducts.

3.18 SEALING

3.18.1 Provide perimeter sealant (sound seal) at junction of gypsum board with structure, other partitions and at junction with dissimilar materials and adjacent construction. Apply in concealed locations only. Install in strict accordance with sealant manufacturer's written instructions.

- 3.18.2 Seal shall consist of 2 (STC 48 or less), 4 (STC 51) or 5 (STC 52) beads to meet or exceed partition rating.
- 3.18.3 Seal openings around ducts and similar protrusions passing through drywall system, at walls and ceilings.
- 3.18.4 Gypsum board shall be made air-tight around window and door openings. Return gypsum board at door and window openings and butt into window and door frames. At window stools, return gypsum board under stool. Perimeter edges where gypsum board butts to the frame shall be made air-tight with sealant.
- 3.18.5 In order to provide a continuous air barrier, the gypsum board on the exterior walls shall extend behind interior partitions, ducts, mechanical chases, heating units, etc. Coordinate with all relevant trades.
- 3.19 CUTTING AND PATCHING
 - 3.19.1 Do all cutting, patching and making good as required by the installation of work of other trades and co-operate closely with these trades to assure a satisfactory finish. Remove and make good any work which, in the opinion of the Consultant is defective and not acceptable, at no additional cost to the Owner.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.
- 1.1.2 All labour, materials, products, equipment and services to supply and install the porcelain and ceramic tile work required and/or indicated on the Drawings and specified herein.

1.2 REFERENCES

- 1.2.1 ASTM C206-14 Standard Specification for Finishing Hydrated Lime.
- 1.2.2 ASTM C207-06(2011) Standard Specification for Hydrated Lime for Masonry Purposes.
- 1.2.3 CAN/CGSB 19.22-M89 Mildew-Resistant Sealing Compound for Tubs and Tiles.
- 1.2.4 CAN/CSA A3000-13 Cementitious materials compendium(Consists of A3001, A3002, A3003, A3004 and A3005), Includes Update No. 1 (2014), Update No. 2 (2014), Update No. 3 (2014).
- 1.2.5 CSA A82.56-M76 Aggregate for Masonry Mortar.

1.3 QUALIFICATIONS

- 1.3.1 Subcontractor executing work of this Section shall employ installers having a minimum of five (5) years continuous Canadian experience in successful installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.
- 1.3.2 Work of this Section shall be executed by workers especially trained and experienced in this type of work. Have a full time, senior, qualified representative at the Site to direct the work of this Section at all times. Representative shall meet Consultant's approval.
- 1.3.3 Ensure proper use of proprietary materials in strict accordance with the material manufacturer's directions. It shall be the responsibility of the material manufacturer or supplier to furnish these directions to the Contractor and to check periodically at the site to ensure that they are being carried out.

1.4 SUBMITTALS

- 1.4.1 Submit two samples of all materials and products to the Consultant for review.
- 1.4.2 Submit two full size tile samples of each colour and tile selected.
- 1.4.3 Maintenance Instructions: Upon completion of the Work, furnish Consultant with copies of maintenance instructions, containing complete detailed and specific instructions for maintaining, preserving and keeping clean the surfaces of this Work and in particular, giving adequate warning of maintenance practices of materials detrimental to the work of this Section for inclusion in the Operation and Maintenance Manual.

1.5 SITE MOCK-UP

- 1.5.1 Following the pre-installation conference, the Contractor shall install a 10'-0" x 10'-0" dry sample area of porcelain tiles, ceramic mosaic tiles and ceramic wall tile showing all colours of tiles and layout in areas designated later by the Consultant.
- 1.5.2 After approval of tile colours and layout the Contractor shall set tile and grout including one caulked joint under the supervision of the material manufacturer's representative.
- 1.5.3 Upon completion and approval, sample areas shall serve as a standard of quality for the balance of the work of this Section. Subsequent work carried out and not in the Consultant's opinion, equal to the quality standard shall be removed and replaced at no additional cost to the Owner.
- 1.5.4 It shall be the responsibility of the material manufacturer's representative to visit the site during installation, at intervals agreed upon with the Consultant to ensure proper use of proprietary materials and assist the Contractor as may be required, and shall also submit a report to the Consultant of their findings after each site review to ensure their directions are being adhered to.
- 1.5.5 Co-ordinate work of mock-up with related work of other Sections.
- 1.5.6 Accepted work may form a part of the final installation.
- 1.6 **EXTRA STOCK**
- 1.6.1 At completion of work, deliver to the Owner 5% extra quantity of each type of tile, from same production run as installed tiles. Include cost of extra stock as part of the work of this Section.
- 1.7 **DELIVERY, STORAGE, HANDLING AND PROTECTION**
- 1.7.1 Co-ordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location. Do not load any area beyond the design limits.
- 1.7.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.
- 1.7.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.
- 1.7.4 Restrict traffic by other trades during installation.
- 1.7.5 Provide adequate protection of completed tiled surfaces to prevent damage by other trades until final completion of this project. Minimum protection shall consist of 4 mil polyethylene sheets lapped 4" and taped.
- 1.7.6 Heavily travelled areas shall have additional 1/2" thick fibreboard sheet protection with taped joints over polyethylene sheet protection as specified above.
- 1.7.7 Protect exposed edges of floor tile with same thickness as tile x 4" wide tapered strip of plywood adhered to floor until adjoining floor finish is to be installed.
- 1.8 **ENVIRONMENTAL REQUIREMENTS**
- 1.8.1 Maintain ambient temperature between 10 deg C and 20 deg C, for a period of 72 hours before commencement, during installation and 72 hours after installation.

- .1 Temperature: Maintain tile materials and substrate temperature between TTMAC recommended minimum and maximum temperature range; unless indicated otherwise by manufacturer, for 48 hours before and during installation until materials are fully set and cured; provide additional heat during winter months or at any other time when there is a risk that surface temperatures may drop below minimum recommended temperatures.
 - .2 Ventilation: Maintain adequate ventilation where Work of this Section generates toxic gases or where there is a risk of raising relative humidity to levels that could damage building finishes and assemblies.
- 1.8.2 Moisture content of floor shall not exceed a maximum of 3 lbs. of water per 1,000 sq. ft. of concrete slab area over a 24 hour period as measured by one of the following methods, as approved by Consultant:
- .1 Does not exceed 3% as measured by Calcium Carbide Hygrometer procedure.
 - .2 Does not exceed 5% as measured by normal Protimeter.
- 1.9 WARRANTY
- 1.9.1 Warrant the work of this Section against defects in materials for a period of five (5) years and in workmanship for a period of two (2) years, except as a result of structural failure of substrate.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- 2.1.1 Dynamic Coefficient of Friction: Tile installed on walkway surfaces shall achieve a DCOF measurement of 0.42 as determined by testing identical products per ANSI A137.1-2012. Where tile is installed in wet environments, including washrooms and showers, test method shall also be carried out on wet tile.
- 2.1.2 Floor Level Tolerances: Provide materials to attain floor levelness tolerances required by this Section; calculate quantity of materials based on the difference between the specified tolerance and the initial tolerance specified in Section 03 35 00; measurements will be made in the same manner as used in Section 03 35 00.
- .1 Small format floor tile: Tiles having dimensions less than 100 mm x 100 mm require floor flatness as specified in Section 03 35 00.
 - .2 Standard format floor tile: Tiles having dimensions from 100 mm x 100 mm and less than 400 mm x 400 mm require floor flatness measured to a minimum FF35; equivalent to 5 mm with no more than 2 gaps under a 3000 mm straightedge measurement.
 - .3 Large format floor tile: Tiles having dimensions 400 mm x 400 mm and larger require floor flatness measured to a minimum of FF50; equivalent to 3 mm with no more than 2 gaps under the 3000 mm straightedge measurement.
 - .4 Wall tiles: Provide wall leveling similar to that specified for floors, for tiles having similar sizes listed above.

2.2 MATERIALS

- 2.2.1 **POR (wall):** 305mm x 610mm "Glocal Series – Clear GC01", Natural finish, Porcelain Tile from Centura, Grout 909-Sterling, or approved equivalent.

- 2.2.2 **POR (floor):** 610mm x 610mm “Glocal Series – Ideal GC03”, Natural finish, Porcelain Tile from Centura, Grout 939-Mist, or approved equivalent.
- 2.2.3 **POR (shower floor):** 50mm x 50mm “Penta-Normatech- Dark Taupe ONI2006177”, Matte finish, Porcelain Tile from Centura, Grout 939-Mist or approved equivalent.
- 2.2.4 **GLA1:** 50mm x 300mm “Miki Glass Series – Sea Haze MTG102”, Glossy finish, Glass Tile from Centura, Grout 909-Sterling, or approved equivalent.
- 2.2.5 **GLA2:** 50mm x 300mm “Miki Glass Series – Atmosphere OPUS662212”, Glossy finish, Glass Tile from Centura, Grout 909-Sterling, or approved equivalent.

Refer to approved sample board, Arch floor finish and interior elevation drawings.

2.3 TRIMS:

- 2.3.1 Wall Outside Corner Coved Edge Strips: Stainless steel edge strips, 6 mm radius along surface edge; height as required to suit tile installation; with integral perforated anchoring leg for setting the strip into the setting material. Basis-of-Design Materials: Schlüter RONDEC.
- 2.3.2 Wall Inside Corner Coved Edge Strips: Roll formed stainless steel inside corner, cove shaped joint profile with perforated anchoring legs for setting the corner joint into the setting material; heights as required to suit installation, complete with pre-formed outside and inside corners, connections, and pre-formed end caps. Basis-of-Design Materials: Schlüter Dilex EHK.
- 2.3.3 Floor Transition Straight Edge Strips: Stainless steel edge strips, 2 mm wide at top edge; height as required to suit tile installation; with integral perforated anchoring leg for setting the strip into the setting material. Basis-of-Design Materials: Schlüter Schiene.
- 2.3.4 Countertop to Backsplash Transition Strips: Extruded satin anodized aluminum cove section with 10mm radius, height as required to suit tile installation; with integral perforated anchoring leg for setting the strip into the setting material. Basis-of-Design Materials: Schlüter Dilex AHK.

2.4 SETTING BEDS

- 2.4.1 Cement: CAN/CSA A3000-08, grey or white Portland cement for mortar, white Portland cement for grout.
- 2.4.2 Sand: CSA A82.56-M, sharp, screened concrete sand free from inorganic and deleterious materials.
- 2.4.3 Water: Clean and free from oil, acid, alkali, organic matter or other deleterious substances.
- 2.4.4 Lime: ASTM C206 or ASTM C207, Type S, hydrated lime.
- 2.4.5 Surface Preparation Materials: Levelling Bed/Mortar Additive: Performance standard meeting requirements of ANSI A108.1, Type 2; Acceptable material:
- .1 Flextile Ltd., Mortar Bed with #43 Additive.
 - .2 MAPEI Inc. Mapecem Premix PL50.
 - .3 Custom Building Products Level Quik Underlayment

- 2.4.6 Interior Thin Set Wall System: Dry set mortar meeting or exceeding the requirements of ANSI A108.1 formulated for thin set applications of ceramic biscuit tile, factory sanded mortar consisting of portland cement, sand and additives requiring only potable water to be added for installation:
- .1 Flextile Ltd., #51 Floor and Wall Mix
 - .2 MAPEI Inc. Kerabond
 - .3 Custom Building Products Premium Blend Thinset
- 2.4.7 Interior Thin Set Floor System: Dry set mortar meeting or exceeding the requirements of ASTM C627 for Heavy installation using latex modified, portland cement mortar meeting requirements of ANSI A108.1:
- .1 Flextile Ltd., #53 Floor Mix
 - .2 MAPEI Inc. Kerabond
 - .3 Custom Building Products Master Blend Thinset
- 2.4.8 Large Format Tile Mortar: Medium bed, dry set polymer modified mortar system designed specifically for use with large format tile materials over 305mm x 305mm (12" x 12"), requiring only the addition of water, rated for extra heavy service installation:
- .1 Flextile Ltd., #50 PM Medium Bed Thin Set Mortar
 - .2 MAPEI Inc., Ultracontact
 - .3 Custom Building Products, Complete Contact
- 2.4.9 Epoxy Adhesive Setting Materials: Thin set adhesive system using 100% solids epoxy resin and epoxy hardener meeting or exceeding the requirements for ANSI A108.1; stain proof, chemical resistant and having high temperature resistance, water cleanable.
- .1 Flextile Ltd., Flex Epoxy 100 Setting
 - .2 MAPEI Inc. Ker 410 Kerapoxy Mortar
 - .3 Custom Building Products 100% Solids Epoxy Mortar
- 2.4.10 All materials comprising a system shall be from one manufacturer and shall be compatible with each other.
- 2.5 GROUT
- 2.5.1 Colours will be selected from manufacturer's full range.
- 2.5.2 Portland Cement Grout for Wall and Floor Joints $\leq 1/8"$ Interior Only: factory blended polymer modified mixture meeting requirements of ANSI A108.1:
- .1 Flextile Ltd., 500 Series Unsanded Grout
 - .2 MAPEI Inc. Ker 800 Unsanded Grout
 - .3 Custom Building Products Polyblend Unsanded Grout
- 2.5.3 Latex-Portland Cement Grout for Floors with Joints $\geq 1/8"$ Interior or Exterior: factory blended stain resistant latex modifiers, portland cement and graded silica sand and dry-set grout and meeting requirements of A108.1:
- .1 Flextile Ltd., 600/100 Series Sanded Grout
 - .2 MAPEI Inc. Keracolor S Sanded Grout
 - .3 Custom Building Products Polyblend Sanded Grout

2.5.4 Epoxy Grout for Floors and Walls: Water cleanable, chemical resistant, factory blended modified portland cement compound with 100% epoxy additives and hardeners meeting requirements of ANSI A108.1:

- .1 Flextile Ltd., Flex Epoxy 100 Grout
- .2 MAPEI Inc. Ker 400 Kerapoxy Grout
- .3 Custom Building Products 100% Solids Epoxy Grout

2.6 MIXES

2.6.1 Underlayment, by volume: 3 parts sand, 1 part cement and water with latex additive as required for proper trowelling consistency.

2.6.2 Thin set mortar: Mix to manufacturer's recommendations.

2.7 MISCELLANEOUS MATERIALS

2.7.1 Primers: As recommended by the manufacturer of the setting bed for the various substrate conditions.

2.7.2 Edge moulding: L-shaped extruded aluminum, anodized finish, 1/4" face depth x 7/8" perforated concealed flange, one piece length per location, by Ramca Tile, or other approved manufacture.

2.7.3 Polyethylene film: 0.1 mm (4 mil) thick.

2.7.4 Sealant and backing: CAN/CGSB 19.22-M, one component silicone, 'DC786' by Dow Corning Canada Limited or other approved manufacture, colour to match grout; tested by sealant manufacturer for non-staining of tile specified. Submit test reports. Joint filler as recommended by sealant manufacturer.

2.8 MEMBRANES

2.8.1 Crack Suppression Membranes: Load bearing, premanufactured self adhering lightweight fabric reinforced crack isolation membrane; nominal 1 mm thick manufactured to accommodate in-plane substrate movement in thin set applications meeting requirements of ANSI A108.1 and as follows:

- .1 Flextile Ltd., 1000 Flexilastic Crack Isolation Membrane
- .2 MAPEI Inc., Mapeguard 2

2.8.2 Waterproofing Membranes: Load bearing, reinforced, liquid applied membrane; manufactured to accommodate flood testing and reduce the incidence of thermal shock cracking to tiling installations; meeting requirements of ANSI A108.1 and as follows:

- .1 Flextile Ltd., Flex WP-980 Waterproof and Crack Isolation Membrane
- .2 MAPEI Inc. Mapelastic 315 Waterproofing and Reinforcing Fabric
- .3 Custom Building Products Level Quik Waterproof and Anti-Fracture Membrane

2.9 SEALERS

2.9.1 Floor sealer and protective coating: Clear, non-slip "Traction Master", or other approved manufacture.

PART 3 - EXECUTION

4.1 INSPECTION

- 4.1.1 Examine the work upon which the work of this Section depends and report any defects to the Consultant.
- 4.1.2 Ensure that backings are structurally sound, level and plumb within the required tolerances.
- 4.1.3 Tolerance of substrate for thin set mortar or epoxy setting bed is used, ensure that overall surface variations do not exceed plus/minus 3 mm (1/8") and 1.6 mm (1/16") within any single running foot, non-cumulative.
- 4.1.4 Ensure that access doors are set to provide a flush installation of the tile.

4.2 PREPARATION

- 4.2.1 Where work is applied to areas having floor drains, apply primer at the rate of 5 sq m to 6 sq m/4.5 (250/300 sq.ft./gal.). Trowel apply underlayment to form a continuous and uniform slope from the room edges to drains provided.
- 4.2.2 Prime gypsum board before application of dry set mortar setting bed.
- 4.2.3 Ensure that concrete substrates are free from latency and foreign matter which would impair bond. Grind concrete if necessary to present a sufficiently smooth surface to ensure proper performance of membrane. Vacuum substrate.
- 4.2.4 Crack Suppression Membranes:
 - .1 Prepare all surfaces of non-structural and structural cracks in strict accordance with the crack suppression membrane manufacturer's written instructions.
 - .2 Prime and fill all surfaces of non-structural and structural cracks in strict accordance with the crack suppression membrane manufacturer's written instructions.

4.3 INSTALLATION - GENERAL

- 4.3.1 Do tile work in accordance with Specification Guide 09 30 00 Tile Installation Manual 2009/2010, produced by Terrazzo Tile and Marble Association of Canada (TTMAC) and Construction Specifications Canada (CSC), except where specified otherwise.

4.4 INSTALLATION - SETTING BED

- 4.4.1 Use thin set with latex mortar system for application of tile to concrete floors in accordance with Detail No. 311F-07.
- 4.4.2 Thin set mortar system for masonry or concrete walls: Apply slight levelling coat plaster base and bond coat in accordance with TTMAC Detail 303W-02.
- 4.4.3 Thin set mortar with latex additive for application of tile to water resistant gypsum board in accordance with Detail 304W-02.
- 4.4.4 Use epoxy setting bed for ceramic wall tile on plywood.

- 4.4.5 On metal access doors, install ceramic tile using epoxy setting bed with rust-inhibitive additives. Pressure apply setting bed to 1.6 mm (1/16") thickness with trowel and comb it prior to the setting of tiles. Mix setting bed in accordance with the written recommendations of the manufacturer.

4.5 INSTALLATION - TILE

- 4.5.1 Back-mortar, tile larger than 150 mm x 150 mm (6" x 6").
 - 4.5.2 Unless otherwise detailed, lay out tile so that fields or patterns are centred on wall and floor areas, or architectural features and so that no tile less than one-half size occurs. Align wall, floor and base tile joints at wall base, if tile sizes are suitable. Do not use cut tiles at finished ceiling level.
 - 4.5.3 Schedule delivery of tile so that a homogeneous blend of colours can be achieved throughout entire extent of this work. Colour blend tile.
 - 4.5.4 Distribute production run varieties evenly maintaining the continuity of pattern.
 - 4.5.5 Unless otherwise detailed, arrange accessories in tile work so that they are evenly spaced, centred with joints and set true with correct projection. Ensure that each tile has continuous solid backing. Saw cut and trim tile as required around fittings, pipes, holdfasts, and fixtures. Cut or drill and set holdfasts, bolts and anchors required for fastening fixtures and fittings in tile areas. Grind cut edges smooth.
 - 4.5.6 Back butter all floor tile.
 - 4.5.7 Finish tile work clean, free of broken, damaged or defective tiles. Reject warped tiles.
 - 4.5.8 Joints in base shall match floor patterns. Joints shall be watertight without voids, cracks or excess grout.
 - 4.5.9 Cure tile installations for three days, sponging and wetting down as necessary.
 - 4.5.10 Unless otherwise noted, install tile with 4.6 mm (3/16") maximum width joints.
 - 4.5.11 Finish exposed edge of tiles with edge moulding at termination of wall, termination of wall tile panels, at external corner and elsewhere as required to provide finished appearance to tile application where bullnosed tile is not used. Secure moulding to substrate straight and true, Grout in perforated flange.
 - 4.5.12 Sound tiles after setting and remove and replace tiles not fully bedded.
 - 4.5.13 Re-point joints after cleaning to eliminate imperfections. Avoid scratching tile surfaces.
 - 4.5.14 Finished tile work shall be clean and free of tiles which are pitted, chipped, cracked or scratched. All damaged tile shall be removed and replaced.
 - 4.5.15 Where indicated on Drawings or as required, install continuous single piece metal edge trims centred under doors in closed position and other locations where tile meets other floor finishes.
- #### 4.6 CONTROL JOINTS AND SEALANT
- 4.6.1 Provide control joint in tile at locations where substrate changes to different material or construction, between new and existing substrates, where tile abuts other hard material, where

areas change direction, at similar joints in structure, where structural substrate abuts non-structural substrate, at 4.8 m (16'-0") maximum in each direction as determined by tile pattern, around room perimeter and where indicated.

- 4.6.2 Apply sealant around fittings penetrating tile work including pipes and drains, around door frames, between tile and threshold, around fixtures, escutcheon plates, along floor/wall junction, and similar areas. Coordinate sealant application at wall/base junction with floor and base installation.

4.7 GROUTING

- 4.7.1 Ensure setting bed has cured before commencing grouting.
- 4.7.2 Grout floor tile using acid resistant grout.
- 4.7.3 Grout wall tile using dry curing grout.
- 4.7.4 Grout epoxy set tile using epoxy grout.
- 4.7.5 Where indicated, colour grout to match middle range of tile colours, as directed. Grout to suit the contour of the tile. Fill joints, tool and make uniform in appearance without voids or cracks and watertight. Where floor and wall tile are matching, use floor grout on walls.
- 4.7.6 Make joints between tile uniform, plumb, straight, true and aligned with adjacent tile. Ensure sheet layout is not visible after installation. Align patterns.
- 4.7.7 When grout hardens damp cure for next 3 days.

4.8 WATERPROOFING

- 4.8.1 Install waterproofing in accordance with waterproofing manufacturer's written instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate.
- 4.8.2 Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

4.9 SEALING

- 4.9.1 Seal unglazed floor tile in accordance with manufacturer's instructions to provide a matte sheen.

4.10 FIELD QUALITY CONTROL

- 4.10.1 Sound walls and floors with a solid object. If there is a hollow sound remove grout around that tile and check tile adhesion.
- 4.10.2 Ensure that adhesive containers bear certification of compliance with specified standards.
- 4.10.3 Ensure that tile containers are labelled with grade seals.

4.11 CLEANING AND FINISHING

- 4.11.1 Clean, seal and finish tile works installed under this Section of the work in accordance with TTMAC Maintenance Guide.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 General Conditions, Supplementary Conditions and Division 01 apply to this Section.

1.2 SECTION INCLUDES

1.2.1 Waterproofing Membrane.

1.2.2 Floor drain, with integrated bonding flange.

1.2.3 Prefabricated shower components.

1.2.4 Waterproof building panel for ceramic and stone tile.

1.2.5 Setting materials.

1.3 RELATED REQUIREMENTS

1.3.1 Section 06 10 00: Rough Carpentry

1.3.2 Section 09 29 00: Gypsum Board

1.3.3 Section 09 30 00: Porcelain and Ceramic Tile

1.3.4 Section 10 28 00: Washroom Accessories

1.4 REFERENCES

1.4.1 CSA B79-08: Floor, Area, and Shower Drains, and Cleanouts for Residential Construction.

1.4.2 IAPMO IGC 195: Interim Guide Criteria for Floor Drain with Integrated Bonding Flange.

1.4.3 Tile Council of North America (TCNA) Handbook for Ceramic Tile Installation.

1.4.4 Terrazzo, Tile and Marble Association of Canada (TTMAC) Specification Guide 09300 Tile Installation Manual.

1.4.5 American National Standard Specifications for the installation of ceramic tile A108 / A118 / A136.1.

1.5 SUBMITTALS

1.5.1 Submit submittals in accordance with the General Conditions and Section 01 33 00.

1.5.2 Product Data

1.6 SUBMITTALS

1.6.1 Submit submittals in accordance with the General Conditions and Section 01 33 00.

1.6.2 Product Data: Manufacturer's data sheets on each product to be used, including:

.1 Preparation instructions and recommendations.

WATERPROOFING MEMBRANE TILING MATERIALS AND ACCESSORIES

- .2 Storage and handling requirements and recommendations.
- .3 Installation methods.

1.6.3 Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and finish.

1.6.4 Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.6.5 Warranty document showing duration and scope to be submitted with product submittals.

1.7 QUALITY ASSURANCE

1.7.1 Installer Qualifications: Company specializing in performing the work of this section with minimum five years' experience.

1.7.2 Source Limitations for Setting Materials and Accessories: Obtain product of a uniform quality for each application condition from a single manufacturer.

1.7.3 Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

- .1 Finish areas designated by Architect.
- .2 Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
- .3 Refinish mock-up area as required to produce acceptable work.

1.7.4 Preinstallation Conference: Conduct conference at the Project site.

- .1 Convene one week prior to commencing work of this section.
- .2 Require attendance of installation material manufacturer, tile supplier, tile installer and installers of related work. Review installation procedures and coordination required with related work.
- .3 Meeting agenda includes but is not limited to:
 - .1 Surface preparation.
 - .2 Tile and installation material compatibility.
 - .3 Manufacturer and installer warranty duration and scope covered by warranty.
 - .4 Edge protection, transition, and pre-fabricated movement joint profiles.
 - .5 Waterproofing techniques.
 - .6 Crack isolation techniques.

1.8 DELIVERY, STORAGE, AND HANDLING

1.8.1 Store products in manufacturer's unopened packaging until ready for installation.

1.8.2 Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

1.8.3 Store materials in a dry, warm, ventilated weathertight location.

1.9 PROJECT CONDITIONS

1.9.1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 WARRANTY

1.10.1 Provide sample warranty during submittal process.

- 1.10.2 Acknowledge warranty duration and scope covered by warranty.
- 1.10.3 Coordinate Work with other operations and installation of floor finish materials to avoid damage to installed materials.
- 1.10.4 Obtain products of a uniform quality for each premanufactured tile profile, and mortar and waterproofing and uncoupling membrane from a single manufacturer, to maintain the installation system and provide multi-product warranty from selected manufacturer.
- 1.11 COORDINATION
 - 1.11.1 Coordinate Work with other operations and installation of floor finish materials to avoid damage to installed materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- 2.1.1 Acceptable Manufacturer: Schluter Systems L.P., which is located at: 194 Pleasant Ridge Road.; Plattsburgh, NY 12901-5841; ASD Toll Free Tel: 800-472-4588; Fax: 800-477-9783; Email: specassist@schluter.com; Web: www.schluter.com/schluter-us/en_US/.
- 2.1.2 Acceptable Manufacturer: Schluter Systems (Canada) Inc., 21100 Chemin Ste-Marie, Ste-Anne-de-Bellevue, QC H9X 3Y8. Tel: (800) 667-8746. Fax (514) 336-2410. Email: specassist@schluter.com; Web: www.schluter.ca.
- 2.1.3 Requests for substitutions will be considered in accordance with provisions of Section 01 63 00.

2.2 SETTING MATERIALS

3.2.1 Schluter®-ALL-SET

- .1 Description: specialized sag-resistant modified thin-set mortar specifically formulated for use with Schluter membranes and boards. It is engineered for use both under and over all DITRA and KERDI products. ALL-SET is suitable for use with ceramic, porcelain, and stone tile, including large and heavy tile, in conjunction with Schluter®-Systems' uncoupling and waterproofing membranes. Meets the requirements of ANSI A118.4T, A118.11, and A118.15T.
- 2. Color: White.

2.3 WATERPROOFING MEMBRANE

- 2.3.1 Project specific warranty to be provided from Schluter Systems L.P. by Tile Contractor.
- 2.3.2 Schluter-KERDI: Polyethylene Membrane: 0.008 inch (0.2 mm) thick, orange with polypropylene fleece laminated on both sides.
 - .1 Meets or exceeds requirements of the "American national standard specifications for load bearing, bonded, waterproof membranes for thin-set ceramic tile and dimension stone

- installation A118.10.
 - .2 Listed by cUPC.
 - .3 Evaluated by ICC-ES. See Report No. ESR-2467.
 - .4 Corners and seals: Matching preformed inside corners. Color: Orange.
 - .5 Corners and seals: Matching preformed outside corners. Color: Orange.
 - .6 Corners and seals: Matching preformed pipe seals. Color: Orange.
 - .7 Corners and seals: Matching preformed mixing valve seals. Color: Orange.
- 2.3.3 Schluter-KERDI-BAND & KERDI-KERECK-F WATERPROOFING CORNERS: Seams and Corners material to be 0.004 inch (0.1 mm) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides. Width: As required.
- 2.3.4 Schluter- KERDI-SEAL-PS/-MV SEAL: Pipe seal with overmolded rubber gasket and mixing valve seal with overmolded rubber gasket. Material to be 0.004 inch (0.1 mm) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides. Size: As required.
- 2.4 UNCOUPLING MEMBRANE
- 2.4.1 Project specific warranty to be provided from Schluter Systems L.P. by Tile Contractor.
- 2.4.2 Schluter-DITRA: 1/8 inch (3 mm) thick, orange, high-density polyethylene membrane.
- .1 Grid Structure: 1/2 x 1/2 inch (12 x 12 mm) square cavities, each cut back in a dovetail configuration.
 - .2 Anchoring Fleece: Polypropylene laminated to its underside.
 - .3 Standards Compliance:
 - .1 Conforms to definition for uncoupling membranes in the Tile Council of North America Handbook for Ceramic Tile Installation.
 - .2 Meets or exceeds the requirements of the "American national standard specifications for load bearing, bonded, waterproof membranes for thin-set ceramic tile and dimension stone installation A118.10.
 - .3 Listed by cUPC and is evaluated by ICC-ES. See Report No. ESR-2467.
 - .4 Waterproofing Seaming Membrane: KERDI BAND Seams and Corners. Material to be 0.004 inch (0.1 mm) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides.
- 2.5 FLOOR DRAIN WITH INTEGRATED BONDING FLANGE
- 2.5.1 Project specific warranty to be provided from Schluter Systems L.P. by Tile Contractor.
- 2.5.2 Schluter-KERDI-LINE DRAIN, Brushed Stainless Steel: Linear floor drain consisting of a formed stainless steel channel body and grate assembly that can be seamlessly adjusted to tile or stone covering thickness from 1/8 inch (3 mm) to 1 inch (25 mm).
- .1 Channel Body: Trough Width: 2-1/4 inch (57 mm). No-Hub Outlet: 2 inch (50 mm). Bonding Flange: 7/8 inch (22 mm) wide laminated with a collar made of the Schluter-KERDI waterproofing membrane.
 - .2 Drain Type: As referenced in methods B422 and B422 STONE in the Tile Council of North America Handbook for Ceramic, Glass, and Stone Tile Installation.
 - .3 Channel Body Material: Stainless Steel 304 (1.4301 equals V2A).
 - .4 Channel Body and Grate Nominal Length: To be determined.
 - .5 Grate Frame Height: To be determined.
 - .6 Grate Design: To be determined.
 - .7 Drain Outlet: To be determined.
 - .8 Drain Grate Connector Plate: To be determined.

WATERPROOFING MEMBRANE TILING MATERIALS AND ACCESSORIES

- 2.5.3 Schluter-KERDI-DRAIN: Stainless steel floor drain, 9-27/32 inch (250 mm) diameter integrated bonding flange with 3 inch (75 mm) no-hub outlet, and grate assembly.
- .1 Grate Assembly: Stainless steel grate, height adjustment collar, and lateral adjustment ring with trapezoid perforations.
 - .2 Listed by UPC.
 - .3 Meets requirements of "International Association of Plumbing and Mechanical Officials Interim Guide Criteria for Floor Drain with Integrated Bonding Flange" (IGC 195), listed by CSA to meet requirements of the Canadian Standards Association standard, "Floor, Area, and Shower Drains, and Cleanouts for Residential Construction" (CSA B79),
 - .4 Drain Detail: As referenced in method B422 and B422C of the Tile Council of North America Handbook for Ceramic Tile Installation.
 - .5 Drain Housing Material: Stainless Steel.
 - .6 Grate Type, Material, and Finish:
 - .1 Classic: Arc-shaped and trapezoid-shaped openings.
 - 1.To be determined.
 - .7 Nominal Grate Size: To be determined.
 - .8 Drain Outlet: To be determined.
- 2.6 PREFABRICATED SHOWER COMPONENTS
- 2.6.1 Project specific warranty to be provided from Schluter Systems L.P. by Tile Contractor.
- 2.6.2 Schluter-KERDI-SHOWER-LTS/-L/-LS: Prefabricated, sloped shower tray base with integrated KERDI waterproofing.
- .1 Material: Expanded Polystyrene. 3.75 lbs per cu ft (60 kg per cu m) density.
 - .2 Removable recessed section for drain placement.
 - .3 In compliance with IAPMO PS 106-2015el.
 - .4 Listed by cUPC.
 - .5 Evaluated by ICC-ES; see Report No. PMG - 1204.
- 2.6.3 Schluter-KERDI-SHOWER-T/-TS/-TT: Prefabricated, sloped shower tray base with integrated KERDI waterproofing.
- .1 Material: Expanded Polystyrene. 3.75 lbs per cu ft (60 kg per cu m) density, self-extinguishing (HF-1 rating per UL-94).
 - .2 Removable Recessed Section: 12.6 inch (320 mm) diameter.
 - .3 In compliance with IAPMO PS 106-2015el.
 - .4 Listed by cUPC.
 - .5 Evaluated by ICC-ES; see Report No. PMG - 1204.
- 2.6.4 Schluter-KERDI-BOARD-SC (For Shower with Curb): Prefabricated waterproof Shower Curb.
- .1 Rigid extruded polystyrene foam building element panel, with reinforcement material and polypropylene fleece webbing laminated on both sides for thin-set ceramic tile and dimension stone installations.
 - .2 Size: To be determined.
 - .3 Accessories provide with SCHLUTER RONDEC PROFILE for convex corners and SCHLUTER DILEX-EKE PROFILE for concave corners
- 2.6.5 Schluter-KERDI-SHOWER-R (For Curbless Shower): Prefabricated, sloped shower ramp with integrated KERDI waterproofing.
- .1 Material: Expanded Polystyrene. 3.75 lbs per cu ft (60 kg per cu m) density.
 - .2 In compliance with IAPMO PS 106-2015el.
 - .3 Listed by cUPC.
- 2.6.6 Evaluated by ICC-ES; see Report No. PMG - 1204
- WATERPROOF BUILDING PANEL FOR CERAMIC AND STONE TILE

- 2.6.7 Project specific warranty to be provided from Schluter Systems L.P. by Tile Contractor.
- 2.7 CEMENT BOARD: Refer to Section 09 29 00 Gypsum Board.
- 2.8 Schluter-SHELF-W: Stainless steel rectangular shelf with double anchoring leg for installation in tandem with tile

PART 3 – EXECUTION

- 3.1 EXAMINATION
 - 3.1.1 Do not begin installation until substrates have been properly prepared.
 - 3.1.2 If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- 3.2 PREPARATION
 - 3.2.1 Clean surfaces thoroughly prior to installation.
 - 3.2.2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- 3.3 INSTALLATION
 - 3.3.1 Install in accordance with manufacturer's instructions.
- 3.4 PROTECTION
 - 3.4.1 Protect installed products until completion of project.
 - 3.4.2 Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

1. PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.
- 1.1.2 This Section includes requirements for supply and installation of ceilings consisting of acoustic panels, stretch-fabric ceiling systems, complete with exposed suspension system and trim.

1.2 REFERENCES.

- | | | |
|--------|--|---|
| 1.2.1 | AMA-1-11 | Ceiling Sound Transmission Test by the Two-Room Method. |
| 1.2.2 | ASTM A580/A580M-98 | Standard Specification for Stainless Steel Wire. |
| 1.2.3 | ASTM A635/A635M-15 | Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability, General Requirements for. |
| 1.2.4 | ASTM A653/A653M-20 | Standard Specification for Steel Sheet, Zinc- Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process. |
| 1.2.5 | ASTM A641/A641M-98 | Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire. |
| 1.2.6 | ASTM C423-17 | Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method. |
| 1.2.7 | ASTM C635/C635M-17 | Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings. |
| 1.2.8 | ASTM C636/C636M-08 | Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustic Tile and Lay-In Panels. |
| 1.2.9 | ASTM E84-12a | Standard Test Method For Surface Burning Characteristics of Building Materials. |
| 1.2.10 | ASTM E1111/E1111-14 | Standard Test Method for Measuring the Interzone Attenuation of Ceiling Systems. |
| 1.2.11 | ASTM E1264/E1264M-14 | Standard Classification for Acoustic Ceiling. |
| 1.2.12 | ASTM E1414/E1414M-21 (2017) | Standard Test Method for Airborne Sound Attenuation between Rooms Sharing a Common Ceiling Plenum. |
| 1.2.13 | ASTM E1477-98A (2017)e1 | Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers. |
| 1.2.14 | Ceilings and Interior Systems Construction Association (CISCA) | Ceiling Systems Handbook |
| 1.2.15 | CAN/ULC S102-10 | Surface Burning Characteristics of Building Materials and Assemblies. |

1.3 QUALITY ASSURANCE

- 1.3.1 Install ceilings by mechanics skilled in this trade and in accordance with system manufacturer's printed directions to produce a finished ceiling level, in true plane, free from warped, soiled or damaged tile or grid. Where manufacturer's directions are at variance with Drawings, consult the Consultant before proceeding.

1.4 SUBMITTALS

- 1.4.1 Product Data: Submit product data for each type of product specified.
- 1.4.2 Submit shop drawings indicating complete layout of sound baffles, hanger spacing, fastening details, splicing method and change in level details. Show areas of co-ordination with other trades and erection sequence.
- 1.4.3 Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling mounted items indicating the following:
- .1 Ceiling suspension system members.
 - .2 Method of attaching suspension system hangers to building structure.
 - .3 Ceiling mounted items including light fixtures; air outlets and inlets; speakers; sprinklers; and special mouldings at walls, column penetrations, and other junctures of acoustic ceilings with adjoining construction.
- 1.4.4 Submit 3 copies of manufacturer's maintenance instructions.
- 1.4.5 For special size units, conduct a load test to ensure ceiling grid will not deflect more than 1/360 span. Submit test report.
- 1.4.6 Obtain approval of hydro authorities having jurisdiction for ceiling grid and supports as related to the support of light fixtures. Adjust grid, fixing devices, and support hangers or guy wire to obtain approval. Submit copy of approval in triplicate to the Consultant.
- 1.4.7 Obtain and submit anchor manufacturer's certification for hanger anchors to be used, stating that anchors are suitable for hanger loading, spacing, and other conditions relating to use intended. Submit anchor manufacturer's instructions for anchor installation.
- 1.4.8 Submit representative samples of colour and finish of all exposed materials, including factory detailed edge and representative samples of mounting devices.

1.5 MOCK-UP

- 1.5.1 Erect in area designated a 3 m x 3 m (10'-0" x 10'-0") sample installation. Modify or replace mock-up to obtain approval. After acceptance, retain mock-up as standard of quality for acoustical ceiling installation. Mock-up shall contain typical lighting fixture, and diffusers.
- 1.5.2 Do not begin fabrication and erection of remainder of ceiling system until mock-up has been inspected and approved.

1.6 PRODUCT DELIVERY, HANDLING, AND STORAGE

- 1.6.1 Deliver materials in their original wrappings or containers with manufacturer's labels and seals intact and store in a dry area under cover and clear of the ground.
- 1.6.2 Ship grid members and mouldings in rigid crates and avoid damage. Bent or deformed material will be rejected.

1.6.3 Suitably wrap members and protect against damage.

1.6.4 Project Conditions:

- .1 Protect system components from excessive moisture in shipment, storage, and handling. Deliver in unopened bundles and store in a dry place with adequate air circulation. Do not deliver materials to building in wet conditions such as concrete, plaster, paint and adhesives have been completed and cured to a condition of equilibrium.

1.7 ENVIRONMENTAL REQUIREMENTS

1.7.1 Do not commence installation until glazing has been completed and exterior openings closed in. Maintain humidity not exceeding 65% where mineral panels are used and temperature in the range of 12°C for 72 hours prior to commencement of work and maintain this temperature until completion.

1.8 EXTRA STOCK

1.8.1 Leave five (5) percent in sealed cartons of each type of panel upon completion, and two (2) percent of each suspension system and trim for Owner's maintenance. Panels shall be from same production run as panels installed. Identify cartons as to type and location of installation.

2. **PART 2 - PRODUCTS**

2.1 MANUFACTURERS

2.1.1 Acceptable Materials Manufacturers: Subject to compliance with requirements specified in this Section, manufacturers offering products that may be incorporated into the Work include the following:

- .1 Armstrong World Industries, Inc.
- .2 Chicago Metallic
- .3 CertainTeed
- .4 CGC Interiors, a USG Company
- .5 Or Approved Equivalent

2.2 DESIGN CRITERIA

2.2.1 Superimposed Loads: Determine superimposed loads applied to suspension systems by components of the building and verify that adequate hangers are installed to support additional loads in conjunction with normal loads of the ceiling system, and as follows:

- .1 Maximum Deflection: Limit deflection to L/360 in accordance with ASTM C635/C535M deflection test.

2.3 SUSPENSION - GENERAL

2.3.1 Suspension system shall support ceiling assembly indicated on the Drawings, or specified herein, with a maximum deflection of 1/360 of the span, in accordance with ASTM C635/C635M intermediate duty classification. Suspension system shall be hot dipped galvanized metal.

- .1 Main and Cross Tees: 15/16" face exposed tee system, standard white finish. Basis of design product: Prelude, by Armstrong Ceiling Systems.
- .2 Perimeter Wall Molding: Shadow molding to provide a 24 mm (15/16" face, 24 MM (15/16") vertical leg and a 19 mm X 19 mm (3/4" x 3/4") reveal,

- .3 Transition Molding: standard white finish.
Shodow molding from acoustic tile to gypsum board ceiling to provide a 24 mm (15/16") face and 19 mm x 19 mm (3/4" x 3/4") reveal, standard white finish. Acoustic tile and gypsum board to align at the same elevation.
 - .4 Edge Trim: 50-406 mm (2"-16") nominal height profile with vertical fin detail, attaching to metal suspension system. Standard white finish.
Basis of design product: Axiom Vector Trim, 50-406 mm (2"-16") Profile, by Armstrong Ceiling Systems.
 - .5 Hangers, Braces, Ties: Nominal 14 ga. diameter steel wire, galvanized.
 - .6 Accessories: Stabilizer bars, access splines, and required anchors and attachment to structure, 22 ga. minimum steel.
 - .7 Tie Wire: 0.4 mm (3/64") galvanized soft annealed steel wire.
- 2.3.2 Suspension system shall lock together in a positive manner providing pull out values in tension of 136 kg (300 lb). or greater.
- 2.4 ACOUSTICAL PANELS
- 2.4.1 AT1: Provide manufacturer's standard panels of configuration indicated in accordance with ASTM E1264 classifications as designated by the nominal values for types, patterns, acoustic ratings, and light reflectance class listed in this Section; with flame spread rating of 25 or less and smoke developed rating of 50 or less when tested in accordance with CAN/ULC S102 and as follows:
- .1 Classification: Type A, Form A2.2, Pattern E, Class A
 - .2 Dimensions: 610mm x 1220mm x 26mm (24" x 48" x 3/4") tile.
 - .3 Edge Profile: 24mm (15/16") Square Lay In.
 - .4 Colour: White.
 - .5 Acoustic and Visual Performance (Minimum Nominal):
 - .1 Noise Reduction Coefficient: 0.75
 - .2 Ceiling Attenuation Class: 35
 - .3 Light Reflectance: 0.88
 - .6 Basis of Design Product:
 - .1 ULTIMA by Armstrong World Industries, Inc.
- 2.4.2 Steel members: Galvanized in accordance with ASTM A653/A653M, light commercial coating class or coated with rust inhibitive primer complying with CAN/CGSB 1.132-M.
- 2.4.3 Exposed metal surfaces: Baked-on, special white enamel, with a gloss value of 25 when tested in accordance with ASTM E1477.

3. **PART 3 - EXECUTION**

3.1 INSPECTION

- 3.1.1 Ensure work above ceilings is complete, inspected and approved by authority having jurisdiction before commencing installation.

3.2 INSTALLATION WORK

- 3.2.1 Installation:
- .1 Verify wet work such as plastering, and concrete is complete and dry. Verify building is enclosed and under standard occupancy conditions (60 - 85°F and not more than 70% relative humidity) prior to start of installation. Commencement of installation constitutes

- Installer's acceptance of surfaces and conditions.
 - .2 Install products in accordance with manufacturer's written instructions and in proper relationship with adjacent construction.
 - .3 Touch-up, repair or replace damaged units until satisfactory results are obtained.
- 3.2.2 Co-ordinate work with all trades affected by work of this Section. Provide a layout of hangers and framing suitable to accommodate fittings and units of equipment. Failure to follow this procedure will require that hangers and channels be revised to suit as necessary without additional cost to the Owner.
- 3.2.3 Where ducts or other equipment prevent the regular spacing of hangars, reinforce nearest adjacent hangers and all related carrying channels and furring as required to span the greater distance.
- 3.2.4 Lay out work in accordance with reflected ceiling plans. Provide a tolerance of 1/360 of span and 5/64" maximum between adjacent edges of metal pans. Allowable tolerance of finished acoustical ceiling system: 3 mm in 3 mm (1/8" in 12'-0") and 0.4 mm (1/64") between adjacent metal members. Tolerances shall not be cumulative.
- 3.2.5 Install acoustical ceilings in accordance with ASTM C636/C636M, "Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels."
- 3.2.6 Supply hangers or inserts for installation to respective section in ample time and with clear instructions for their correct placement. Provide additional hangers and inserts as required.
- 3.2.7 Design and space hangers and carrying members to support entire ceiling system, including lighting fixtures, diffusers and grilles. Recessed objects shall replace or be centred on acoustical panels, except where indicated otherwise. Consult with mechanical and electrical trades to co-ordinate the work.
- 3.2.8 Secure hangers to structure. Hang suspended ceilings independently of walls, columns, ducts, pipes and conduit. Where carrying members are spliced avoid visible displacement of longitudinal axis of face plane of adjacent members.
- 3.2.9 Centre acoustical ceiling installation on room axis leaving equal border pieces. Provide a row of hangers adjacent to and parallel with walls for support of ends of main tee runners at not more than 6" from ends of runners. Lay directionally patterned tile one way with pattern parallel to longest room axis unless otherwise directed.
- 3.2.10 Install components to form a level ceiling with all parts flush and true, parallel to module lines, and to pattern shown. Install panels in level, uniform plane free from twist, warp, dents and flush, without gaps and exposed face of carrying members. Fit border units neatly against abutting surfaces.
- 3.2.11 Do not support fixtures from main runners or cross runners if weight of fixture causes total dead load to exceed deflection capability of suspension system. In such cases, support fixture load by supplementary hangers located within 6" of each corner, or support fixture independently. Do not install fixtures so that main runners and cross runners will be eccentrically loaded. Where fixtures installation would produce rotation of runners, provide stabilizer bars. Provide carrying channels to transfer fixture load to carrying members as required. Ensure that joints in suspension do not occur at recessed fixture sides. Frame around recessed fixtures, diffusers, grilles, and other openings; provide allowance for thermal movement. Furr around ducts, beams, and bulkheads as required. Suspension of electrical fixtures shall comply with requirements of hydro.
- 3.2.12 Accessibility percentage: 100.

3.3 INSTALLATION - GRID SYSTEM

- 3.3.1 Grid system shall consist of the following components: Hangers, Exposed main tee, exposed cross tee, wall moulding, lay-in panels, and hold-down clips where required.
- 3.3.2 Install hangers of correct length at 1219 mm (4'-0") o.c. maximum in each direction.
- 3.3.3 Install main runners level and in maximum length available. Do not bend hangers as a means of levelling. Form wire loops tightly to prevent vertical movement or rotation within the loop.
- 3.3.4 Join abutting sections of main tees by means of suitable connections such as splices, interlocking ends, tab locks, pin locks. Intersecting tees shall form a right angle. Butt ends of cross tees flush to exposed edge of intersecting member. Fur around ducts, beams and bulkheads as required. Provide edge moulding at intersection of ceiling and vertical surfaces.
- 3.3.5 Provide edge moulding at intersection of vertical surfaces using maximum lengths, straight, true to line and level. Mitre corners. Provide edge transition moulding at junction with gypsum board ceilings as indicated. Where bullnose concrete block occurs, provide preformed closers to match edge moulding.
- 3.3.6 Carefully fit acoustic tile in place, no broken edges permitted.
- 3.3.7 Install hold-down clips on all lay-in panels to hold such panels tight to grid system where within 6 m (20'-0") of an exterior door.
- 3.3.8 Recessed items shall replace or be centred on acoustical tiles, except where indicated otherwise. Consult with mechanical and electrical trades to co-ordinate the work.

3.4 ADJUSTMENTS

- 3.4.1 Adjust any sags or twists which develop in suspension system and replace any part of complete system which is damaged or faulty.

3.5 CLEANING

- 3.5.1 Thoroughly clean all acoustic ceiling surfaces upon completion of the installation.
- 3.5.2 Promptly as the work proceeds and on completion, remove all surplus materials and debris resulting from the work of this Section.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

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

1.1.2 This Section includes, but is not limited to, the following:

- .1 Vinyl composition floor tile.
- .2 Sheet Vinyl
- .3 Static dissipative floor tile.
- .4 Rubber tile flooring.
- .5 Resilient wall bases.
- .6 Resilient accessories for transition strips, area dividers

1.2 REFERENCES

- 1.2.1 CAN/CSA A126.5-87 Resilient Wall Base.
- 1.2.2 ASTM F1066-04(2014)e1, Standard Specification for Vinyl Composition Floor Tile
- 1.2.3 ASTM F 1344-15 Standard Specification for Rubber Floor Tiles
- 1.2.4 ASTM F1516-13, Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when Recommended)
- 1.2.5 ASTM F1700 Standard Specification for Solid Vinyl Floor Tiles
- 1.2.6 ASTM F1861-08(2012)e1, Standard Specification for Resilient Wall Base
- 1.2.7 ASTM F1869-11, Standard Test Method for Measuring Moisture Vapour Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

1.3 SUBMITTALS

1.3.1 Product Data: Submit one copy of product data for each type of product specified.

1.3.2 Shop Drawings: Submit shop drawings indicating:

- .1 Location of seams and edges
- .2 Location of columns, doorways, enclosing partitions, built-in furniture, cabinets, and cut-out locations
- .3 Type and style of resilient transition strip used between adjacent flooring types

1.3.3 Submit the following samples to the Consultant for approval: 2 samples 300mm x 300 mm (12" x 12") of each colour of sheet flooring, 1 300mm (12") length of edge strip.

1.3.4 Submit three copies of maintenance data for incorporation into maintenance manual. Manual shall give specific warning of any maintenance practice which may damage or disfigure sheet flooring.

1.3.5 Site Quality Control Test Results: Submit results or moisture emission testing of concrete subfloors prior to installation of flooring. Results shall include comparison of manufacturer's recommended moisture content to actual moisture vapour emission rate.

1.4 SITE MOCK-UP

- 1.4.1 Following the pre-installation conference, the Contractor shall install a 10'-0" x 10'-0" dry sample areas of flooring material and accessories, indicating all colour variations, and layout in areas designated later by the Consultant.
- 1.4.2 After approval of tile colours and layout, install flooring materials and accessories, under the supervision of the material manufacturer's representative.
- 1.4.3 Upon completion and approval, sample areas shall serve as a standard of quality for the balance of the work of this Section. Subsequent work carried out and not in the Consultant's opinion, equal to the quality standard shall be removed and replaced at no additional cost to the Owner.
- 1.4.4 It shall be the responsibility of the material manufacturer's representative to visit the site during installation, to ensure proper use of proprietary materials and assist the Contractor as may be required.
- 1.4.5 Co-ordinate work of mock-up with related work of other Sections.
- 1.4.6 Accepted work may form a part of the final installation.
- 1.5 **EXTRA STOCK**
- 1.5.1 Provide 5% of each colour of flooring material and 30' lineal feet coil stock of each colour of base specified, boxed and labelled. Store maintenance materials on the premises as directed by the Owner.
- 1.6 **QUALITY ASSURANCE**
- 1.6.1 Contractor executing work of this Section shall have a minimum of five (5) years continuous Canadian experience in successful and installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.
- 1.6.2 Resilient Flooring Installer: Use an installer who is competent in heat welding and have a minimum of five (5) years documented experience in the installation of resilient sheet flooring and seams in accordance with manufacturer's training or certification program:
- 1.7 **DELIVERY, STORAGE, HANDLING AND PROTECTION**
- 1.7.1 Coordinate deliveries to comply with Construction Schedule and arrange ahead for off-the-ground, under cover storage location. Do not load any area beyond the design limits.
- 1.7.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.
- 1.7.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.
- 1.7.4 Restrict traffic by other trades during installation.
- 1.7.5 Provide adequate protection of completed tiled surfaces to prevent damage by other trades until final completion of this project. Minimum protection shall consist of kraftpaper.
- 1.8 **ENVIRONMENTAL CONDITIONS**
- 1.8.1 Temperature of room, floor surface and materials shall not be less than 21 deg C for 48 hours before, during and for 48 hours after installation. Concrete floors shall be aged for a minimum of 28 days and shall be dry before application of the resilient floor tile.

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

- .1 Rubber Manufacturer's Association (RMA) moisture test using anhydrous calcium chloride.
- .2 Does not exceed 3% as measured by Calcium Carbide Hygrometer procedure.
- .3 Does not exceed 5% as measured by normal Protimeter.

1.8.3 Avoid exposure to high humidity, cold drafts and abrupt temperature changes.

1.9 WARRANTY

1.9.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions but for an extended period of five (5) years and agree to repair or replace faulty materials or work which become evident during warranty period without cost to the Owner. Defects shall include, but not limited to, bond failure, and extensive colour fading.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1 Basis-of-Design Manufacturers: Manufacturers named in this Section are approved to provide work specified in this Section. Additional manufacturers offering similar products may be incorporated into the work of this Section provided they meet the performance requirements indicated and provided requests for substitution.

2.1.2 Approved manufacturers:

- .1 Interface
- .2 Flexco
- .3 Johnsonite
- .4 Mannington Commercial
- .5 Armstrong Flooring
- .6 Altro Flooring
- .7 Or Approved Equivalent

2.2 TILE FLOORING MATERIALS

2.2.1 Luxury Vinyl Tile, conforming to ASTM F1700:

- .1 Classification: Class III Type A+B
- .2 Gauge: 2.5mm
- .3 Wear layer: 0.55mm
- .4 Size: 203 x 1219mm
- .5 Colour: Grey Limed Oak 4082 (G/F large kitchenette and lunch room)
- .6 Basis of Design Product: EXPONA Commercial PUR by Polyflor

2.2.2 Luxury Vinyl Tile, conforming to ASTM F1700:

- .1 Classification: Class III Type A+B
- .2 Gauge: 2.5mm
- .3 Wear layer: 0.55mm
- .4 Size: 610 x 610mm

- .5 Colour: Light Grey Concrete 5067 (other kitchenettes)
- .6 Basis of Design Product: EXPONA Commercial PUR by Polyflor

2.2.3 Sheet Vinyl Flooring & Wall Base, conforming to ISO-14644-9:12:

- .1 Classification: Class 34, very heavy
- .2 Thickness: 2.0mm (0.08")
- .3 Size: 2.0m x 20m (6'7" x 65'5")
- .4 Colour: Flurry – PH2012 WR402/A1M81 LRV30
- .5 Basis of Design Product: Symphonia by Altro Flooring

2.3 RESILIENT ACCESSORIES

2.3.1 Resilient Wall Base (RB): Smooth, matte finish exposed face, supplied in maximum practical length, with pre-moulded end stops and external corners to match base, conforming to ASTM F1861 and as follows:

- .1 Type: TS – Rubber, vulcanized thermoset
- .2 Group: 1 – Homogeneous
- .3 Style: B – Cove
- .4 Height: 150mm
- .5 Thickness: 3mm
- .6 Length: Manufacturers standard maximum length
- .7 Color: black or other colour approved by Architect.
- .8 Basis of Design Product: 'Wallflower' Rubber Wall Base by Flexco

2.3.2 Resilient Transition and Edge Strips: Extruded vinyl shapes meeting or exceeding ADA Recommendations for change of level transitions for transition between floors finishes having different levels, i.e.: between resilient flooring to carpet with no cushion or underlayment. The following list is included to indicate the most commonly used transition and edge strip accessories; additional materials may be required where transition heights differ from the products listed and shall be included as a part of the Contract:

- .1 Carpet to Resilient Flooring Transition Strip: Flexco 168. Colour to be selected from manufacturer's standard range.

2.3.3 Primers and adhesives: Waterproof, of the types recommended by resilient flooring manufacturer for applicable substrate.

2.3.4 Sub-floor filler: White pre-mix latex requiring water only to produce cementitious paste.

2.3.5 Welding rods: As approved by the manufacturer, to match floor, colours selected by Consultant.

2.3.6 Metal edge strip: Aluminum extruded, smooth, mill finish with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.

2.3.7 Sealer and wax: Type recommended by sheet vinyl flooring material manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1 Ensure that floors are clean, level and dry, free from cracks, ridges, dusting, scaling and carbonation.

3.1.2 Test concrete substrate for excessive moisture content by a method acceptable to the Consultant

and material manufacturer.

- 3.1.3 Maintain room and material temperature at 21°C for at least 24 hours before, during and 7 days after flooring installation. Concrete shall be at least 28 days old before commencing application.
- 3.1.4 Do not install sheet flooring until ceiling and partition finishing work are completed.
- 3.1.5 Before spreading primer or adhesive, thoroughly clean the surface of the floor, remove dust and debris.
- 3.1.6 Apply filler as may be required. Prohibit traffic until filler has cured.
- 3.1.7 Prime concrete slabs to flooring manufacturer's recommendations.

3.2 FLOORING INSTALLATION

- 3.2.1 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.
- 3.2.2 Lay flooring to produce a minimum number of seams. Border widths minimum 1/3 width of full material.
- 3.2.3 Run sheets parallel to length of room. Double cut sheet joints and continuously heat or chemically weld.
- 3.2.4 As installation progresses, roll flooring with 45kg (100lb) roller to ensure full adhesive, according to manufacturer's instructions.
- 3.2.5 Cut flooring and fit neatly around fixed or excessively heavy objects.
- 3.2.6 Provide flush joint transition strip where sheet resilient flooring meets carpet.
- 3.2.7 Terminate flooring with metal edge strips at centreline of door in openings where adjacent floor finish or colour is dissimilar.
- 3.2.8 Layout tile flooring as follows:
 - .1 Lay tile with joints parallel to building lines to produce a symmetrical tile pattern.
 - .2 Install tile flooring so that perimeter tile width is minimum 1/2 full size.

3.3 SEAMING

- 3.3.1 After adhesive has set, groove seams with equipment recommended by flooring manufacturer. Width of groove; 3.5mm (0.14") wide x 2.5mm (1/10") deep.
- 3.3.2 Clean seams carefully by vacuum.
- 3.3.3 Use high-speed hot-air welding gun to weld all grooved seams, in accordance with flooring manufacturer's instructions.
- 3.3.4 Trim off excess surplus material in two operations.

3.4 INSTALLATION – BASE

- 3.4.1 Provide resilient base or cove base as indicated on Room Finish Schedule.

- 3.4.2 Securely adhere cove base filler at juncture of wall and floor. Spread adhesive up wall, full coverage.
- 3.4.3 Extended flooring material to form cove base, ensure solid backing behind base.
- 3.4.4 Terminate top of base in base cap, straight, level and true.
- 3.5 CLEAN AND WAXING
 - 3.5.1 Remove excess adhesive from floor, base and wall surfaces without damage.
 - 3.5.2 Clean, seal and wax floor surface to flooring manufacturer's instructions.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL

1.1.1 Conform to Sections of Division 1 as applicable.

1.1.2 This Section includes requirements for supply and installation for tile carpeting.

1.2 RELATED SECTIONS

1.2.1 Section 03 35 00: Concrete Floor Cures and Finishes

1.3 REFERENCES

- | | | |
|-------|-------------------|--|
| 1.3.1 | ASTM D1335-12 | Standard Tests Method for Tuff Bind of Pile Yarn Floor Coverings. |
| 1.3.2 | CAN/CGSB 4.129-93 | Carpets for Commercial Use. |
| 1.3.3 | CAN/ULC S102 | Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies. |
| 1.3.4 | CAN/ULC S102.2-10 | Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies. |
| 1.3.5 | AATCC 174-2011 | Antimicrobial Activity Assessment of Carpets. |

1.4 SUBMITTALS

1.4.1 Shop Drawings:

- .1 Submit Shop drawings in accordance with Section 01 30 00 Administrative Requirements
- .2 Indicate carpet layout, locations of all seams and cross joints.
- .3 Do not install carpet until seam layout has been reviewed and approved by Architect.

1.4.2 Samples:

- .1 Prior to ordering carpet, submit samples of carpet and accessories to Architect for approval, minimum 300 mm x 300 mm (12" x 12"), for each type and colour of carpet to be used.
- .2 Architect may take random samples of carpet as installation progresses for comparison with approved samples. If, in the opinion of Architect, such samples fail to meet the standard of approved samples, remove the carpets and replace with approved carpet, as required, at no cost to Owner.
- .3 Site Quality Control Test Results: Submit results or moisture emission testing of concrete subfloors prior to installation of flooring. Results shall include comparison of manufacturer's recommended moisture content to actual moisture vapour emission rate.

1.5 SITE MOCK-UP

1.5.1 In an area designated by Architect, provide a sample installation of carpeting of at least 9 m² (100 sq ft) showing colour matching, longitudinal and transverse joints and including trench duct. Make changes as required until approved.

- 1.5.2 When approved, sample area shall represent the minimum acceptable standard for the work.
- 1.5.3 Remove sample installation when directed unless sample area can be satisfactorily incorporated into the Work.
- 1.6 EXTRA STOCK
 - 1.6.1 Submit maintenance instructions in triplicate for insertion in maintenance manuals in accordance with Section 01 30 00 Administrative Requirements. Include information on recycling carpet, manufacturer's reuse or recycling program
 - 1.6.2 Provide 5% of each colour of flooring material, boxed and labelled. Store maintenance materials on the premises as directed by the Owner.
- 1.7 TESTS REPORTS AND CERTIFICATES
 - 1.7.1 Submit test reports to demonstrate compliance with CAN/ULC S102 (for vertical surfaces) and CAN/ULC S102.2 (for horizontal surfaces).
 - 1.7.2 Submit test report verifying Tuft Bind meets requirements specified to CAN/CGSG 4.129 or ASTM D1335.
 - 1.7.3 Submit proof to Architect that removed carpet was transferred to manufacturer's reclamation program in accordance with Section 01 35 00: Environmental Requirements. Pay cost for return to Manufacturer or environmentally friendly re-use program.
 - 1.7.4 Submit evidence that Contractor can and shall implement required waste diversion program in accordance with Section 01 35 00: Environmental Requirements.
 - 1.7.5 Recycling: Submit certification and description of reclamation and recycling process to recycle recovered carpets.
 - 1.7.6 Submit WHMIS MSDS - Material Safety Data Sheets acceptable to Labour Canada, Health, and Welfare Canada for carpet adhesive. Indicate level of VOC content.
- 1.8 DELIVERY, STORAGE AND HANDLING
 - 1.8.1 Delivery: Deliver carpet tiles to Site clearly tagged to show installation location suited for best colour matching.
 - 1.8.2 Storage: Store adhesive, carpet tapes and similar items in a heated area maintained at minimum temperature of 10 deg C (50 deg F) or at such temperature as recommended by product manufacturer.
 - 1.8.3 Handling: Comply with adhesive and carpet manufacturer's directions for use of adhesive. Observe open time limits for adhesives and place lids on open cans when not being used. Under no circumstances contaminate or thin adhesives with water or solvents, unless specifically directed by the manufacturer in writing.
- 1.9 WASTE MANAGEMENT
 - 1.9.1 Collect, separate and recycle waste materials in accordance with Section 01 35 00: Environmental Requirements, and with waste reduction work plan.

- 1.9.2 Place materials defined as hazardous or toxic in designated containers.
- 1.9.3 Close and seal tightly, used sealant containers and store in designated containers in areas designated for hazardous materials.
- 1.9.4 Collect, package and store carpet cut-offs and waste material for recycling and return to recycler in accordance with manufacturer's reclamation program.
- 1.10 ENVIRONMENTAL CONDITIONS
 - 1.10.1 Ensure substrate is within moisture limits prescribed by Manufacturer.
 - 1.10.2 Maintain Relative Humidity (RH) between 20 and 65% RH for 48 hrs before, during installation and 48 hrs after installation.
 - 1.10.3 Maintain ambient temperature of not less than 18 C from 72 hrs prior to and during installation and 48 hrs after installation.
 - 1.10.4 Provide continuous ventilation during installation and for seven (7) days after completion of installation.
 - 1.10.5 Comply with the requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials.
 - 1.10.6 Moisture content of floor shall not exceed a maximum of 3 lbs. of water per 1,000 sq. ft. of concrete slab area over a 24 hour period as measured by one of the following methods, as approved by Consultant:
 - .1 Does not exceed 3% as measured by Calcium Carbide Hygrometer procedure.
 - .2 Does not exceed 5% as measured by normal Protimeter.
 - 1.10.7 Avoid exposure to high humidity, cold drafts and abrupt temperature changes.
- 1.11 WARRANTY
 - 1.11.1 Warrant work of this Section against defects and deficiencies for a period of two (2) years for labour, and ten (10) years for defects and deficiencies in accordance with the General Conditions of the Contract. Promptly correct defects and deficiencies that become apparent during the warranty period, to the satisfaction of Architect and at no additional expense to Owner. Defects shall include but not be limited to buckling, openings at seams, bond failure; extensive colour fading and loss of 10% of pile fibre in any area. Damage due to improper cleaning or abnormal use is expected from warranty.

PART 2 - PRODUCTS

- 2.1 MATERIALS
 - 2.1.1 Carpet provided under this Contract shall be uniform in colour, texture and supplied from the same dye batch.
 - 2.1.2 Carpet to comply with Health Canada Regulation made under "Hazardous Products (Carpet) Regulations" Part II of the Schedule

- 2.1.3 Carpets to be tested in accordance with CAN/ULC S102.2 for floor and CAN/ULC S102 for wall and ceiling surface covering and be certified by ULC; maximum flame spread rating 300, and smoke developed classification 500.

2.2 MATERIALS AND FABRICATION

- 2.2.1 Carpet tile: 25cm x 100cm "World Woven Collection WW880 - 105359 Linen Loom, Layout: Ashlar" by InterfaceFLOR
- 2.2.2 Antimicrobial: to AATCC 174, 99% reduction, 0% growth; to be incorporated into the backing laminate to inhibit the growth of fungi, mold and mildew.
- 2.2.3 Flame Spread: Tested to CAN/ULC S102.2 for floor coverings.
- 2.2.4 For buildings under 18.0 m in height: measured between floor level of the top storey and grade: Meet or exceed CAN/CGSB 4.129.
- 2.2.5 Adhesive: Adhesive compatible with selected carpet tile by InterfaceFLOR. Follow manufacturer's installation guidelines for installation product recommendation. VoC requirements by manufacturer's shall be met.
- 2.2.6 Thresholds and Binder Bars: Aluminum, screw-down type as recommended by carpet accessories manufacturer, colour selected by Architect from manufacturers' standard colour range.
- 2.2.7 Sub-floor filler: White (re-mix latex requiring water only to produce cementitious paste).
- 2.2.8 Carpet Base: 100mm (4") high continuous roll of same material, colour, texture and pattern as adjoining carpet.
- 2.2.9 Apply adhesive maintaining an even continuous coating free of bubbles. Carpet Pile shall run in the same direction as floor carpet.
- 2.2.10 Use continuous runs of 3600mm (12') lengths of minimum, except for short runs or corner areas. All appropriate joins shall be mitred.
- 2.2.11 Bind edge of carpet base. Binding shall be machine sewn using material to match carpet.

PART 3 - EXECUTION

3.1 EXAMINATION

- 3.1.1 Examine work of other Sections affecting work of this Section and report any defects or discrepancies to the Architect.
- 3.1.2 Commencement of installation shall constitute acceptance of substrates as satisfactory.

3.2 PREPARATION

- 3.2.1 Where indicated on Drawings, remove existing carpet in areas to be covered with new carpet.
- 3.2.2 Return carpet for reclamation in accordance the General Conditions of the contract and Section 01 35 00 Environmental and Protection Requirements.

- 3.2.3 Thoroughly remove old adhesive, dirt and other foreign material from existing surfaces.
- 3.2.4 Floor shall be clean and free of cracks and protrusions. Remove dirt, debris and loose toppings or finishes.
- 3.2.5 Fill gaps or cracks more than 2 mm (1/16") wide and minor depressions with latex compound. Grind protrusions smooth.
- 3.2.6 Vacuum clean floors prior to installation.

3.3 INSTALLATION

- 3.3.1 Refer to Drawings and Room Finish Schedule for areas where carpet is to be installed.
- 3.3.2 Install work of this Section after all trades have completed their work and just prior to completion of the project, unless otherwise instructed by Architect.
- 3.3.3 Install materials in accordance with manufacturer's directions.
- 3.3.4 Install perimeter carpet grippers, carpet and other accessories required for finished installation.
- 3.3.5 Unless otherwise indicated on Drawings, install carpet with TacTiles by InterfaceFLOR. Follow all manufacturer's installation instructions.
- 3.3.6 Lay carpet smooth and level, free from ridging, pulling, drifting or other imperfections detrimental to appearance or wearing qualities.
- 3.3.7 Form carpet around contours of stairs and step in manner to prevent shifting at nosing.
- 3.3.8 Pile in any one area shall be in the same direction.
- 3.3.9 Cut carpet to exact fit, completely covering all designated areas.
- 3.3.10 Neatly cut carpet for floor outlets, trench ducts and similar items.
- 3.3.11 Room less than 3.6 m (12') wide shall have no side seams.
- 3.3.12 End seams will not be permitted.
- 3.3.13 Where seams are required, they shall be placed in locations indicated on carpet layout shop drawings. In general, locate seams in lighter traffic areas and in direction of main traffic flow. No cross seams are permitted unless shown in carpet layout as approved.
- 3.3.14 Lay carpet with seams parallel to walls unless indicated otherwise.
- 3.3.15 Trim and seal edges and fit seams so that they are as inconspicuous as possible.
- 3.3.16 Protect exposed edges of carpet with edging binder bars.
- 3.3.17 Position edges of carpet in door openings under door in its closed position.

3.4 CLEANING

- 3.4.1 Immediately following installation, inspection and approval of the Work, vacuum clean carpet and

remove debris.

3.5 PROTECTION

- 3.5.1 Cover the entire carpeted area with plastic covering held in place by masking tape at the seams and stay-tacking around the perimeter.
- 3.5.2 Use heavy gauge 0.152 mm (6 mil) plastic covering when the uncompleted sub-trades activity is extensive and large quantities of furniture, equipment and partitions are being moved. Use 6 mm (1/4") thick plywood on carpets with underpad where furniture and office equipment are being moved, or where public access must be maintained during construction.
- 3.5.3 Restrict traffic by other trades during installation.
- 3.5.4 Do not remove carpet protection until directed by Architect.
- 3.5.5 Work shall be handed over to Owner free of blemishes and in perfect condition.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCES

- 1.2.1 CAN/ULC S702-14 Standard for Thermal Insulation Mineral Fibre for Buildings.
- 1.2.2 ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials

1.3 QUALITY ASSURANCE

- 1.3.1 Installation: By skilled mechanics and in accordance with system manufacturer's printed directions to produce a finished wall, level, in true plane, free from warped, soiled or damaged panels. Where manufacturer's directions are at variance with the drawings, consult the Consultant before proceeding.
- 1.3.2 Walls supporting acoustical panels shall be field measured prior to manufacture and installation. The shop drawings shall indicate the mounting and fixing method. It should be checked that all reveal acoustical panels with dimensions shown on the Architectural drawings can be accommodated by the available wall surfaces. Where acoustical panels fill the entire height and/or width of a wall above millwork etc., the available wall surface shall be field measured and the panels produced to the appropriate dimensions. Where acoustical panels are shown occupying the full height of a wall above millwork. A 1" reveal at the ceiling is acceptable to allow for mechanical installation.

1.4 SUBMITTALS

- 1.4.1 Product Data: Submit product data including construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- 1.4.2 Shop drawings: Indicate the complete layout of panels, fastening details, splicing method corners and change in level details. Show area of co-ordination with other Sections and erection sequence.
- 1.4.3 Samples: Submit 305mm x 305mm (12" x 12") samples for each type of exposed finish specified for verification by the Consultant prior to ordering.
- 1.4.4 Maintenance data: Three copies of manufacturer's maintenance instructions.

1.5 PRODUCT DELIVERY, HANDLING AND STORAGE

- 1.5.1 Handle and store materials to prevent damage to materials or structure.
- 1.5.2 Deliver materials in their original wrappings or containers with manufacturer's labels and seals intact and store in a dry area under cover and clear of the ground.
- 1.5.3 Suitably wrap members and protect against damage.

1.6 MOCK-UP

- 1.6.1 Provide 4'-0" x 8'-0" sample installation of acoustic wall panel and 4'-0" x 8'-0" ceiling panel work, at locations as designated. Modify or replace mock-up to obtain approval. After acceptance, retain mock-up as standard of quality for remaining work. Mock up may form part of the Work.
- 1.6.2 Do not begin fabrication and erection of the remainder of the wall system until the mock-up have been inspected and approved.

1.7 ENVIRONMENTAL REQUIREMENTS

- 1.7.1 Do not commence installation until glazing has been completed and exterior openings closed in. Maintain humidity not exceeding 65% where mineral panels are used and the temperature in the range of 12 deg C for 72 hours prior to commencement of work and maintain this temperature until completion.
- 1.7.2 Ambient Conditions: Install acoustical panels only when building is fully enclosed and HVAC system is operational; maintain manufacturer's recommended temperature and humidity conditions in the area of installation for 24 hours before, during and after installation.

1.8 WARRANTY

- 1.8.1 Manufacturer Warranty: Provide manufacturers standard five (5) year written warranty indicating replacement of fabrics that have sagged or failed to anchor to edge clip system arising from defects in materials or workmanship.
- 1.8.2 Warrant work of this Section to remain dimensionally stable throughout the year and to not sag or distort due to variations in temperature and humidity conditions. Grain patterns and seams shall remain, level, plumb, true and aligned.

PART 2 - PRODUCTS

2.1 ACOUSTIC PANELS

- 2.1.1 AP: 2" thick semi-rigid fibreglass panel, with density of at least 6 lb/ft³. Edges to be resin-hardened to depth of at least 1/8", square profile. Panels to be wrapped in acoustically transparent polyester fabric, "Anchorage 2335 – White 2664" (or other colour selected by the architect) by Guilford of Maine. NRC value shall be at least 0.80, with Class A flame spread rating as per ASTM E84.
- 2.1.2 Mounting: Concealed mechanical system, allowing panels to be demounted and replaced.

2.2 FABRICATION

- 2.2.1 Fabrication panels to exact field dimensions, to a tolerance of +/- [0.5 mm|0.02"], dimensionally stable and shall not warp.
- 2.2.2 Mechanically sand panel face after sizing to ensure best possible surface prior to fabric application.

PART 3 - EXECUTION

3.1 INSTALLATION

- 3.1.1 Co-ordinate the work with all trades affected by the work of this Section.
- 3.1.2 Install components to form an even surface with all parts flush and true, parallel to the module lines, and to the pattern shown on architectural drawings.
- 3.1.3 Install work level, in uniform plane, free from twist, warp, dents and flush, without gaps to exposed face of carrying members. Fit border units neatly at abutting surfaces.
- 3.2 **ADJUSTMENTS**
 - 3.2.1 Adjust any sags or twists which develop in the system and replace any part of the complete system which is damaged or faulty.
 - 3.2.2 Cleaning: Clean exposed surfaces of acoustical wall panels in accordance with manufacturer's recommendations and as follows:
 - .1 Trim and remove all loose threads
 - .2 Remove surplus materials, rubbish and debris resulting from installation and leave areas of installation in a neat, clean condition.
 - .3 Touch up minor finish damage; remove and replace work which cannot be successfully cleaned and repaired to eliminate evidence of damage.
 - 3.2.3 Protection: 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

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.
- 1.1.2 Provide all labour, materials, products, equipment and services to complete the painting and finishing work required and/or indicated on the Drawings and specified herein.
- 1.1.3 Provide surface preparation to receive painting and finishing specified under this Section of the work, in accordance with the the Master Painters Institute (MPI) Painting Specification Manual and as specified herein.
- 1.1.4 Examine the Specifications and Drawings for the work of other Sections regarding the provisions for prime and finish coats. Paint or finish all materials installed throughout the project which are required to be painted and which are left unfinished or unpainted by other Sections.
- 1.1.5 The only exception to the requirements of the preceding paragraph is where the drawings, Specifications, or Schedules state positively and explicitly that a surface is not to be finished.
- 1.1.6 For areas indicated as unfinished in the specifications, Finish Schedules, and Drawings, painting is not required, except for doors and frames, windows and frames, railings, steel stairs, insulation on mechanical equipment, pipes and fittings, and other items requiring protection including electrical panels.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- 1.2.1 Section 08 11 00 Hollow metal doors and frame.
- 1.2.2 Section 09 29 00 Gypsum Board
- 1.2.3 Division 23 Identification of piping and ductwork.

1.3 REFERENCES

- 1.3.1 ASTM D523-14(2018) Standard Test Method for Specular Gloss.
- 1.3.2 The Master Painters Institute (MPI) New Surfaces: Architectural Painting Specification Manual.
- 1.3.3 The Master Painters Institute (MPI) Existing Surfaces: Interior Maintenance Repainting Manual.
- 1.3.4 MPI ASM MPI Architectural Painting Specification Manual.
- 1.3.5 MPI #43 Latex, Interior, (MPI Gloss Level 4)
- 1.3.6 MPI #50 Primer Sealer, Latex, Interior
- 1.3.7 MPI #52 Latex, Interior, (MPI Gloss Level 3)
- 1.3.8 MPI #53 Latex, Interior, Flat (MPI Gloss Level 1)
- 1.3.9 MPI #139 Latex, Interior, High Performance Architectural, (MPI

	Gloss Level 3)
1.3.10 MPI #140	Latex, Interior, High Performance Architectural, (MPI Gloss Level 4)
1.3.11 MPI #143	Latex, Interior, Institutional Low Odor/VOC, Flat (MPI Gloss Level 1)
1.3.12 MPI #145	Latex, Interior, Institutional Low Odor/VOC, (MPI Gloss Level 3)
1.3.13 MPI #146	Latex, Interior, Institutional Low Odor/VOC, (MPI Gloss Level 4)
1.3.14 MPI #149	Primer Sealer, Interior, Institutional Low Odor/VOC
1.3.15 MPI #151	Light Industrial Coating, Interior, Water Based (MPI Gloss Level 3)
1.3.16 40 CFR 59, Subpart D (2000)	National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.
1.3.17 ASTM D16-11a	Standard Terminology for Paint, Related Coatings, Materials and Applications.
1.3.18 ASTM E84-12c	Standard Test Method for Surface Burning Characteristics of Building Materials.
1.3.19 ASTM F1869-11	Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
1.3.20 CSA A23.1/A23.2-04	Concrete Materials and Methods of Concrete Construction.
1.3.21 CAN/CGSB 85.10-99	Protective Coatings for Metals.
1.3.22 CAN/CGSB 85.100-93	Painting.
1.3.23 UL 2818	Standard for Chemical Emissions for Building Materials, Finishes and Furnishings - GREENGUARD.
1.3.24 SSPC	Good Painting Practice; Society for Protective Coating; 1993, Third Edition.
1.3.25 SSPC	Coating Materials Guidelines.
1.3.26 SSPC	Surface Preparation Guidelines.
1.3.27 SSPC	Application, Inspection and Quality Control Guidelines.

1.3.28 SCAQMD 1113 South Coast Air Quality Management District Rule # 1113; February 2016.

1.3.29 40 CFR 59, Subpart D National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

1.4 QUALITY ASSURANCE

1.4.1 Arrange with the paint manufacturer's and Canadian Paint and Coatings Association (CPCA) representatives to visit the site prior to the commencement of the painting operation to discuss the painting and finishing procedures to be used and to analyse the surface conditions in order that alternative recommendations may be made to the Consultant should adverse conditions exist.

1.4.2 Arrange with the paint manufacturer and CPCA to visit the site at intervals during the surface preparation and painting operations to insure that the proper surface preparation has been completed, the specified paint products are being used, the proper number of coats are being applied and the agreed finishing procedures are being used, and that the paint manufacturer regularly submits written reports to the Consultant.

1.5 QUALIFICATIONS

1.5.1 Use only paint manufacturers and products as listed under the Approved Products section of the MPI Manual Architectural Painting Specification Manual.

1.5.2 Applicator shall have a minimum of ten (10) years proven satisfactory experience and shall maintain a qualified crew of painters throughout the duration of the work, who shall be qualified to fully satisfy the requirements of this specification. Only qualified journeymen (and apprentices) shall be engaged in painting and decorating work who have Tradesman Qualification certificate of proficiency.

1.6 SUBMITTALS

1.6.1 Submit 2 samples of every colour, in the required number of coats on 8"x 8" pieces of hardboard. Include specifications of materials, products and installation procedure used to obtain the finish. Resubmit samples until colours have been approved by the Consultant.

1.6.2 Coordinate with Section 01300 – Administrative Requirements.

1.6.3 Colours shall match those specified in the Colour Schedule, specifications, and Architectural Drawings.

1.6.4 Product Data: Provide a complete list of all products to be used, with the following information for each:

- .1 Manufacturer's name, product name and / or catalogue number, and general product category.
- .2 Cross-reference to specified paint system(s) that the product is to be used in; include description of each system.

1.6.5 Retain samples at job site until completion of the work.

1.6.6 Samples: Submit three (3) paper samples: 5" by 7" (127mm x 178mm) in size, illustration

selected colours for each colour, texture, gloss/sheen level and system selected with specified coats cascaded. The samples are to be verified by the Architect.

1.6.7 Manufacturer's instruction: Indicate special surface preparation procedures.

1.6.8 Materials and products delivered to the work shall comply with the approved list.

1.6.9 Maintenance Data: Submit data on cleaning, touch-up and repair of paint and coated surfaces.

1.7 MOCK UP

1.7.1 A sample installation area located in the building will be designated by the Consultant.

1.7.2 Apply samples of finishes in the presence of the Consultant, Contractor, and paint manufacturer. Apply samples with the correct material, number of coats, colour, texture, gloss/sheen level and system selected with specified coats cascaded required. Refinish if required, until approval of the Consultant is obtained.

1.7.3 Leave sample installation undisturbed until completion of the Work. Approved sample installation shall serve as a standard for similar work throughout the Project. Work which does not match the approved finishes shall be corrected and refinished at no expense to the Owner.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

1.8.1 Store materials in a single place. Keep storage clean and tidy.

1.8.2 Accept only paint and finishing materials and products delivered to the site in the manufacturer's unbroken, sealed containers, with manufacturer's label indicating type of paint, colour and instructions for reducing.

1.8.3 Store packaged materials undamaged in their original wrappings or containers with manufacturer's labels and seals intact.

1.8.4 Before commencement of work, remove electrical plates, surface hardware, canopies of lighting fixtures, and other escutcheons or appurtenances. Reinstall items in satisfactory condition when painting is completed. Do not clean hardware with solvents which will remove permanent lacquer finish.

1.8.5 Use sufficient drop cloth and protective coverings for the full protection of floors and surfaces not to be painted.

1.8.6 Protect materials and products from frost.

1.9 ENVIRONMENTAL REQUIREMENTS

1.9.1 Atmosphere at the area of work shall be dust free.

1.9.2 Temperatures, humidity, and moisture content of surfaces shall conform to the following:

- .1 Temperatures; No painting shall be performed when temperatures on the surface, or the air in the vicinity of painting work are below 5°C. The minimum temperatures allowed for latex paints shall be 7°C. for interior work and 10°C for exterior work, unless specifically approved by the Consultant.
- .2 Relative humidity shall not be higher than 85%.

- .3 Moisture of surfaces shall be tested by an electronic Moisture Meter.
 - .4 Moisture content of wallboard shall not exceed 12%, of masonry, concrete or concrete block, 12% for solvent type paint.
 - .5 Masonry surfaces shall be tested for alkalinity.
 - .6 Maximum moisture content of wood; 15%.
- 1.9.3 Masonry and concrete block must be installed at least 28 days prior to painting, with a moisture content not exceeding 12%, before painting commences. This is not to be construed as including a "wetting down" process for latex.
- 1.9.4 Painting work shall not proceed unless a minimum of 15 candle power/sq ft lighting is provided on the surface to be painted.
- 1.9.5 All areas where painting work is proceeding shall have adequate continuous ventilation and sufficient heating to maintain temperatures above 7°C. for 24 hours before and after paint application.
- 1.9.6 Take all necessary precautions to prevent fire hazard and spontaneous combustion.
- 1.9.7 Where toxic materials, and both toxic and explosive solvents are used, take appropriate precautions and prohibit smoking.
- 1.10 INSPECTION AND WARRANTY
- 1.10.1 Inspections shall be carried out in accordance with the Canadian Painting Contractors' Architectural Painting Specification Manual.
- 1.10.2 Warrantee the work of this Section against faulty workmanship for a period of two (2) years from date of Substantial Completion.
- 1.10.3 Warrantee shall be in a form acceptable to the Consultant.
- 1.11 PROTECTION
- 1.11.1 Adequately protect other surfaces from paint and damage and make good any damage caused by failure to provide suitable protection.
- 1.11.2 Furnish sufficient drop cloths, shields and protective equipment to prevent spray or dropping from fouling surfaces not being painted and in particular, surfaces within storage and preparation area.
- 1.11.3 Cotton waste, cloths and material which may constitute a fire hazard shall be placed in closed metal containers and removed daily from the site.
- 1.11.4 Remove all electrical plates, surface hardware, fittings and fastenings, prior to painting operations. Carefully store, clean and replace these items on completion of work in each area. Do not use solvent that will remove the permanent lacquer to clean hardware.

PART 2 - PRODUCTS

2.1 MATERIALS

- 2.1.1 Paint, varnish, stain, enamel, lacquer, fillers and other finishing materials shall comply with or exceed MPI for Premium Grade Work, highest grade, top line quality products of the specified manufacturers, and be of a type and brand herein specified and listed under "Approved Product Listing" as covered in the MPI Architectural Painting Specifications Manual, for the specific

purposes

- 2.1.2 Paints shall use a latex bonding agent.
- 2.1.3 Paint materials such as linseed oil, shellac, turpentine, etc., and any of the above materials not specifically mentioned herein but required for first class work shall be the highest quality of an approved manufacturer. All coating materials shall be compatible.
- 2.1.4 Paints, finishing and cleaning products shall be formulated with no petroleum based or other organic solvents (no V.O.C.'s) wherever possible.
- 2.1.5 The approval of the manufacturer of the painting and finishing materials will be based on his agreement to provide the supervision service herein before specified.
- 2.1.6 The following manufacturers are acceptable:
 - .1 Benjamin Moore Paints
 - .2 PPG/ Dulux Paints Canada
 - .3 Pratt and Lambert Inc.
 - .4 Sherwin-Williams Company of Canada Limited
 - .5 Para Paints
- 2.1.7 For paint location references, refer to Architectural Drawing.
- 2.1.8 The Consultant reserves the right to refuse any paint or finishing material if in his opinion it is not suitable or adequate for the use which it is proposed.
- 2.1.9 Exterior paints: Factory tinted to scheduled colours.
- 2.1.10 Interior galvanized metal primer: to comply with LEED VOC limit of 100 g/L per SCAQMD Rule 1113.
- 2.1.11 Paint shall have good flowing and brushing properties and shall dry cure free of sags and runs etc. to yield the desired finish specified.
- 2.1.12 Paints shall be ready-mixed unless otherwise specified, except that any coating in paste or powder form, or to be field-catalysed shall be field-mixed in accordance with directions of its manufacturer. Pigments shall be fully ground and shall maintain a soft paste consistency in the vehicle during storage that can and shall be dispersed readily and uniformly by paddle to a complete homogeneous mixture

2.2 MATERIALS - GENERAL

- 1..1.1 Volatile Organic Compound (VOC) Content:
 - 1. Provide coatings that comply with the most stringent requirements specified in the following:
 - 40 CFR 59, Subpart D-National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

2.3 MIXING AND TINTING

2.3.1 Except where specifically noted in this section, all paint shall be ready-mixed and pre-tinted. Agitate all paint prior to and during application to ensure uniform color, gloss, and consistency.

2.3.2 Thinner addition shall not exceed manufacturer's printed recommendations. Do not use kerosene or other organic solvents to thin water-based paints.

2.4 HIGH PERFORMANCE INTERIOR PAINT SYSTEMS - CANADA

2.4.1 DRYWALL – (Wall, Ceiling, Gypsum Board)

.1 Latex Systems:

.1 Gloss Finish:

- 1st Coat: Benjamin Moore Ultra Spec 500 Interior Latex Primer K534 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149, LEED 2009, LEED V4, CHPS Certified. Dulux Ultra Interior Latex Primer/ Sealer 976000 (0 g/L) MPI # 50, X-Green 50, 149, X-Green 149, LEED 2009, LEED V4, CHPS Certified
- 2nd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Gloss K540 (0 g/L), MPI # 54, X-Green 54, 147, 147 X-Green, 141, X-Green 141, LEED 2009, LEED V4, CHPS Certified. Dulux Pitt-Tech Plus EP Acrylic Gloss 90-1510 Series (< 50 g/L) MPI # 114, X-Green 114, LEED V4, CHPS Certified.
- 3rd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Gloss K540 (0 g/L), MPI # 54, X-Green 54, 147, 147 X-Green, 141, X-Green 141, LEED 2009, LEED V4, CHPS Certified. Dulux Pitt-Tech Plus EP Acrylic Gloss 90-1510 Series (< 50 g/L) MPI # 114, X-Green 114, LEED V4, CHPS Certified

.2 Semi-Gloss Finish:

- 1st Coat: Benjamin Moore Ultra Spec 500 Interior Latex Primer K534 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149, LEED 2009, LEED V4, CHPS Certified. PPG/ Dulux Ultra Interior Latex Primer/ Sealer 976000 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149 or PPG/ Dulux Ultra Interior Latex Primer/ Sealer 976000 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149, LEED V4, CHPS Certified.
- 2nd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Semi-Gloss K539 (0 g/L), MPI # 43, X-Green 43, 146, X-Green 146, 140, X-Green 140, LEED 2009, LEED V4, CHPS Certified or PPG/ Dulux Ultra Interior Latex Semi-Gloss 978000 (0 g/L), MPI # 54, X-Green 54, 147, X-Green 147, LEED V4, CHPS Certified.
- 3rd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Semi-Gloss K539 (0 g/L), MPI # 43, X-Green 43, 146, X-Green 146, 140, X-Green 140, LEED 2009, LEED V4, CHPS Certified or PPG/ Dulux Ultra Interior Latex Semi-Gloss 978000 (0 g/L), MPI # 54, X-Green 54, 147, X-Green 147, LEED V4, CHPS Certified.

.3 Low Sheen / Eggshell:

- 1st Coat: Benjamin Moore Ultra Spec 500 Interior Latex Primer K534 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149, LEED 2009, LEED V4, CHPS Certified. PPG/ Dulux Ultra Interior Latex Primer/ Sealer 976000

(0 g/L), MPI # 50, X-Green 50, 149, X-Green 149

- 2nd Coat: Benjamin Moore Ultra Spec 500 Latex Eggshell K538 (0 g/L), MPI # 52, X-Green 52, 145, X-Green 145, 139, X-Green 139, LEED 2009, LEED V4, CHPS Certified or PPG/ Dulux Interior Latex Pearl 949100 (0 g/L), MPI # 52, X-Green 52, LEED v4, CHPS Certified.
- 3rd Coat: Benjamin Moore Ultra Spec 500 Latex Eggshell K538 (0 g/L), MPI # 52, X-Green 52, 145, X-Green 145, 139, X-Green 139, LEED 2009, LEED V4, CHPS Certified or PPG/ Dulux Interior Latex Pearl 949100 (0 g/L), MPI # 52, X-Green 52, LEED v4, CHPS Certified.

.4 Flat Finish:

- 1st Coat: Benjamin Moore Ultra Spec 500 Interior Latex Primer K534 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149, LEED 2009, LEED V4, CHPS Certified. PPG/ Dulux Ultra Interior Latex Primer/ Sealer 976000 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149
- 2nd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Flat K536 (0 g/L), MPI # 53, X-Green 53, 143, X-Green 143, LEED 2009, LEED V4, CHPS Certified. or PPG/ Dulux Ultra Interior Latex Flat 945000 (0 g/L), MPI # 53, X-Green 53, 143, X-Green 143, LEED v4, CHPS Certified.
- 3rd Coat: Benjamin Moore Ultra Spec 500 Interior Latex Flat K536 (0 g/L), MPI # 53, X-Green 53, 143, X-Green 143, LEED 2009, LEED V4, CHPS Certified. or PPG/ Dulux Ultra Interior Latex Flat 945000 (0 g/L), MPI # 53, X-Green 53, 143, X-Green 143, LEED v4, CHPS Certified.

.2 Epoxy Systems (Water Base):

1. Gloss System:

- 1st Coat: Benjamin Moore Ultra Spec 500 Interior Latex Primer K534 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149, LEED 2009, LEED V4, CHPS Certified. PPG/ Dulux Ultra Interior Latex Primer/ Sealer 976000 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149
- 2nd Coat: Corotech Acrylic Epoxy V450 (168 g/L) or PPG/ Dulux Aquapon WB EP Ultra Low VOC Water-Based Epoxy 98E-1 Series (26 g/L), MPI # 115.
- 3rd Coat: Corotech Acrylic Epoxy V450 (168 g/L) or PPG/ Dulux Aquapon WB EP Ultra Low VOC Water-Based Epoxy 98E-1 Series (26 g/L), MPI # 115.

2. Semi-Gloss System:

- 1st Coat: Benjamin Moore Ultra Spec 500 Interior Latex Primer K534 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149, LEED 2009, LEED V4, CHPS Certified. PPG/ Dulux Ultra Interior Latex Primer/ Sealer 976000 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149
- 2nd Coat: Corotech Acrylic Epoxy V450 (168 g/L) or PPG/ Dulux Aquapon WB EP Ultra Low VOC Water-Based Epoxy 98E-1 Series (26 g/L), MPI # 215.
- 3rd Coat: Corotech Acrylic Epoxy V450 (168 g/L) or PPG/ Dulux Aquapon WB EP Ultra Low VOC Water-Based Epoxy 98E-1 Series (26 g/L), MPI # 215.

.3 Pre-Catalyzed Epoxy (Waterborne):

1. Semi-Gloss System:

- 1st Coat: Benjamin Moore Ultra Spec 500 Interior Latex Primer K534 (0

g/L), MPI # 50, X-Green 50, 149, X-Green 149, LEED 2009, LEED V4, CHPS Certified. PPG/ Dulux Ultra Interior Latex Primer/ Sealer 976000 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149

- 2nd Coat:
- 3rd Coat: Corotech Pre-Catalyzed Waterborne Epoxy Semi-Gloss V341 (71 g/L), LEED 2009 or PPG/ Dulux Pitt-Glaze WB1 Precatalyzed Epoxy Semi-Gloss 16-1510C (0 g/L), MPI # 141, 147, 153, LEED v4, CHPS Certified.

2. Eggshell/Low Luster System:

1. 1st Coat: Benjamin Moore Ultra Spec 500 Interior Latex Primer K534 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149, LEED 2009, LEED V4, CHPS Certified. PPG/ Dulux Ultra Interior Latex Primer/ Sealer 976000 (0 g/L), MPI # 50, X-Green 50, 149, X-Green 149
2. 2nd Coat: Corotech Pre-Catalyzed Waterborne Epoxy Eggshell V342 (73 g/L), MPI # 151, LEED 2009. or PPG/ Dulux Pitt-Glaze WB1 Precatalyzed Epoxy Eggshell 16-1310C (0 g/L), MPI # 139, 145, 151, LEED v4, CHPS Certified.
3. 3rd Coat: Corotech Pre-Catalyzed Waterborne Epoxy Eggshell V342 (73 g/L), MPI # 151, LEED 2009. or PPG/ Dulux Pitt-Glaze WB1 Precatalyzed Epoxy Eggshell 16-1310C (0 g/L), MPI # 139, 145, 151, LEED v4, CHPS Certified.

2.4.2 EXISTING WINDOW & SCREEN FRAME & RADIATOR COVERS

- .1 Aquapon WB EP Primer:
Two component, ultra low VOC, water-based epoxy primer
- .2 Aquapon WB EP:
Two component, ultra low VOC, water-based epoxy finish

PART 3 - EXECUTION

3.1 INSPECTION

- 3.1.1 Examine the work upon which the work of this Section depends prior to commencement of work. If surfaces cannot be put in proper condition by customary cleaning, sanding and puttying, report any defects to the Consultant.
- 3.1.2 Failure to report defects will constitute acceptance of surfaces. Refinish the faulty work at no expense to the Owner.
- 3.1.3 Test all surfaces by an approved moisture testing device for moisture content before commencing work. Do not apply paint to substrates when the moisture content exceeds 12%.

3.2 PREPARATION

- 3.2.1 Refer to Canadian Painting Contractors' Architectural (CPCA) Painting Specification Manual for surface preparations.
- 3.2.2 Clean floors, adjacent surfaces and surfaces to be painted before work is commenced.

- 3.2.3 Cut out scratches, cracks and abrasions in wall surfaces and adjoining trim, as required, and fill with an approved non-shrink patching compound flush with adjoining surface. When dry, sand the patch smooth and seal before the application of the prime coat.
- 3.2.4 Fill nail holes, screw holes and other similar defects after the first coat of paint has been applied. The filler shall match the colour of the finish.
- 3.2.5 Surfaces to be finished shall be clean, free from machine, tool, or sanding marks, dust, grease, soil or other extraneous matter which could be detrimental to an acceptable finish.
- 3.2.6 Wood: Prepare in accordance with CAN/CGSB 85.100 Sand smooth, removing all tool marks, and dust clean. Apply one coat of aluminum primer to all knots and sap streaks, on wood if to be painted or one coat of white shellac if to be stained and varnished. Putty nail holes, cracks and defects only after the correct priming coat is dry. Fine sanding and dusting to be carried out between coats.
- 3.2.7 Gypsum board: Inspect to ensure properly filled joints, sand smooth. Remove contamination.
- 3.2.8 Concrete, Masonry: Surfaces shall be clean, free from all contamination. Scrape off all mortar nibs and cement spatter. Remove form oil by washing with Xylol. Remove efflorescence by brushing or washing with a dilute solution of muriatic acid - 1 part commercial muriatic acid to 20 parts water by volume - followed by complete rinsing with clean water. Remove mildew by the application of one part sodium hypochloride (Javex) to three parts water. If dirt is also in evidence, add 1/2 lb. trisodium phosphate to 1 gallon of the above solution. Scrub surface well and follow with a thorough clean water rinse.
- 3.2.9 Wash masonry surfaces which are to be painted with a solution consisting of 2.0 lb. of zinc sulphate to 1 gallon of water. Rinse with clean water and allow to dry thoroughly. Remove mortar spots and sharp edges with a scraper and ensure that patching is done where required.
- 3.2.10 Mildew removal: Scrub with solution of T.S.P. and bleach, rinse with clear water and allow surface to dry completely.
- 3.3 APPLICATION - GENERAL
 - 3.3.1 Apply paint according to accepted trade method.
 - 3.3.2 Apply each coat at proper consistency.
 - 3.3.3 Sand lightly between coats to provide anchor for successive coat.
 - 3.3.4 Each coat of paint shall be slightly darker than preceding coat unless otherwise approved.
 - 3.3.5 Do not apply finishes on surfaces that are not sufficiently dry. Each coat of finish shall be dry and hard before next coat is applied unless manufacturer's directions state otherwise. (Refer to polyurethane coatings).
 - 3.3.6 Tint filler to match wood when clear finishes are specified. Work filler well into grain and before it has set wipe excess from surface.
 - 3.3.7 On exterior work do not paint during temperatures under 5°C, or immediately following rain, frost or dew. On interior work do not paint during temperatures under 5°C, or on surfaces where condensation has formed or is likely to form (unless specifically formulated paints are used). Minimum temperatures allowed for latex paints shall be 7°C for interior work and 10°C for exterior

work.

3.4 FIELD QUALITY CONTROL

- 3.4.1 Use pink litmus paper for testing surfaces for alkalinity. Where extreme alkali conditions occur, neutralize surface by washing. Wash shall consist of a 4% solution of Zinc Sulphate. Does not apply to surfaces to receive latex paints.

3.5 APPLICATION - PRIMERS

- 3.5.1 Apply one coat of primer to exposed ferrous metal surfaces including structural steel, mechanical and electrical equipment, piping, ducts and conduit that have not received a shop coat of primer.
- 3.5.2 Touch up primed metal work after loose paint and scale have been removed.
- 3.5.3 Thoroughly clean galvanized steel, including piping and ductwork of oil and grease with mineral spirits, treat with an approved chemical phosphoric metal etch and allow to dry, unless galvanized metal primer is to be used.
- 3.5.4 Wash masonry surfaces which are to be painted, with a solution consisting of 2.0 lb. of zinc sulphate to 1 gal. of water. Rinse with clean water and allow to dry thoroughly. Remove mortar spots and sharp edges with a scraper and ensure that patching is done where required. Prime masonry block surfaces with primer/block filler to fill all pores including pin holes.
- 3.5.5 Apply primer to piping having bituminous covering which is compatible with finish paint which will prevent bitumen bleeding through finish.
- 3.5.6 Apply sealer and prime coat on walls to receive mirrors before installation of mirrors.
- 3.5.7 When the primer-sealer coat is dry, touch up all visible suction spots before the first finish coat is applied and do not proceed with the work until all suction spots are sealed.
- 3.5.8 Minimal cracks, holes and imperfections appearing after application of prime coat shall be filled, patched and smoothed to match adjoining surface by Section providing the surface being painted.

3.6 APPLICATION - FINISH COATS

- 3.6.1 Mix materials thoroughly before application, apply evenly under adequate illumination and free from sags, runs, crawls and other defects. Do cutting in neatly.
- 3.6.2 Apply finish coats of the proper consistency as received from the container, and brush well showing a minimum of brush marks.
- 3.6.3 Sand semi-gloss, medium and high gloss lightly between coats.
- 3.6.4 Gloss terms shall have the following values when tested in accordance with ASTM D523 "Test for Specular Gloss" in accordance with the following MPI Values:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	a traditional matte finish - flat	0 to 5	10 max.
G2	a high side sheen flat - 'a velvet-like' finish	0 to 10	10 to 35
G3	a traditional 'eggshell-like' finish	10 to 25	10 to 35
G4	a 'satin-like' finish	20 to 35	35 min.
G5	a traditional semi-gloss	35 to 70	
G6	a traditional gloss	70 to 85	
G7	a high gloss	> 85	

- 3.6.5 Finish walls in eggshell, ceilings in flat and frames in semi-gloss, unless noted otherwise.
- 3.6.6 Apply coats only when the previous coat of paint, varnish or enamel is perfectly dry. Each finish coat shall be a tint lighter than the following. Only the last coat shall match the accepted samples.
- 3.6.7 Finish tops, bottoms and edges of doors in the same manner as the remainder of the door.
- 3.6.8 Finish the work uniformly as to sheen, gloss, colour and texture.
- 3.6.9 Apply materials in accordance with the directions and instructions of the manufacturers of the various materials. Do not use adulterants.
- 3.6.10 Finish closets and the interior of cabinets the same as adjoining surfaces of rooms, unless otherwise specified. Finish all other surfaces the same as the nearest or adjoining surfaces unless otherwise specified or directed by the Consultant.
- 3.6.11 Spray painting may be used only with the approval of the Consultant.
- 3.6.12 Repaint the entire plane of areas showing incomplete coverage. Patching is prohibited.
- 3.6.13 Paint surfaces and items visible through convector covers, grilles, heating cabinets, louvres and soffits with two coats black matte paint.
- 3.6.14 Do not paint over fire rating labels on doors and frames and over identification labels on mechanical and electrical equipment.
- 3.6.15 Paint reveals the same colour as the surface in which it occurs, unless otherwise indicated.
- 3.6.16 All interior metalwork which is exposed in the completed work, in rooms which are shown on the "Room Finish Schedules" to have a finish on the walls or ceiling shall receive two coats of interior paint over the prime coat. Painting shall include without being limited to, all structural steel, mechanical and electrical equipment, ductwork, and piping.
- 3.6.17 All interior metalwork in unfinished areas shall receive one coat of interior paint over the prime coat. Painting shall include without being limited to structural steel, steel ladders, mechanical and electrical equipment, piping and ductwork.
- 3.6.18 The following generally, will be painted in colour, texture and sheen to match adjacent surfaces:
- .1 Access doors
 - .2 Registers

- .3 Radiators and covers
- .4 Prime coated butts
- .5 Prime painted door closers
- .6 Exposed piping.

3.7 APPLICATION - EXISTING SURFACES

- 3.7.1 Paint or repaint all existing surfaces of rooms where noted on the "Room Finish Schedule" including "new" work which has been incorporated into the existing work and existing work which has been damaged, altered, or otherwise disturbed during renovation operations.
- 3.7.2 Repaint surfaces or rooms adjacent to rooms where alterations or renovations have been carried out and which have been damaged or otherwise disturbed by the alterations or renovations. Where such damage occurs, repaint completely.
- 3.7.3 Remove from existing surfaces to be coated all rust, scale, oil, grease, mildew, chemicals, and other foreign matter.
- 3.7.4 If coatings on existing surfaces have failed so as to affect the proper performance or appearance of coatings to be applied, or if such coatings can be easily scraped off, remove them and prepare their substrates properly. Dull hard or glossy surfaces by sanding, sandblasting, or by other abrasive methods prior to painting.
- 3.7.5 Repaint surfaces entirely between changes of plane which have been incorporated into the existing work and existing work which has been damaged, altered, or otherwise disturbed during renovation operations. Give existing surfaces two coats of paint or enamel over existing finish to match the previous finish.
- 3.7.6 Paint existing mechanical and electrical items exposed to view in areas indicated.

3.8 CLEANING

- 3.8.1 Promptly as the work proceeds and on completion of the work, remove all paint where spilled, splashed or spattered. During progress of the work keep premises free from unnecessary accumulation of tools, equipment, surplus materials and debris. At conclusion of the work leave premises neat and clean to the satisfaction of the Consultant, Paint Inspector and/or Owner.

3.9 INTERIOR FINISHES

- 3.9.1 Finish the various interior surfaces as follows, in addition to previously specified treatments, coatings or primers:

- | | |
|--------------------------|--|
| <u>1. Concrete Block</u> | 1 coat masonry block filler and primer |
| | 2 coats eggshell latex |

INT 4.2A LATEX (over latex block filler)

Or

INT 4.2D HIGH PERFORMANCE ARCHITECTURAL LATEX (over latex block filler)

Or

INT 4.2J EPOXY- MODIFIED LATEX (over latex block filler) (for dry environments)

Or

INT 4.2K W.B. LIGHT INDUSTRIAL COATING (over latex block filler)

2. Galvanized Steel

1 coat galvanized metal primer or pretreatment
2 coats vinyl latex or epoxy of selected sheen

INT 5.3J LATEX (over w.b. galvanized primer)

Or

INT 5.3M HIGH PERFORMANCE ARCHITECTURAL LATEX (over w.b. galvanized primer)

Or

INT 5.3K W.B. LIGHT INDUSTRIAL COATING(over w.b. galvanized primer)

3. Gypsum Drywall Wall & Ceilings

1 coat primer-sealer
2 coats flat vinyl-latex paint

INT 9.2A LATEX (over Latex Primer / sealer)

Or

INT 9.2B HIGH PERFORMANCE ARCHITECTURAL LATEX (over Latex Primer / sealer)

Or

INT 9.2F EPOXY- MODIFIED LATEX (over Latex Primer / sealer)

Or

INT 9.2L W.B. LIGHT INDUSTRIAL COATING (over Latex Primer / sealer)

4. Steel, Miscellaneous

1 coat rust inhibiting primer
2 coats alkyd enamel of selected sheen

INT 5.1B W.B. LIGHT INDUSTRIAL COATING (over w.b. rust-inhibitive primer)

5. Shop Primed Steel

1 coat vinyl wash primer
2 coats alkyd paint of selected sheen

INT 5.1X LATEX (over shop-applied q.d. Shop Primer) (for dry locations only)

6. Piping, Conduit & Ductwork

1 coat metal primer
1 coat fire retardant and mildew resistant paint of
selected sheen

INT 5.3K W.B. LIGHT INDUSTRIAL COATING (over w.b. galvanized primer)

7. High heat areas

2 coats heat resistant paint

INT 5.2A HEAT RESISTANT ENAMEL - MAXIMUM 400° F (205° C)

8. Insulation on pipes and ducts

1 coat fire retardant and latex sealer
2 coats latex paint of selected sheen

INT 10.1A - LATEX (over Latex Primer sealer)

9. Mechanical Equipment 2 coats gloss enamel

10. Metal Convectors & Heating Units 2 coats gloss enamel

3.10 EXTERIOR FINISHES

3.10.1 Finish the various exterior surfaces as follows:

1. Galvanized Steel
 EXT 5.3J W.B. LIGHT INDUSTRIAL COATING (over w.b. galvanized primer)
2. Steel
 EXT 5.1C W.B. LIGHT INDUSTRIAL COATING (over alkyd metal primer)

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 General Conditions, Supplementary Conditions and Division 01 apply to this Section.

1.2 SUMMARY

1.2.1 Furnish all labour and materials necessary for the completion of work in this Section as shown on the Contract Drawings and specified herein.

1.2.2 Work in this Section includes but is not limited to:

- .1 Solid plastic toilet/shower compartments including the following: (ARIA)
 - .1 Floor mounted toilet compartments.
 - .2 Floor mounted privacy screens.
 - .3 Floor mounted entry partitions.
 - .4 Floor mounted urinal screens.
 - .5 Wall mounted urinal screens.

1.2 RELATED REQUIREMENTS

- 1.2.1 Section 05 99 90: Miscellaneous Metals
- 1.2.2 Section 06 10 00: Rough Carpentry
- 1.2.3 Section 09 29 00: Gypsum Board
- 1.2.4 Section 09 30 00: Porcelain and Ceramic Tile
- 1.2.5 Section 10 28 00: Washroom Accessories

1.3 REFERENCES

1.3.1 ASTM International (ASTM):

- .1 ASTM A 666 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- .3 ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3.2 National Fire Protection Association (NFPA):

- .1 NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

1.4 SUBMITTALS

1.4.1 Submit submittals in accordance with the General Conditions and Section 01 33 00.

1.4.2 Shop Drawings:

- .1 Submit shop drawings showing and describing in detail materials, finishes, dimensions, details of connections and fastenings elevations, plans, sections, thicknesses, hardware and any other pertinent information.

- 1.4.3 Product Data: Manufacturer's data sheets on each product to be used, including:
 - .1 Preparation instructions and recommendations.
 - .2 Storage and handling requirements and recommendations.
 - .3 Installation methods.
- 1.4.4 Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- 1.4.5 Samples:
 - .1 Submit necessary templates and instructions where supports or anchors have to be built-in by others.
 - .2 Submit one sample of each of the following:
 - .1 Hinge, latch, panel fitting.
 - .2 Corner section, 305mm x 305mm (12" x 12") showing colour, corner, edge and core construction.
- 1.4.6 Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic checking and adjustment, cleaning and maintenance.
- 1.5 QUALITY ASSURANCE
 - 1.5.1 Manufacturer Qualifications: Five years or more experience in manufacture of laboratory casework and equipment of type specified.
 - 1.5.2 Installer: Five years or more experience with installation of similar products, and acceptable to the manufacturer.
 - 1.5.3 Mock-Up: Provide a mock-up for evaluation of fabrication techniques and application workmanship.
 - .1 Install in areas designated by Architect.
 - .2 Do not proceed with remaining work until installation is approved by Architect.
- 1.6 DELIVERY, STORAGE, HANDLING AND PROTECTION
 - 1.6.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location.
 - 1.6.2 Do not permit delivery of work to job site until building is sufficiently dry, wet trades are completed and the moisture readings of surfaces in proposed storage area is less than 18%.
 - 1.6.3 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Store materials flat on level surface. Protect materials with suitable non-staining waterproof coverings, but allow for air circulation at sides.
- 1.7 COORDINATION AND SCHEDULING
 - 1.7.1 Schedule delivery of access flooring so that spaces are sufficiently complete and access flooring materials can be installed immediately following delivery.
- 1.8 PROJECT CONDITIONS
 - 1.8.1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental

conditions outside manufacturer's recommended limits.

1.9 WARRANTY

- 1.9.1 Manufacturer's Warranty: Provide manufacturer's standard 25 year limited warranty for against breakage, corrosion, and delamination under normal conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- 2.1.1 Acceptable Manufacturer: Scranton Products, which is located at: 801 E. Corey St.; Scranton, PA 18505; Toll Free Tel: 800-445-5148; Fax: 855-376-6161; Email:[request info \(yasser_rana@azekco.com\)](mailto:request_info(yasser_rana@azekco.com)); Web:<http://www.scrantonproducts.com>
- .1 Fabricator: Santana Toilet Partitions.
 - .2 Fabricator: Comtec Toilet Partitions.
 - .3 Fabricator: Capitol Toilet Partitions.

- 2.1.2 or approved equivalent.

2.2 MATERIALS

2.2.1 Doors, Panels and Pilasters:

- .1 High density polyethylene (HDPE), fabricated from polymer resins compounded under high pressure, forming single thickness panel.
- .2 Waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.
- .3 Thickness: 1 inch (25 mm) with 1/4 inch (6 mm) radiused edges. One edge of pilaster and transom panels to be ship lapped.
- .4 Recycled Content (Post Industrial): 25 percent.
- .5 Recycled Content (Post Industrial): 100 percent.
- .6 Recycled Content (Post Consumer): 100 percent.
- .7 Fire Rating: Tested in accordance too NFPA 286: Pass.
- .8 Fire Rating: Tested to meet ASTM E 84: Class B flame spread/smoke developed rating.
- .9 Standard Collection, Does not meet NFPA 286 or ASTM E84.

- 2.2.2 Aluminum and Aluminum Extrusions: ASTM B221, 6463-T5 alloy and temper.

- 2.2.3 Stainless Steel: ASTM A167, Type 304.

2.3 TOILET / SHOWER COMPARTMENT SYSTEM

- 2.3.1 Basis of Design: ARIA Toilet / Shower Partitions as manufactured by and supplied by Scranton Products.

- .1 Style: Full height floor mounted overhead braced toilet compartments.

2.3.2 System Construction:

- .1 System Specified Height: Up to ceiling height 2700mm.
- .2 Doors: 79 inches (2007 mm) high. Mounted 1 inch (25 mm) above finished floor.
- .3 Dividing Panels: Two panels stacked and secured with 3 dowels ensuring proper alignment totaling the system specified height
 - .1 Trim: Application to hide seam gap between dividing panels.
- .4 Pilasters: System specified height, shoeless system secured with 3/4 inch (19 mm) long stainless steel tamper resistant Torx head screws and angled wall brackets.
- .5 Transom Panel: Height required to accommodate specified system height with ship lap

- on one edge. Mounted with four mending plates using 3/4 inch (19 mm) long stainless steel tamper resistant Torx head screws.
 - .6 Wall Brackets: 54 inches (1372 mm) long, heavy-duty aluminum with bright dip anodized finish. Mounts to pilasters, panels and walls with 3/4 inch (19 mm) long stainless steel tamper resistant Torx head screws.
- 2.3.3 System Design:
- .1 Door Design: Traditional Series; Model 1000.
 - .2 Side Panel Design: Plain (standard).
 - .3 Color: Traditional; Charcoal grey. Texture: Orange Peel.
 - .4 Trim and headrail: Standard radius edged, 5 inches (127 mm) wide.
 - .5 Trim Color: Traditional; Charcoal grey. Texture: Orange Peel.
- 2.4 HARDWARE:
- 2.4.1 Hinges: Helix style 78 inches (1981 mm) edge mounted continuous hinge.
- .1 Stainless steel: 0.074 inch (1.88 mm) thick 304-2B stainless steel using a stainless-steel pin in 0.234 inch (5.94 mm) diameter.
 - .2 Closing degree is minus 5 degrees. Hinge is designed to come to a full close on its own weight.
- 2.4.2 Occupancy Indicator Latch and Housing: Satin stainless-steel showing green and red occupancy indicators.
- .1 Latch housing: Satin stainless steel.
 - .2 Slide bolt and button: Satin stainless steel.
 - .3 Door Pulls: Satin stainless steel.
- 2.4.3 Coat Hook and Bumper:
- .1 Combination type, chrome plated Zamak.
 - .2 Equip outswing handicapped doors with second door pull and door stop.
- 2.4.4 Urinal Screen:
- .1 1114mm (42") long x 610mm (24") wide wall hung type High density polyethylene (HDPE) urinal screens with continuous U bracket aluminum.

PART 3 - EXECUTION

- 3.1 EXAMINATION
- 3.1.1 Examine areas receiving toilet partitions, panels and pilasters for correct height and spacing of anchorage, blocking and plumbing fixtures that affect installation of partitions. Report discrepancies to the Architect.
- 3.1.2 Do not begin installation until substrates have been properly prepared.
- 3.1.3 If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- 3.2 PREPARATION
- 3.2.1 Clean surfaces thoroughly prior to installation.
- 3.2.2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- 3.3.1 Install in accordance with manufacturer's instructions.
- 3.3.2 Install partitions rigid, straight, plumb, and level manor, with items laid out as shown on shop drawings.
- 3.3.3 Clearance at vertical edges of doors shall be uniform top to bottom.
- 3.3.4 No evidence of cutting, drilling, and/or patching shall be visible on the finished work.
- 3.3.5 Finished surfaces shall be cleaned after installation and be left free of imperfections.

3.4 PROTECTION

- 3.4.1 Take protective measures to prevent exposure to other construction activity.
- 3.4.2 Protect installed products until completion of project.

3.5 CLEANING

- 3.5.1 Clean surfaces to remove soiling, stains, dust, and dirt using materials acceptable to manufacturer.
- 3.5.2 Touch-up, repair or replace damaged products and defective work, as directed by Architect.
- 3.5.3 Leave installation area clean, free of residue and debris resulting from work of this Section.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. This section specifies the Bridgewall Melius demountable partition wall system including all framing aluminum components, doors and door hardware as indicated on the construction drawings. All required adhesives and fasteners, plus all materials needed for complete assembly are included.

1.2 Section Includes

- A. Manufactured aluminum framing
- B. Glass and glazing
- C. Doors, frames and door hardware
- D. Film, vinyl overlays, custom glass finishes are available

1.3 REFERENCES

- A. ASTM E90 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
- B. NAAWS3.1- North American Architectural Woodwork Standards manual- current edition
- C. ASTM B221 – Standard Specification for Aluminum-Alloy Extruded Bars, Rods, Wires, Shapes and Tubes.

1.4 SUBMITTALS

- A. Submittals for assessment
 - 1. Submit shop drawings from manufacturer detailing:
 - a. Partition panel layout(s) in both plan and elevation views
 - b. Opening locations
 - c. Opening sizes
 - d. Relationship to any adjacent construction
 - 2. Standard aluminum finish submittal: single aluminum sample of standard finishes: black powder coat.
 - 3. Premium anodized samples: single sample of dark bronze, light bronze, and champagne will be submitted for review when requested.
 - 4. Custom aluminum finish submittal: submit two samples for review and approval/ comment with one to be retained by the consultant and the other one returned for coordination purposes.

B. Manufacturer information:

1. Provide manufacturer's literature with Melius system overview, door and finish option overviews, and door technical summaries
2. Provide manufacturers website

C. Quality Control Submittals.

1. finish sample showing specified color
2. Product data samples of each hardware component

1.5 QUALITY ASSURANCE

A. Installer Qualifications

1. All Bridgewall systems are to be installed by manufacturer authorized installation teams to meet warranty requirements.

B. Manufacturer Qualifications

1. All doors and associated hardware and glazing must be supplied by Bridgewall to ensure compatibility (and meet warranty requirements)
2. All partition components must be supplied by Bridgewall to ensure warranty requirements

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Materials must be delivered to site in the original manufacturer's packaging.
- B. Store materials in a dry and secure location that is safe from unwanted moisture. Protect finished surfaces from moisture and scratching.

1.6 WARRANTY

A. Provide manufacturers standard warranty

1. Bridgewall will provide a five-year warranty in accordance with the Bridgewall warranty document.
2. Provide operation and maintenance data for incorporation into the Operation and Maintenance Manual.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Systems provided by:

Bridgewall Systems

89 Paramount Road

Winnipeg, MB

R2X 2W6

Phone: 866-334-3940

Website: www.bridgewallsystems.com

B. Or approved equivalent.

2.2 DEMOUNTABLE PARTITION SYSTEM

A. General

1. Provide demountable partition system including all required parts. Door frames and doors to be pre-drilled for assembly and installation.
2. System is intended to be installed on top of finished floors using a base extrusion fastened directly to the existing floor.
3. Review section details and installation instructions for system connections and layout.

B. Frame Materials

1. Aluminum Extrusion
 - a. Standard Finishes:
 - i. Black powder coat
2. Pull Hardware: 60" Pull Handle, Satin Black
3. Hinges: Bridgewall stainless steel pivot hinges
4. Concealed overhead closers with soft close and 90 degree hold open standard on hinged doors
5. Glass
 - a. 1/2" inch (13mm) + 0.060 P.V.B. + 1/2" inch (13 mm) laminated glass (49 STC) standard double glazed

2.3 Standard Modules

A. Double Glazed Wall Dimensions (if specified):

1. Wall (extrusion) Thickness: 2 3/8 inches (32 mm)
2. Glass panel width: 6 inches (150 mm) minimum, 48 inches (1200 mm) maximum
3. Top Rail Height: 2 1/2 inches (64 mm)
4. Bottom Trim Height: 1 1/4 inches (32 mm)

5. Maximum Height: 120 inches (3048 mm)
- B. Swing Door Frame Dimensions- single glazed (double glazed if specified):
 1. Door Frame Height: 2 ½ inches (64 mm)
 2. Door Frame Depth: 2 3/8" inches (60 mm)
- C. Door Sound Mitigation
 1. Perimeter sound seals vertically and at top of door (standard)
 2. Automatic drop seals at bottom of both sliding and swing doors (standard)
- D. Door Dimensions:
 1. Glass Door Dimensions (Sliding or Swing):
 - a. 3/8" (10 mm) tempered glass standard (49 STC double glazed)
 - b. Maximum Door Width: 44 inches (1118 mm)
 - c. Maximum height: 120 inches (including door frame) (3048 mm)

PART 3 - EXECUTION

3.1 Site Preparation

- A. To maintain dimensional stability of any product, it is recommended that our systems be installed in enclosed space environments only, under temperature control and on sites with a maintained relative humidity of between 25% to 55%. Even though our products may not be as readily affected by variances in relative humidity, adjacent products or surfaces which our product is attached to, contained or captured within may affect their performance.
- B. Before beginning the installation, ensure that the installation area is clean and free of any items that will interfere with the installation or damage product.
- C. Identify the flow of materials and determine places to store glass and hardware that is safe from damage.

3.2 Installation

- A. Install the partitioning system in adherence with the instructions and approved drawings issued by the manufacturer
- B. Partitions need to be installed straight, plumb and level.
- C. Ensure partitions elements are correctly fastened to adjacent building elements
- D. All doors to be installed level and plumb

3.3 Cleaning and Protection

- A. All packaging to be removed and discarded
- B. Always ensure finished surfaces of glass, aluminum profiles and hardware are protected from scratching and damage

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

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

1.2. REFERENCES

UL 752 Standard for Bullet Resisting Equipment

ASTM E119-98 Standard test methods for Fire Tests of Building Construction and Materials

NIJ 0108.01 Standard for Ballistic Resistant Protective Materials

MIL-P-46593A Numerical simulation of ballistic impact on composite laminates

MIL-STD-622F V50 Ballistic Test for Armor

1.3. SUBMITTALS

- 1.3.1. Submit for approval prior to fabrication: shop drawings (dimensioned profiles including anchorage details), product specifications, and test reports (current UL Listing Verification & UL 752 Test Results as provided by Underwriters Laboratories).

1.4. DESIGN

- 1.4.1. Through the design, manufacturing techniques and material application the Bullet Resistant Fiberglass shall be of the "non-ricochet" type. This design is intended to permit the capture and retention of an attacking projectile lessening the potential of a random injury or lateral penetration.

1.5. QUALITY ASSURANCE

- 1.5.1. Manufacturer shall be a Company that specializes in manufacturing products of the specified type with a minimum of three years' experience. Installer shall be a Company that specializes in product type.

1.6. HANDLING, DELIVERY AND STORAGE

- 1.6.1. Delivery of the materials to the project with the manufacturer's Labels intact and legible. Handle the materials with care to prevent damage. Store materials inside and under cover, stack flat and off floor. Project conditions (temperature, humidity, and ventilation) shall be within the maximum limit recommendations set by manufacturer. Do not install products that are under conditions outside these limits.

1.7. WARRANTY

- 1.7.1. All materials shall be warranted against defects for a period of 1 year for the date of receipt at the project site. All workmanship, shall be installed by a certified installer, shall be guaranteed against defects for a period of 1 year from the date of installation. Certificates of warranty shall be provided at project completion.

PART 2 - PRODUCTS

2.1. ACCEPTABLE MANUFACTURERS

- 2.1.1. Products shall be UL 752 Level 3 listed manufactured/distributed by: Gaffco Ballistics LLC, or approved equivalent.
- 2.1.2. Unlisted UL752 bullet resistant fiberglass products will not be considered acceptable or equal.

2.2. BULLET RESISTANT FIBERGLASS MATERIAL

- 2.2.1. Fiberglass composite panels are constructed of multiple layers of ballistic grade woven fibers combined with a thermoset polyester resin binder. The unique composition is intended to retain ballistic projectiles thereby averting hazardous ricocheting.
- 2.2.2.
- 2.2.3. Fiberglass weighs a fraction of its steel armor counterpart with identical performance levels. Due to its lighter weight, reinforcement of traditional stud walls is not necessary and panels can be adhered to walls using customary construction methods. Panels can be cut and drilled using conventional carpentry tools and can be covered with wood or plastic veneer then upholstered and/or painted.
- 2.2.4. Approximate weight: 100 lbs (4' x 8' panel) and 125 lbs (4' x 10' panel)
- 2.2.5. Nominal thickness: 0.25" - 0.26"
- 2.2.6. Available standard sizes: 4' x 8', 4' x 10'

2.3. SECURITY LEVEL

- 2.3.1. The Bullet Resistant Fiberglass must be **UL 752 LISTED RATED FOR LEVEL 1** (1 Ply) batten in front / behind method

PART 3 - EXECUTION

3.1. CONTRACT DOCUMENTS

- 3.1.1. Prior to installing the bullet resistant material, the contractor shall verify that all supports have been installed as required by the contract documents and architectural drawings, and approved shop/CAD drawings, if required.

3.2. INSTALLATION

- 3.2.1. Do not begin installation until openings have been verified and surfaces properly prepared in accordance with Drawings. Prepare all surfaces per recommendations of manufacturer. Install in accordance with manufacturer's instructions and UL 752. Set all equipment plumb. Fire rated assemblies in accordance with NFPA80.
- 3.2.2. Install in accordance with manufacturer's printed recommendations. Installation tolerance shall not exceed 1/16th of an inch (1.6mm) for squareness, alignment, twist and plumb. Install hardware as specified.
- 3.2.3. Pilot holes should be drilled into the fiberglass that will hang on stud walls. Avoid screwing directly into the fiberglass to prevent delamination around the screw and void any warranty. Drywall screws 12-24" O.C. is preferred.

- 3.2.4. Fiberglass panels may be adhered using an industrial adhesive and/or screws or bolts. To ensure ballistic integrity, it is recommended that 4" overlap battens be installed at butt joints and seams forming a 2" ballistic overlap on each side of the seam. For curved surfaces, 12"-18" vertical strips following the inside curvature of the surface to be protected should be installed followed by 4" overlapping battens at each joint.

3.3. CUTTING AND DRILLING

- 3.3.1. Cutting fiberglass can be completed using conventional saws (circular, table, panel, saber), whereas drilling should be done with a high-speed, steel twist drill at low speed. Cutting is best done using an abrasive carbide-grit edge blade or a diamond blade intended for fiberglass. The saw operator cuts while an assistant sprays water on the saw blade to develop a stream of water. This minimizes the dust and develops a non-hazardous slurry. Given the nature of the product, we recommend wearing disposable coveralls and respirators.

3.4. JOINTS

- 3.4.1. All joints shall be reinforced by a back-up layer of bullet resistive material. The bullet resistance of the joint, as reinforced, shall be at least equal to that of the panel. Minimum width of reinforcing layer shall be 4" (2" on each panel) or a 2" overlap minimum. No rigid high-density material shall be used adjacent to the panel's inner surface, allow 1/4" gap.

3.5. POST APPLICATION

- 3.5.1. Inspection and Cleaning: Verify installation is complete and complies with manufacturer's requirements. Clean product and accessories, removing excess sealant, labels and protective covers.
- 3.5.2. Touch-up, repair or replace damaged products before Substantial Completion.
- 3.5.3. Product Warranty: Applicable warranty shall be issued to owner upon final release of completed project in project close-out manuals.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.
- 1.1.2 Provide all labour, materials, products, equipment and services to supply and install washroom accessories required as shown on the Drawings and as specified herein.

1.2 REFERENCE STANDARDS

- 1.2.1 ASTM A167-99(2009) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip (Withdrawn 2014).
- 1.2.2 ASTM A653/A653M-15 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- 1.2.3 ASTM B117-11 Standard Practice for Operating Salt Spray (Fog) Apparatus.
- 1.2.4 CAN/CGSB 12.5-M86 Mirrors, Silvered.
- 1.2.5 CSA W55.3-08(R2013) Certification of Companies for Resistance Welding of Steel and Aluminum.

1.3 SUBMITTALS

- 1.3.1 Submit shop drawings, clearly indicating accessory materials, products and finishes and showing in large scale detail the construction, reinforcing, anchorage and location of exposed fastenings, where permitted. Submit a prototype of each accessory for review before delivery to the site.
- 1.3.2 Submit necessary templates and instructions where recesses, openings, fastenings or anchors have to be built in by others.
- 1.3.3 Submit three copies of list of accessories requiring supplies together with names and addresses of local distributors of the supplies.

1.4 DELIVERY AND STORAGE

- 1.4.1 Carefully wrap accessories ensuring protection during shipping and storage.
- 1.4.2 Store accessories inside the building in location directed, and so that their identification is readily visible, and in the general order in which they will be required for installation.
- 1.4.3 Adequately protect the structure and work of other Sections during delivery, storage, handling and execution of the work of the Section.
- 1.4.4 Provide tools, plant and other equipment required for the proper execution of the work of this Section.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

2.1.1 The following manufacturers may be used for Base Bid:

- .1 Bobrick Washroom Equipment of Canada
- .2 Bradley Corporation
- .3 ASI Watrous
- .4 Saferail Products Inc.
- .5 Or other approved manufacturers meeting or exceeding these requirements.

2.1.2 Manufacturer's standard products shall be modified to comply with these Specifications unless otherwise stated with bid submission for work of this Section.

2.1.3 Washroom accessories shall be as specified in this Section, and shall be of one manufacturer except as otherwise specified or approved. Washroom accessories of the same materials, construction and finishes, and similar in function, design and appearance to those specified of other manufacturers will be considered, in accordance with the requirements of the Contract Documents for proposing substitutions.

2.2 MATERIALS

2.2.1 Stainless steel: ASTM A167 Type 304 or Type 316, of one type throughout.

2.2.2 Galvanized steel sheet: ASTM A653/A653M, commercial quality sheets, plain commercial galvanized or electro-galvanized.

2.3 FABRICATION

2.3.1 Fabricate accessories true, square, rigid, free from distortion and from defects detrimental to appearance and performance.

2.3.2 Visible joints, where permitted, shall be straight, accurate, hairline butt joints. Corner joints shall be mitred.

2.3.3 Assemble sheet metal accessories by welding in accordance with CSA W55.3. Conceal welds, or grind smooth such as to be invisible in completed work.

2.3.4 Except as otherwise specified, assemble fastenings, hardware fixings, and mounting or installation devices shall be concealed in the finished work.

2.3.5 Provide fasteners for mounting accessories. Fasteners shall be of non-corrosive, expansion type metal, toggle type or other approved type of positive, mechanical anchor as required to suit the construction to which the accessory is to be mounted. Exposed fasteners, where permitted, shall be finished to match adjacent accessory surface, and shall be countersunk. Where accessories are mounted to sheet metal, provide 1/8" thick minimum full size metal back plate drilled and tapped to receive machine screws and finished to match the adjacent sheet metal surface.

2.3.6 Unless otherwise specified, hinges shall be concealed stainless steel piano hinges and shall extend full length of hinged element. Hinged elements shall have concealed, mechanically retained, rubber bumpers for silent closing, and shall close flush with faces of fronts or frames.

- 2.3.7 Unless otherwise specified, portions of sheet metal accessory items which are visible in the completed work shall be stainless steel. Changes in plane shall be formed or continuously welded and ground smooth.
- 2.3.8 Sheet metal accessory parts concealed in the finished installation shall be electro galvanized sheet metal.
- 2.3.9 Accessories for flange type mounting shall have forged brass, full flanges drilled and countersunk for three mounting fasteners. Fix flanges to tubes using solid silver soldering.
- 2.3.10 Accessory lettering shall be silk screened with durable paint to withstand wear, or shall be engraved. Size, location and typeface of lettering shall selected by Consultant. Edges of letters shall be straight and sharp.

2.3.11 Washroom and Custodial Accessories:

- .1 Surface Mounted:
 - .1 Fabricate units with tight seams and joints, and exposed edges rolled.
 - .2 Hang doors and access panels with continuous stainless steel hinge.
 - .3 Provide concealed anchorage where possible.
- .2 Recessed Mounted:
 - .1 Fabricate units of all welded construction, without mitred corners.
 - .2 Hang doors and access panels with full length, stainless steel hinge.
 - .3 Provide anchorage that is fully concealed when unit is closed.
- .3 Workmanship shall be best grade of modern shop practice known to recognized manufacturers specializing in this work. Joints and intersecting members shall be accurately fitted, made in true planes with adequate fastening. Wherever possible fastenings shall be concealed.
- .4 Isolate where necessary to prevent electrolysis between dissimilar metal to metal or metal to masonry or concrete contact.
- .5 Keys: Provide universal keys for internal access to accessories for servicing and re-supplying. Provide minimum of six (6) keys to Owner's representative.

2.4 FINISHES

- 2.4.1 Finish stainless steel to a standard No. 4 mechanical finish. Where possible, arrange sheet stainless steel so that the grain of the finish runs vertically in the finished installation. Where accessories consist of stainless steel and brass, finish all visible surfaces to match a No. 4 stainless steel finish including etching, nickel strike, chromium plating and mechanical finishing.
- 2.4.2 Finish metal surfaces for paint finish visible in the completed installation with a comprehensive pre-treatment including mechanical removal of imperfections, buffing, degreasing, non etch chemical cleaning and 2 baked on coats of thermo setting acrylic enamel. Colour and gloss of enamel finish as designated by the Consultant.

2.5 WASHROOM AND CUSTODIAL ACCESSORY SCHEDULE

No.	Description / Model
H1	Coat Hooks: Satin finished stainless steel, Surface-Mounted Coat Hook with Bumper, concealed mounting, provide 1 for each regular WC stall: Bobrick B-9541

H2	Collapsible Coat Hooks: Satin finished stainless steel, Surface-Mounted Collapsible Coat Hook, provide 1 for each barrier-free stalls, barrier-free washroom, universal washroom, police washroom: Frost 1150-SS
GB	Grab Bar: 1.214mm (0.048") thickness; 610mm (24") long x 38mm (1-1/2") Ø, straight, stainless steel, slip resistant grip, concealed mounting, cap secured with vandal resistant set screws: ASI 3801-24P Bobrick B-6806.99x24
LGB	Grab Bar: Side "L"-shape grab bar, 760mm (30") long x 760mm (30") high 38mm (1-1/2") dia., stainless steel, slip resistant grip, concealed mounting, cap secured with vandal resistant set screws: ASI 3807-4P Bobrick B-6898.99
LGB2	Shower Grab Bar: Side "L"-shape grab bar, 1016mm (40") long x 760mm (30") high 38mm (1-1/2") dia., stainless steel, slip resistant grip, concealed mounting, cap secured with vandal resistant set screws: Bobrick B-5854.99
VGB	Shower Grab Bar: 1.214mm (0.048") thickness; 1066mm (24") long x 38mm (1-1/2") Ø, straight, stainless steel, slip resistant grip, concealed mounting, cap secured with vandal resistant set screws: ASI 3801-42P Bobrick B-6806.99x42
GBF	Fold Down Grab Bar: Swing Up grab bar, 750mm (29-1/2") long, 32mm (1-1/4") dia., satin finish stainless steel peened, slip resistant grip, concealed mounting, cap secured with vandal resistant set screws: ASI 3413-P Bobrick B-4998.99 (min 750mm long)
RGB	Waste Receptacle: Recessed waste receptacle stainless steel with satin finish with access door. ASI 6474 Bobrick B-35643
MR	Mirror (Flat): Satin finish stainless steel framed, tempered glass, size 610mm wide x 1220mm high, fixed installation, mounted 1000mm (40") to bottom of frame: ASI 0600- B2448 Bobrick B-290 2448
TM	Mirror (Tilted): Satin finish stainless steel framed, tempered glass, size 610mm wide x 1220mm high, fixed installation, mounted 1000mm (40") to bottom of frame, mirror is tapered from 102 mm at top to 25 mm at bottom: ASI 0535-2448 Bobrick B-293 2448
MS	Convenience shelf: 610mm long, 125mm wide, 18-gauge type 304 stainless steel, satin finish. 19mm return edge, hemmed front edge, 16-gauge supporting brackets. ASI 0692-524 or 0694-24 Bobrick B-295 x 24

PART 3 – EXECUTION

3.1 EXAMINATION

- 3.1.1 Inspect surfaces over which the work of this Section is dependent for any irregularities detrimental to the application and performance of the work. Notify Consultant in writing of all conditions which are at variance with those in the Contract Documents and/or detrimental to the proper and timely installation of the work of this Section. The decision regarding corrective measures shall be obtained from the Consultant prior to proceeding with the affected work.
- 3.1.2 Commencement of work of this Section implies acceptance of surfaces and conditions.

3.2 INSTALLATION

- 3.2.1 Securely fasten accessories, level and plumb in the locations shown on the Drawings, specified herein and as further directed by the Consultant on the site.
- 3.2.2 Co-ordinate installation with Work of trades providing adjacent construction as required to achieve reveals or other edge conditions shown on Drawings. Install fully recessed frameless accessories so that their front face is flush with finished wall surface.
- 3.2.3 Perform drilling of steel, masonry and concrete necessary to install work of this Section.
- 3.2.4 Insulate accessory surfaces to prevent electrolytic action due to contact with masonry, concrete or dissimilar metal surfaces. Use bituminous paint, building paper or other approved means.

3.3 INSTALLATION – MIRRORS

- 3.3.1 Do not install mirrors until back up wall has been thoroughly sealed and primed.
- 3.3.2 Install hand dryers in accordance with manufacturer's recommendations.

3.4 ADJUSTMENT

- 3.4.1 Upon completion of the work or when directed, remove all traces of protective coatings or paper.
- 3.4.2 Test mechanisms, hinges, locks and latches and where necessary, adjust and lubricate and ensure accessories are in perfect working order.
- 3.4.3 Load accessories with initial charge of supplies and leave ready for use.

3.5 CLEANING

- 3.5.1 Clean and make good surfaces soiled or otherwise damaged in connection with the work of this Section. Pay the cost of replacing finishes or materials that cannot be satisfactorily cleaned.
- 3.5.2 Upon completion of the Work, remove all debris, equipment and excess materials resulting from the work of this Section from the site.

END OF SECTION

PART 1 - GENERAL**1.1 GENERAL REQUIREMENTS**

1.1.1 Confirm to Sections of Division 1 as applicable.

1.1.2 This Section includes supply and installation of manual chain operated, roller type fabric shade assembly consisting of the following:

- .1 Shade housing complete with fascia
- .2 Single, sunscreen fabric shade material

1.2 REFERENCE

1.2.1 CAN/ULC S109-14 Flame Tests of Flame Resistant Fabrics and Films.

1.2.2 NFPA 701-15 Standard Method of Fire Tests for Flame Propagation of Textiles and Films.

1.3 SUBMITTALS

1.3.1 Sample: Submit for approval. A sample shade, installed where directed, fully representing the shades to be provided. Submit samples of fabrics and finish colours for selection and approval.

1.3.2 Shop Drawings: Submit shop drawings showing and describing details of opening sizes, clearances, handing of operating chains, anchorage, assembly, materials, components, finishes and assembly.

1.3.3 Failure to submit samples may result in disqualification of tender.

1.3.4 Fire-Performance Characteristics: Provide shade material tested in accordance with NFPA 701 – Vertical-Burn Test and rated “PASS”. AND CAN/ULC S109.

1.3.5 Operation and Maintenance Data: Submit copies of manufacturers maintenance data sheets in accordance with Section 01 33 00 Submittals: Maintenance Manual and Operating Instructions, and as follows:

- .1 Provide written literature and instructions to Owner’s personnel addressing maintenance and replacement of fabric shades specified in this Section.
- .2 Provide specific warning of any maintenance practice or materials that may damage or disfigure the finished Work.

1.4 QUALITY ASSURANCE

1.4.1 Qualifications: Shade systems specified in this Section shall be provided by one manufacturer who takes full responsibility for design, engineering and installation:

- .1 Patry Products Inc. (Solarfactive System)
- .2 Sun Project of Canada Inc.
- .3 Hunter Douglas Contract Window Coverings Inc.
- .4 Equivalent product by other manufacturer acceptable to consultant or Owner.

1.5 DELIVERY, STORAGE AND HANDLING

1.5.1 All materials shall be free of damage when delivered to the site. Protect all work with suitable

heavywrapping before delivery to the site. Maintain protection until final clean-up.

1.5.2 Store parts in a designed area to permit natural ventilation over their finished surfaces.

1.5.3 Protect the work of this Section from damage resulting from the work of other Sections.

1.6 SITE CONDITIONS

1.6.1 Check dimensions and on site measure before fabrication commences, and report to Architect or owner in writing all discrepancies.

1.6.2 Where dimensions are not available before fabrication is commenced, the dimension required to be agreed upon between the various Sections concerned.

1.7 SITE MOCKUP

1.7.1 Prior to performing work of this Section, subcontractor executing work of this Section shall install one (1) fabric shade type window covering, complete with all attachments and accessories. Adjust site mockup as required to gain approval of Consultant.

1.7.2 Maintain site mockup on Site until directed by the Consultant/Tenant to remove. Site mockup maybe incorporated into the work of this Section if so approved by the Consultant.

1.7.3 Upon completion and approval, site mockup shall serve as a standard of quality for the balance of the work of this Section. Subsequent work of this Section carried out and not in the Consultant's opinion, equal to the quality standard established by the site mockup, shall be removed and replaced at no additional cost to the Owner.

1.8 WARRANTY

1.8.1 Provide an extended warranty certificate of the work of this Section, covering the period for two (2) years beyond the expiration of the one year warranty period specified in the General Conditions of the Contract as amended by Document 00 80 00: Supplementary Conditions or Part 2 under General Requirements section 2.18

Total warranty of three (3) years (Labour and Parts).
Plus ten (10) year no nonsense manufacturer's warranty.

1.8.2 Promptly correct, at no expense to the Owner, any defects or deficiencies which become apparent within Warranty Period from date of Substantial Performance.

1.8.3 Warranty certificate shall provide for steadfastness of dye colours, fade-proof fabric, free from deterioration in any fashion due to exposure to sunlight, to be permanently flame-retardant, shrink and complete replacement cost including removal of existing system material and installation of new materials.

1.9 MAINTENANCE

1.9.1 Submit maintenance and operating instructions, detailing the care, maintenance and cleaning of fabric.

1.10 ALTERNATES

1.10.1 Bidder must provide bid on specified items.

- 1.10.2 Bidder providing or requesting consideration of alternate products shall be fully liable for all costs attributable to acceptance of the change from the architects, engineers; general contractors and subcontractors effected by the charge. Further, bidder shall clearly indicate reasons for the consideration of the alternate product. Such description shall include, but not be limited to cost; performance; construction; installation and operation; advantages of the proposed alternate system.
- 1.10.3 Alternate product requests must be applied for 14 days prior to bid closing.

PART 2 - PRODUCTS

2.1 WINDOW SHADES SYSYEMS

2.1.1 Models:

SunProject Model - Lite-Lift Cassette Roller System
Solarfective Model - Teleshade System
Hunter Douglas Model - Roller Shades FR
Mechoshade by MechoShade Systems Inc.
Equal or better approved by Consultant or Owner

2.2 MANUFACTURER

- 2.2.1 To establish a standard of quality, design and function desired, drawings and product specifications are based on;
- .1 Solarfective Products Ltd. Toronto, Ontario, Canada. 416-421-3800
 - .2 Sunproject of Canada. Concord, Ontario, Canada. 905-660-3117
 - .3 Hunter Douglas Contract Window Coverings Inc. Brampton, ON, Canada. 905-796-5540
 - .4 Other manufacturers approved by Consultant or Owner.

2.3 OPERATION

- 2.3.1 Easy-lift manual chain drive. Shade to be able to move freely when pulled on hembar or chain. The unit shall consist of a tension activated lifting mechanism utilizing a multi-layer concentric coil spring system. The lifting mechanism must contain a memory lock which shall maintain pre-tensioning when the shade is removed from the cassette bracket, and shall not require re-tensioning when shade is re-inserted into the bracket. The multilayer coil spring mechanism must be free-floating along a grooved non-corrosive shaft and must be reversible for future alterations and maintenance on site.
- 2.3.2 Internal tension idler (I.T.I) limiter automatically adjusts and controls the amount of torque being generated for constant smooth operation of the shade system. The (I.T.I.) automatically releases during down-travel, and automatically engage during up-travel of the shade system.
- 2.3.3 Lifting mechanism must accommodate tension modules-(type D) for maximum shade performance when necessary. The tension modules must also contain a memory lock for torque retention.
- 2.3.4 Noise reduction seals must be used for sound isolation and absorption of the mechanism.
- 2.3.5 Drive sprocket must contain a planetary gear system for increased operational performance, speed ratio control, smoothness of lift, and balance to the chain and shade system.

2.4 ASSEMBLY

- 2.4.1 Shade unit shall be supplied to site fully assembled in a one piece fully extruded aluminum cassette closed on two sides, top and bottom return with plastic injected-molded end caps.

Mounting detail: A) Ceiling mounted

Shade Orientation: A) Regular-roll, shadecloth to roll at window side of roller.

Removal must not require the disassembly of the shade unit.

2.5 SHADE ROLLER TUBE

- 2.5.1 Rigid roller tubes shall be all aluminum extruded available in 32mm, or 50mm with reinforced internal ribs to provide maximum span without tube deflection. Tube sizes will depend on shade size – see weights and measures chart.

2.6 TUBE END PLUG

- 2.6.1 Internal tension idler (I.T.I.) limiter automatically adjusts and controls the amount of torque being generated for constant smooth operation of the shade system. The (I.T.I.) must automatically release during down-travel, and automatically engage during up-travel of the shade system.

2.7 CHAIN DRIVE

- 2.7.1 Shall consist of a heavy duty commercial grade sprocket. Drive sprocket must contain a planetary gear system for increased performance, speed ratio, smoothness, and balance to the chain and shade system. Must provide for infinite positioning of shade system.

2.8 OPERATING CHAIN

- 2.8.1 Shall be No. 10 qualified heavy duty bead chain 90 lb load test formed in a continuous loop. With stops at highest and lowest positions to prevent overwinding and unrolling.

2.9 EXTERIOR OVAL HEMBAR

- 2.9.1 Shall be tubular extruded aluminum with recess to secure fabric without visible seams. End plugs shall be screwed securely on ends showing no exposed aluminum. Design allowing shade to be pulled on the hembar or chain. Finish/colour shall match fascia.

2.10 CHAIN HOLD DOWN

- 2.10.1 Operating chain shall be fully secured to SP chain holder.

- 2.10.2 Supply and install chain retainer with bracket.

2.11 MOUNTING BRACKETS

- 2.11.1 Shall be 0.60 galvanized steel snap on brackets for ceiling, wall, or recessed mount in ceiling.

2.12 CASSETTE BOX

- 2.12.1 Cassette design shall be a one piece aluminum extruded box closed on two face and bottom

return or all three sides if surface mounted. Cassette sections to be 55mm, 73mm or 110mm in square profile or 110mm in radius face profile. Cassette section with internal groove to accommodate a self cleaning brush to insure fabric maintenance as well as a gap brush on top back side of cassette to provide for a light seal. Wall thickness to be 1.52. Cassette end caps shall be 2mm delrin plastic with four countersunk flat headed screw holes.

2.12.2 Finish clear anodized or custom painted in colour selected by Consultant or Owner.

2.13 FABRICS

2.13.1 Construction of shadeband includes the fabric, the external bottom bar, and the attachment of the shadeband to the roller tube:

Fabric shade cloths shall be woven of .018, vinyl coated polyester yarn consisting of single thickness non-raveling 0.030-inch thick vinyl fabric, comprising of 21 % polyester and 79% reinforced vinyl, the fabric shall be dimensionally stable. Colors selected from manufacturer's available range.

Linear Weave solarblock, 3% open, dense linear-weave pattern. Abrasion resistance and U.V. Deterioration resistance.

2.14 SOLARSCREEN / MULTICOLOR SHADING FABRIC

2.14.1 Approximate
Openness Factor 3%,
Weight/sq. mt. 505 g/mt or 21 oz.
Tensile strength 1lb.... (1in. strip)
Warp 315
Fill 270

Stretch (271 lb. Wt.)
Warp 26%
Fill 22%
Set% Warp 0.5 to 1.5%
Fill 0.5 to 1.5%

Abrasive resistance (500 Taber cycles)
Yarn rupture None
Wear Trace
U.V. Deterioration
Fade None
Tensile Retention 96%

2.15 FLAME RETARDANCE

2.15.1 Fabric shall be certified by independent laboratory to pass the small scale vertical burn requirements test CAN/ULC S109 and NFPA 701.

2.16 FABRICATION

2.16.1 Prior to fabrication, the actual dimensions of openings must be verified by accurate site measurements taken by the fabricator himself.

- 2.16.2 Fabricate fabric shades to completely fill the openings from head to sill and from jamb to jamb, excluding fabrication and installation clearances.
- 2.16.3 Install hem bars at bottoms of fabric shades, providing double thickness of shade fabric on room side and securely sew-in hem bar, with continuous hem just above hem bar and at both ends of hem bar.
- 2.16.4 Securely install fabric shades in roller tubes "keyway" channels with shade mounting splines.
- 2.16.5 Fabricate aluminum fascia/soffits and custom trims of single length piece to suit location of each fabric shade, free of splices or joints.
- 2.16.6 For multiple window installations, fabricate fabric shades so that the ends occur only over mullions or over defined vertical separations.
- 2.16.7 Fabricate fabric shades for full operation.
- 2.16.8 Hand manual chain operators in suitable positions for each room, confirmed by the Consultant and Owner/Tenant.
- 2.16.9 Manual Operation:
 - .1 Fabric shades shall be operated by chain and sprocket assembly incorporating an adjustable slip clutch to control the rate of fall, from free running to zero friction factor, to 100% friction factor.
 - .2 Fabric shades shall be adjustable to stop and hold at an infinite number of positions, to be adjustable at any percentage of friction and to control the fall rate of the fabric shades.
 - .3 When position of fabric shades are set as free fall, system shall be mechanical by use of chain retainer.
 - .4 Highest and lowest fabric shade position shall have automatic stops to prevent overwinding or unrolling.

2.17 FINISHES

2.17.1 Aluminum Fascia/Soffits and Custom Trims:

- .1 Ultra-violet light resistant polyester powder coating finish in colours to match adjacent aluminum framing finish colour.
 - .2 Protect finish with strippable protective film.
- 2.17.2 Mounting brackets/clips shall have painted finish, with colour, gloss and sheen to match baked enamel finish.
- 2.17.3 Isolate where necessary to prevent electrolysis due to dissimilar metal-to-metal contact or metal-to-masonry and concrete contact. Use butyl tape or other approved divorcing material.

PART 3 - EXECUTION

3.1 EXAMINATION

- 3.1.1 Examine substrate and conditions for installation. Notify the Architect or Owner in writing prior to installation when the project conditions are unacceptable for shade installation. "Beginning of installation" means acceptance of substrate and project condition. Contractor to verify all measurements, do not scale drawings.

3.2 INSTALLATION

3.2.1 Install units to comply with the Manufacturer's instructions for the type of mounting and operation required. Provide units plumb, true, and securely anchored in place with recommended hardware and accessories to provide smooth operation without binding.

3.2.2 Install units within the following tolerances:

- .1 Maximum variation of gap at window opening perimeter: ¼ inch, per 8 feet (+/- 1/8 inch) of shade height.
- .2 Maximum offset from level: 1/8 inch.
- .3 Follow Manufacturer's edge-clearance specifications for shades where the width-to-height (W:H) ratio exceeds 1:3.
- .4 Locate equipment, controls, switches in locations shown, or if not shown, as directed by Consultant or Owner.

3.3 ADJUSTING

3.3.1 Adjust units for smooth operation. Adjust shade and shadecloth to hang flat without buckling or distortion. Replace any units or components which do not hang properly or operate smoothly.

3.4 CLEANING

3.4.1 Touch up damaged finishes and repair minor damage in order to eliminate evidence of repair. Remove and replace work that cannot be satisfactorily repaired.

3.4.2 Clean exposed surfaces, including metal and shadecloth, using non-abrasive materials and methods recommended by the Shadecloth Manufacturer. Remove and replace work which cannot be satisfactorily cleaned.

3.5 DEMONSTRATION

3.5.1 Demonstrate operation method and instruct Owner's personnel in the proper operation and maintenance of the window shade systems and provide all instructions.

END OF SECTION

#

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 General Conditions, Supplementary Conditions and Division 01 apply to this section.

1.2 SUMMARY

1.2.1 This Section includes requirements for supply and installation of quartz surfacing on top of millwork, ready to accept under mount sinks indicated on Mechanical Drawings.

1.3 RELATED REQUIREMENTS

1.3.1 Section 05 99 90: Miscellaneous Metals

1.3.2 Section 06 10 00: Rough Carpentry

1.3.3 Section 06 20 00: Finish Carpentry

1.3.4 Section 07 92 00: Caulking and Sealants

1.3.5 Section 22 42 00: Commercial Plumbing Fixtures

1.4 REFERENCES

1.4.1 American Society for Testing of Materials (ASTM):

- | | | |
|----|-----------------|---|
| .1 | ASTM C503-05 | Standard Specification for Marble Dimension Stone |
| .2 | ASTM C97/C97-09 | Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone |
| .3 | ASTM C615-03 | Standard Specification for Granite Dimension Stone |

1.5 SUBMITTALS

1.5.1 Provide product information in accordance with Section 01 33 00 Submittals.

1.5.2 Action Submittals: Provide the following samples before starting any work:

- .1 Product Data: Indicate product description, fabrication information, and compliance with specified performance requirements.
- .2 Shop Drawings: Submit shop drawings indicating dimensions, component sizes, fabrication details, attachment provisions and coordination requirements with adjacent work.
- .3 Samples for Initial Selection: Submit minimum 305mm x 305mm (12" x 12") samples. Indicate full colour and pattern variation.
- .4 Consultant recognizes that stone is a natural material, and that variations in tone and hue are normal to this material; however, countertops will be rejected at site if finish, texture colour and hue are outside of a reasonable range of variation based on the submitted samples.

1.5.3 Project Closeout Submissions:

- .1 Operation and Maintenance Data: Submit manufacturers care and maintenance data,

including repair and cleaning instructions in accordance with Section 01 33 00
Submittals: Operations and Maintenance Data.

1.6 QUALITY ASSURANCE

1.6.1 Qualifications: Provide proof of qualifications when requested by Consultant:

- .1 Fabricator: Use a fabricator having a minimum of three (3) years experience in fabrication and installation of stone countertops and have training and certification from the manufacturer for work of similar scope and complexity as that required for the project.
- .2 Installer: Install using personnel experienced in installation decorative stone countertops of similar design and complexity as that required for this Project.

1.7 DELIVERY, STORAGE AND HANDLING

1.7.1 Delivery and Acceptance Requirements: Deliver components to project when areas are ready for installation.

- .1 Transport stone countertops with care, securely anchored to pallet, to prevent damage to materials or finishes.
- .2 Transport stone countertops to the site after completion of adjacent construction that could damage materials of this Section.

1.7.2 Storage and Handling Requirements:

- .1 Store stone countertops indoors in an area adjacent to installation. Store away from direct exposure to sunlight, and between 25°F and 130°F (-4°C and 54°C)
- .2 Block off floor.
- .3 Tilt slightly and secure to prevent falling over, with finished face turned toward finished face.
- .4 Protect and wrap to prevent abuse, damage, warpage or soiling.

1.8 SITE CONDITIONS

1.8.1 Site Measurements: Verify dimensions by site measurements before fabrication and indicate measurements on shop drawings where stone countertops are indicated to fit between or around other construction; coordinate fabrication schedule with construction progress to avoid delaying the Work.

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

1.9 WARRANTY

1.9.1 Provide manufacturer's commercial 10 year warranty against product defects when fabricated and installed by a certified fabricator.

PART 2 - PRODUCTS

3.1 QUARTZ COUNTERTOP MATERIALS

3.1.1 Provide Grade 1 stone only; seconds material will not be acceptable, sealed in accordance with manufacturer's standard to prevent staining and discolouration, and as follows:

- .1 Quartz countertop: crushed quartz aggregate combined with resins and pigments, fabricated into slabs under a vacuum vibro-compaction process.
- .2 Accepted Manufacturer: Caesarstone Quartz Surfacing by Caesarstone, or approved equivalent.
- .3 Caesarstone Raw Concrete 4004 or Colour to be selected by Consultant from manufacturer's full range
- .4 Finish: Polished
- .5 Thickness: 20mm (3/4")
- .6 Edge Profile: Refer to Drawings

3.2 COUNTERTOP SUPPORT MATERIALS

3.2.1 Steel Support Framing: Refer to Section 05 50 00, fabricate steel support framing to support weight of stone materials and to account for cut outs and openings required for installation.

3.2.2 Wood Core: Fabricate countertop core from shop sanded exterior grade veneer core plywood.

3.2.3 Shims: Fabricator's standard shim materials to fully support stone slab on wood core to provide flat and level installation that does not transfer stresses that could cause cracking in stone slab.

3.2.4 Fasteners: As recommended by manufacturer and as follows:

- .1 Draw Bolt Fasteners: Mitre butt joint fastener, adjustable and requiring no special tools for installation, galvanized.
- .2 Non-Exposed Fasteners: Fabricators choice consistent with quality level specified; exposed fasteners will not be permitted.

3.3 ACCESSORIES

3.3.1 Joint Adhesive: Manufacturers recommended adhesive designed to create chemically bonded, inconspicuous, nonporous joints. Adhesive that will be visible in the finished work to be tinted to match the quartz surfacing.

3.3.2 Sealant: Manufacturer's recommended mildew resistant, clear silicone joint sealant.

3.3.3 Stone Sealer: Clear penetrating sealer as recommended by manufacturer having zero Volatile Organic Compounds (VOC).

3.3.4 Cleaner: Type recommended by manufacturer.

3.4 FABRICATION

3.4.1 Fabricate units to maximum size capable of being safely transported and handled to place of final installation in accordance with shop drawing and manufacturers written instructions using a fabricator certified by the manufacturer.

3.4.2 Fabricate and machine shapes to profiles indicated on Drawings; obtain all dimensions affecting

fabrication and installation from job site before starting fabrication.

- 3.4.3 Cut, drill and shape fabrications as required to receive plumbing fittings and services, and built-in accessories, provide edge treatments, back splashes, and other details as indicated on Drawings.
- 3.4.4 Finish edges and surfaces true, level and even with inconspicuous joints between having no voids formed using manufactures standard joint adhesive and reinforcing strips.
- 3.4.5 Make cut outs with 10mm (3/8") radius corners to prevent stress cracking.
- 3.4.6 Fabrication assemblies with tolerances as follows:
 - .1 Variation in component size: + 3mm (1/8").
 - .2 Location of openings: + 3mm (1/8") from indicated location.
- 3.4.7 Match numbered components assembled on site; number items to show proper location on site; number on back using material that will not show or telegraph through finished assemblies.
- 3.4.8 Materials used throughout the project shall be from the same batch and bear labels with the same batch numbers. Visually inspect materials to be used for adjacent panels to ensure acceptable colour match.
- 3.4.9 Provide anchorage to receive Work of other Sections scheduled and detailed to be installed.

PART 3 - EXECUTION

4.1 EXAMINATION

- 4.1.1 Examine substrates, areas, and conditions where installations of stone countertops occur, with Installer present, for compliance with manufacturers requirements. Verify that substrates and conditions are satisfactory for installation and comply with requirements specified.
 - .1 Carefully inspect the backup structure and millwork to verify that it is ready to accept the work of this Section. Substrates supporting quartz surfaces shall be plumb, level, and flat to within 1/16" in 10 feet (1.6mm in 3000mm).
 - .2 Verify all anchors, seats, connections attached to miscellaneous metal supports properly and securely fastened in correct locations.
 - .3 Verify access to point of installation for each stone unit.

4.2 INSTALLATION

- 4.2.1 Seal stone materials before shipping to site.
- 4.2.2 Support stone countertops evenly to prevent stress fractures.
- 4.2.3 Apply a thin bead of adhesive to top edges of base cabinet and set stone on top, square to face of cabinet work; cut out openings to match fixtures required and remove from countertops after final set of adhesive.
- 4.2.4 Secure and tighten connections with equal torque to prevent stress fractures after stone units are properly aligned, vertically and horizontally with each other and with other related building components.
- 4.2.5 Seal joints between countertops and adjacent materials, and between abutting countertops with

silicone sealant. Joints shall be flush, tight fitting, and level with quartz surfacing.

- 4.2.6 Adhere under mount sinks to countertops using manufacturer's recommended adhesive and mounting hardware.
- 4.2.7 Install backsplashes and end splashes as indicated on Drawings; adhere to countertops using manufacturer's standard colour matched silicone sealant.
- 4.2.8 Coordinate plumbing connections and electrical requirements with affected Sections of work.
- 4.3 **CLEANING AND PROTECTION**
 - 4.3.1 Keep components and hands clean during installation; remove adhesives, sealants and other stains as work progresses; keep components clean until Substantial Performance for the Project.
 - 4.3.2 Demonstration: Inform Owner of cleaning techniques and required cleansing materials.
 - 4.3.3 Repair or replace damaged work that cannot be repaired to match installed work at no additional cost to the Owner.
 - 4.3.4 Protect quartz surfaces and corners liable to damage with wood blocking, sacking, or other means, to prevent damage and chipping of installed countertops until Substantial Performance of the Project.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.1.1 General Conditions, Supplementary Conditions and Division 01 apply to this section.

1.2 SUMMARY

1.2.1 This Section includes requirements for supply and installation of solid surface countertops on top of millwork, ready to accept under mount sinks indicated on Mechanical Drawings.

1.3 RELATED REQUIREMENTS

1.3.1 Section 05 99 90 Miscellaneous Metals

1.3.2 Section 06 10 00 Rough Carpentry

1.3.3 Section 06 20 00 Finish Carpentry

1.3.4 Section 07 90 00 Caulking and Sealants

1.3.5 Section 09 30 00 Porcelain and Ceramic Tile

1.4 REFERENCE STANDARDS

1.4.1 American Society for Testing of Materials (ASTM):

- | | | |
|-----|----------------------------------|---|
| .1 | ANSI/NPA A208.2-09 | Medium Density Fiberboard (MDF) for Interior Application. |
| .2 | ASTM C920-14a | Standard Specification for Elastomeric Joint Sealants. |
| .3 | ASTM D638-10 | Standard Test Method for Tensile Properties of Plastics. |
| .4 | ASTM D785-08 | Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials. |
| .5 | ASTM D790-10 | Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials. |
| .6 | ASTM D5420-10 | Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker. Impacted by a Falling Weight (Gardner Impact) |
| .7 | ASTM E84-14 | Standard Test Method for Surface Burning Characteristics of Building Materials. |
| .8 | ASTM E228-11 | Standard Test Method for Linear Thermal Expansion of Solid Materials with a Push-Rod Dilatometer. |
| .9 | ASTM G21-13 | Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi. |
| .10 | ASTM G22-76(96) | Standard Practice for Determining Resistance of Plastics to Bacteria. |
| .11 | ASTM G155-13 | Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials. |
| .12 | CSA B45.5-11/
IAPMO Z124-2011 | Plastic Plumbing Fixtures. |
| .13 | CSA O115-M82 | Hardwood and Decorative Plywood. |
| .14 | NFPA 255-06 | Standard Method of Test of Surface Burning Characteristics of Building Materials. |

- | | | |
|-----|---|---|
| .15 | NSF/ANSI 51-07 | Food Equipment Materials. |
| .16 | SCAQMD Rule 1168 | Adhesive and Sealant Applications (amended January 2005) |
| .17 | CAN/ULC-S102-07 | Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies. |
| .18 | UL 723 | Standard for Test for Surface Burning Characteristics of Building Materials. |
| .19 | UL Environment/
GREENGUARD – UL 2818 | Standard for Chemical Emission for Building Materials, Finishes and Furnishings, Section 7.1. |
| .20 | UL Environment/
GREENGUARD – UL 2818 | Gold Standard for Chemical Emission for Building Materials, Finishes and Furnishings, Section 7.1 and 7.2. |
| .21 | UL 2824 | GREENGUARD Certification Program, Method for Measuring Microbial Resistance from Various Sources Using Static Environmental Chambers. |

1.5 DEFINITION

- 1.5.1 Solid surface is defined as nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

1.6 SUBMITTALS

- 1.6.1 Provide product information in accordance with Section 01 33 00 Submittals.

- 1.6.2 Action Submittals: Provide the following samples before starting any work:

- .1 Product Data: Indicate product description, fabrication information, and compliance with specified performance requirements.
- .2 Shop Drawings: Submit shop drawings indicating dimensions, component sizes, fabrication details, attachment provisions and coordination requirements with adjacent work.
- .3 Samples for Initial Selection: Submit minimum 100 mm x 100 mm samples. Indicate full colour and pattern variation.
- .4 Samples for Verification: Submit minimum 305 mm x 305 mm sample for each type, texture, pattern and colour of solid polymer.
- .5 Maintenance Data: Submit manufacturers care and maintenance data, including care, repair and cleaning instructions. Include in Project closeout documents.

- 1.6.3 Informational Submittals: Provide the following submittals during the course of the work:

- .1 Coordination Drawings: Submit coordination drawings indicating layout of plumbing and electrical work, steel reinforcing, recessed and built-in items and wall blocking information.
- .2 Fire-Test-Response Characteristics: Provide original fire test reports to ensure compliance with the following requirements:
 - .1 Rate of Burning: ASTM D635 Class: CC1 for a nominal thickness of 1.5 mm (0.060 in.)
 - .2 Self-Ignition Temperature: ASTM D1929: greater than 650 deg F
 - .3 Density of Smoke: ASTM D2843: Less than 75%
- .3 Impact Resistance: Provide Solid Polymer Fabrications that comply with the following requirements:

- .1 Impact Strength, Un-notched (23 deg), ASTM D4812: No breakage.
 - .2 Impact Strength, Notched (23 deg), ASTM D526: 88J/m (1/16)
- .4 Allowable Tolerances: Maximum deflection: 2 mm over 305 mm.
- 1.6.4 Project Closeout Submissions:
 - .1 Operation and Maintenance Data: Submit manufacturers care and maintenance data, including repair and cleaning instructions in accordance with Section 01 33 00 Submittals: Operations and Maintenance Data.
- 1.7 QUALITY ASSURANCE
- 1.7.1 Qualifications: Provide proof of qualifications when requested by Consultant:
 - .1 Fabricator: Use a fabricator having a minimum of three (3) years experience in fabrication and installation of solid surface materials and have training and certification from the manufacturer for work of similar scope and complexity as that required for the project.
- 1.8 DELIVERY, STORAGE AND HANDLING
 - .1 Delivery and Acceptance Requirements: Deliver components to project when areas are ready for installation.
 - .2 Storage and Handling Requirements: Store components indoors in heated conditions similar to the area of installation until ready for installation; handle materials to prevent damage to finished surfaces; provide protective coverings to prevent physical damage or staining following installation until just prior to Substantial Performance for the Project.
- 1.9 SITE CONDITIONS
- 1.9.1 Environmental Limitations: Do not install Solid Polymer Fabrications until spaces are enclosed and weatherproof, and ambient temperatures and humidity conditions are maintained at the levels recommended by manufacturer.
- 1.10 WARRANTY
- 1.10.1 Manufacturer Warranty: Provide manufacturer's standard 10 year warranty against defects in materials and workmanship; including material and labour to repair or replace defective materials.

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
- 2.1.1 Basis-of-Design products are named in this Section; additional manufacturers offering similar setting systems may be incorporated into the work provided they meet the performance and aesthetic requirements established by the named products.
- 2.1.2 Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - .1 Corian
 - .2 Dupont
 - .3 Formica
 - .4 Hanex

2.2 MATERIALS

2.2.1 Solid Surfacing Sheet: Cast, nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminium trihydrate filler and pigment; not coated, laminated or of composite construction; meeting the following criteria:

- .1 Thickness: ½" (13 mm)
- .2 Surface Burning Characteristics: in accordance with CAN/ULC S102 and as follows:
 - .1 Flame Spread: Maximum 25
 - .2 Smoke Developed: Maximum 450
- .3 Pattern and Colour: Corian Solid Surface:
 - SF-1 Silver Gray- Non-Glossy
 - SF-2 Glacier White- Non-Glossy

2.3 ACCESSORIES

- 2.3.1 Joint Adhesive: Manufacturers recommended adhesive designed to create chemically bonded, inconspicuous, nonporous joints.
- 2.3.2 Sealant: Mildew resistant, silicone sealant, as specified in Section 07 90 00. Colour: As selected by the Consultant from the manufacturers standard product line.

2.4 FABRICATION

- 2.4.1 Fabricate units to maximum size capable safely transported and handled to place of final installation in accordance with shop drawing and manufacturers written instructions using a fabricator certified by the manufacturer.
- 2.4.2 Fabricate and machine shapes to profiles indicated on Drawings; obtain all dimensions affecting fabrication and installation from job site before starting fabrication.
- 2.4.3 Cut, drill and shape fabrications as required to receive plumbing fittings and services, and built-in accessories
- 2.4.4 Finish edges and surfaces true, level and even with inconspicuous joints between having no voids formed using manufacture's standard joint adhesive and reinforcing strips.
- 2.4.5 Make cut outs with 3 mm radius corners to prevent stress cracking.
- 2.4.6 Fabrication assemblies with tolerances as follows:
 - .1 Variation in component size: + 3 mm.
 - .2 Location of openings: + 3 mm from indicated location.
- 2.4.7 Match numbered components assembled on site; number items to show proper location on site; number on back using material that will not show or telegraph through finished assemblies.
- 2.4.8 Provide anchorage to receive Work of other Sections scheduled and detailed to be installed.
- 2.5 MISCELLANEOUS MATERIALS**
- 2.5.1 Cleaner: Type recommended by manufacturer.

- 2.5.2 Fasteners: Use stainless steel fasteners designed specifically for plastics. Self-threading screws are acceptable for permanent installations. Provide threaded metal inserts for applications requiring frequent disassembly such as light fixtures. Use threaded rods and bolts to suit application.

PART 3 - EXECUTION

3.1 EXAMINATION

- 3.1.1 Examine substrates, areas, and conditions where installations of solid surface materials occur, with Installer present, for compliance with manufacturers requirements. Verify that substrates and conditions are satisfactory for installation and comply with requirements specified.

3.2 INSTALLATION

- 3.2.1 Install components plumb and level, in accordance with shop drawings and manufacturers written installation requirements.
- 3.2.2 Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.
- 3.2.3 Adhere under mount sinks to countertops using manufacturer's recommended adhesive and mounting hardware.
- 3.2.4 Adhere top mount sinks to countertops using manufacturer's recommended adhesives and colour matched silicone sealant.
- 3.2.5 Install backsplashes and end splashes as indicated on Drawings; adhere to countertops using manufacturer's standard colour matched silicone sealant.
- 3.2.6 Coordinate plumbing connections and electrical requirements with affected Sections of work.

3.3 CLEANING AND PROTECTION

- 3.3.1 Keep components and hands clean during installation; remove adhesives, sealants and other stains as work progresses; keep components clean until Substantial Performance for the Project.
- 3.3.2 Repair or replace damaged work that cannot be repaired to match installed work at no additional cost to the Owner.

END OF SECTION

APPENDIX A

LIMITED DESIGNATED SUBSTANCE SURVEY REPORT (Pre-RENOVATION)



**Peel Regional Police
180 Derry Road East
Mississauga, Ontario**

Presented to:

Peel Regional Police
7150 Mississauga Road
Mississauga, Ontario
L5N 8M5

Attention: John Cabral

October 9, 2025

Maple Project No. 22779

EXECUTIVE SUMMARY

Maple Environmental Inc. ('Maple') was retained by Peel Regional Police to perform a survey for Designated Substances as well as polychlorinated biphenyls (PCBs) and mould within the specified areas of the building located at 180 Derry Road East, Mississauga, Ontario (the 'Site'). It is our understanding that the building requires a survey to identify possible hazardous building materials that may be disturbed during the proposed renovations of specified areas throughout the building.

The survey was limited to the areas that will be impacted by the proposed renovation based on the architectural drawings provided by the Peel Regional Police. The findings of the current survey are summarized below. Please refer to the main body of this report for details on all materials.

Asbestos

No known sources of asbestos-containing materials were identified within the surveyed areas at the time of the assessment.

It should be noted that due to the presence of solid walls and ceilings in the surveyed areas, access for viewing within the wall and ceiling cavities was not always possible. Suspect asbestos-containing materials may be present within wall and ceiling cavities that were not identified but are suspected to be present in this report. Caution should be taken when demolishing solid walls and ceilings within the areas being surveyed. Given the construction date of the building, the presence of asbestos materials in architectural finishes is not likely.

Lead

Based on the findings, the following general conclusions are made:

- Representative bulk samples of the predominant paint colours were collected which indicated the presence of low level lead paints (i.e. "virtually safe") in the surveyed area.
- Representative bulk samples of mortar were collected which indicated the presence of low level lead mortar (i.e. "virtually safe") in the surveyed area.
- It should be noted that lead may also be present in wiring connectors, electric cable sheathing, solder joints on copper piping, ceramic glazes, lead sheeting, and as sub-surface layers to the most recent paint layers currently applied, where present at the Site.

Mercury

- Mercury vapour is present in all fluorescent light tubes.

Silica

- Free crystalline silica, present as common construction sand, is present in all concrete and masonry products where present within the surveyed areas.

Mould

- No visible mould growth was observed to be present within the surveyed areas at the time of the assessment.
- It is possible that mould growth is present in concealed areas such as wall or ceiling cavities, pipe chases, etc. or in areas not currently assessed by Maple.

The client should notify Maple should any water damage or suspect mould growth be discovered.

Polychlorinated Biphenyls (PCBs)

- The fluorescent lamp fixtures observed contained T8 fluorescent light tubes. T8 fixtures have electronic ballast and are considered as not containing PCB. Other fixtures were LED, and have ballasts that are not PCB containing.

Recommendations

Based on the Laboratory Analytical Results and observations made on Site, Maple provides the following recommendations.

- Low Level Lead paints and mortar (0.1% or less or 1000 mg/Kg or less) are considered virtually safe provided that;
 - airborne lead concentrations are kept below 0.05 mg/m³
 - general dust suppression and worker hygiene procedures are utilized
 - torching or other activities that create fumes are not completed
- Recycle and reclaim mercury from fluorescent light tubes when taken out of service. Do not break lamps or separate liquid mercury from components. Liquid mercury is classified as a hazardous waste and must be disposed of in accordance with local regulations.
- Proper dust suppression techniques and other safety precautions to control possible generation of silica dust from the demolition of concrete and masonry products present in the surveyed area should follow those outlined in the Ministry of Labour Guideline- Silica on Construction Projects, 2004.

Appropriate procedures for asbestos, lead, mercury, silica, mould, and PCBs must be utilized if these materials are likely to be disturbed by scheduled renovations. Please refer to Section 5.0 of the report to review the required procedures.

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	APPLICABLE ONTARIO REGULATIONS.....	1
2.1	DESIGNATED SUBSTANCES AND OTHER HAZARDOUS MATERIALS	1
2.2	ONTARIO REGULATION 278/05 (ASBESTOS)	2
2.3	ONTARIO REGULATION 347.....	2
2.4	ONTARIO REGULATION 362.....	2
3.0	SURVEY SCOPE AND METHODOLOGY.....	3
3.1	ASBESTOS-CONTAINING BUILDING MATERIALS (ACM)	3
3.2	LEAD.....	5
3.3	MERCURY	5
3.4	OTHER DESIGNATED SUBSTANCES.....	5
3.5	MOULD	5
3.6	POLYCHLORINATED BIPHENYLS.....	6
3.7	LIMITATIONS AND OMISSIONS FROM SCOPE	6
3.8	DRAWINGS	6
4.0	INVENTORY FINDINGS	6
4.1	ASBESTOS	6
4.2	LEAD.....	9
4.3	MERCURY	10
4.4	SILICA	10
4.5	ISOCYANATES	10
4.6	VINYL CHLORIDE MONOMER.....	10
4.7	BENZENE.....	10
4.8	ACRYLONITRILE	10
4.9	COKE OVEN EMISSIONS.....	10
4.10	ARSENIC	10
4.11	ETHYLENE OXIDE	10
4.12	MOULD	11
4.13	POLYCHLORINATED BIPHENYLS (PCBs).....	11
5.0	RECOMMENDATIONS	11
5.1	ASBESTOS	11
5.2	LEAD.....	11
5.4	MERCURY	11
5.5	SILICA	11
5.6	POLYCHLORINATED BIPHENYLS.....	12
6.0	LIMITATIONS	12

APPENDICES

APPENDIX I

LABORATORY ANALYSIS REPORT - ASBESTOS

APPENDIX II

LABORATORY ANALYSIS REPORT - LEAD

1.0 INTRODUCTION

Maple Environmental Inc. ('Maple') was retained by Peel Regional Police to perform a survey for Designated Substances as well as polychlorinated biphenyls (PCBs) and mould within the specified areas of the building located at 180 Derry Road East, Mississauga, Ontario (the 'Site'). It is our understanding that the building requires a survey to identify possible hazardous building materials that may be disturbed during the proposed renovations of specified areas throughout the building.

The survey was limited to the areas that will be impacted by the proposed renovation based on the architectural drawings provided by the Peel Regional Police. The findings of the current survey are summarized below. Please refer to the main body of this report for details on all materials.

Section 30 of the Ontario Occupational Health and Safety Act requires that the following Designated Substances be included in a Designated Substance Survey:

Asbestos

Lead

Mercury

Silica

Isocyanates

Vinyl Chloride Monomer

Benzene

Acrylonitrile

Coke Oven Emissions

Arsenic

Ethylene Oxide

Additional detailed information with respect to asbestos was collected at the time of the survey to ensure compliance with Ontario Regulation 278/05.

The assessment was performed by Jayden Leclerc of Maple on August 28, 2025.

2.0 APPLICABLE ONTARIO REGULATIONS

Applicable Ontario Regulations for each of the materials included in the investigation are briefly described below.

2.1 Designated Substances and Other Hazardous Materials

Section 30 of the Occupational Health and Safety Act requires building owners or their agents (architects, general contractors, etc.) to prepare or have prepared a Designated Substance report for specified potentially hazardous materials possibly present in a facility. The owner must ensure that a prospective constructor has received a Designated Substance report before entering into a binding contract with the contractor. The owner is liable to the contractor for damages and costs arising from unreported materials (of which the owner should reasonably have been aware), and could also be subject to orders and fines from the Ministry of Labour.

In addition to the requirements under the Occupational Health and Safety Act, Section 6 of the Ministry of Labour Regulations for Construction Projects requires the contractor, when submitting the Notice of Project form, report any Designated Substances likely to be used, handled or disturbed during the project.

The disturbance of asbestos materials on construction projects is controlled by Ministry of Labour Regulation R.R.O. 2005/278. The disposal of asbestos waste is controlled by Ministry of Environment Regulation, R.R.O. 1990/347.

There are no specific Ministry of Labour regulations for control of the other Designated Substances on construction projects. However, the Ministry of Labour actively enforces the general duty clause of the Health and Safety Act which protects workers and provides guidance on exposure monitoring, permissible exposure levels, medical monitoring, etc. for all Designated Substances.

Although Regulations exist for many of the Designated Substances, they apply to industry settings using Designated Substances in manufacturing processes, and do not apply to general property management, renovation or maintenance of buildings.

Polychlorinated Biphenyls ("PCBs") and mould were also included in the investigation, which are not specifically named as Designated Substances. No specific regulations are attached to these materials, but are generally governed by the due diligence section of the Health and Safety Act for employers to protect their workers.

2.2 Ontario Regulation 278/05 (Asbestos)

Ontario Regulation 278/05 applies to buildings with regards to maintenance, renovations or demolition work where asbestos-containing materials (ACM) is present and may be disturbed. The Regulation requires that a detailed asbestos inventory be performed in all buildings where friable and non-friable asbestos materials are present. The inventory must be available at the work place and must identify the type of asbestos, and location of asbestos on a room-by-room basis. The following report does not necessarily meet the requirements for an asbestos survey under Ontario Regulation 278/05.

2.3 Ontario Regulation 347

Ontario Regulation 347 applies to the transport of waste from the location of generation to a landfill site authorized to receive specific wastes. The regulation also prescribes procedures on how the specific wastes are to be handled at the landfill site.

The major requirements of the building owner and the person(s) removing the waste are to ensure that:

- The waste is appropriately packaged and labelled;
- The transport vehicle is appropriately placard; and
- The waste is to be transported as directly as possible to the landfill site once it leaves the site.

Some wastes require the owner to register a Generator (of waste) number and many wastes require classification that can restrict or even prohibit their disposal in landfill.

It is important to note that the building owner can be held responsible for the waste until the waste disposal site accepts it.

2.4 Ontario Regulation 362

Ontario Regulation 362, made under the Ontario Environmental Protection Act applies to the waste management and transport of PCB waste from the location of generation to a landfill site authorized to receive specific wastes. The regulation also prescribes procedures on how the specific wastes are to be handled at the landfill site.

3.0 SURVEY SCOPE AND METHODOLOGY

The methodology for the assessment for hazardous materials is outlined below.

In order to determine the location of materials included in the assessment, the project technologist entered the room where practical (i.e. where access was possible without the demolition of walls, roof or ceilings or destruction of flooring). Representative views were made above accessible suspended ceiling systems. Cavities within solid ceiling and wall systems were accessed via existing access panels only. The inventory did not include demolition of building systems or finishes to check on possible hidden conditions.

3.1 Asbestos-Containing Building Materials (ACM)

The scope of the survey included all friable asbestos products and all major non-friable asbestos materials. The term friable is applied to a material that can be readily reduced to dust or powder by hand or moderate pressure. Asbestos materials that are friable have a much greater potential to release airborne asbestos fibres when disturbed.

Typical friable asbestos materials include: sprayed fireproofing or thermal insulation, textured (stippled) plaster, and thermal mechanical insulation. Typical non-friable materials include: asbestos cement (transite) products, vinyl floor tiles, asbestos textiles and gaskets. Additional materials such as ceiling tiles, drywall joint compounds and vinyl sheet flooring are classified as non-friable, but because of their ability to release dust when disturbed are considered as "potentially friable" for the purpose of this report.

Bulk samples of materials suspected to contain asbestos were collected for analysis during the survey. Specifically, a small volume of material was removed either from a damaged section of suspect material, or taken from intact material. In these latter cases, the material from which the sample was collected was sealed with tape to temporarily prevent fibre release. Samples were placed in plastic bags and sealed until receipt by an independent laboratory. To ensure quality results, the independent laboratory chosen successfully participates in an "Asbestos Proficiency Analytical Testing Program". As such, these independent laboratories are responsible for their findings.

Bulk samples were collected in accordance with regulatory sampling requirements and with sufficient frequency to obtain a general pattern of asbestos use within the building. Due to building renovations or modifications that may have occurred in the past, the consistency of the application of asbestos materials may not be uniform throughout the entire Site. It is important to note that without sampling each individual wall, pipe section, ceiling tile etc. it is not possible to identify the asbestos content of every material present in the selected areas. For this reason, visually similar materials are considered to be homogenous with those already sampled elsewhere in the building without additional analysis.

O. Reg. 278/05 prescribes that a minimum number of samples be collected of materials suspected to contain asbestos. These minimum sampling requirements are summarized in Table 1, below.

Table 1- Suspect ACM Bulk Sampling Requirements		
Type of Material	Quantity of Material Present	Minimum # of Bulk Samples Required
Surfacing Materials (i.e. sprayed fireproofing, drywall joint compound, texture coat, and plaster)	Up to 90 sq/m (1000 sq/ft)	3
	From 90 sq/m (1000 sq/ft) to 450 sq/m (5000 sqft)	5
	Greater than 450 sq/m (5000 sq/ft)	7
All other potential ACM	Any	3

Excluding surfacing materials, the laboratory was instructed to cease analysis within Sample Groups of homogenous materials when one of the samples in the group is found to contain asbestos. For example, if three samples of a type of vinyl floor tile are collected (as required by O. Reg. 278/05) and submitted for analysis and the first sample is positively identified as containing asbestos, the balance of the sample group is not analysed.

EMC Scientific ("EMC"), an independent laboratory, was selected to analyse the collected bulk suspect asbestos samples. EMC successfully participates in an "Asbestos Proficiency Analytical Testing Program" and as such, is responsible for its findings. EMC followed the Code of Practice for the identification of asbestos in bulk material, as detailed in O. Reg. 278/05. Bulk samples were analysed using the Polarized Light Microscopy ("PLM") Technique with Dispersion Staining. The identification of asbestos fibre in bulk material is based on a collective set of parameters dependent on the unique shape and crystallographic properties of each fibre as viewed through the microscope. This method is useful for the qualitative identification of asbestos and the semi-quantitative determination of asbestos content in bulk materials expressed as a percent of projected area. The method identifies types of asbestos and also measures percent of asbestos as perceived by the analyst in comparison to standard area projections or trained experience.

The recommendations made as part of this report with respect to asbestos have taken into consideration: the condition and accessibility of the material, vibration, air movement, and general activities likely to occur within the vicinity of the ACM.

In each area or room inventoried, the technician recorded the quantity, condition (GOOD, FAIR, or POOR) of each suspect asbestos-containing material.

The definitions for condition and accessibility of the asbestos-containing items are as follows:

GOOD	Material is intact with no visible signs of damage.
FAIR	Material is visibly damaged but can be repaired.
POOR	Material is damaged beyond repair and likely needs to be removed.

Where ACM is found to be in GOOD condition and not likely to deteriorate or fall, the general recommendation would be to re-evaluate the condition of the material on an annual basis (required by O. Reg. 278/05). This recommendation can be subject to change if the material is located in a manner that persons untrained in asbestos awareness could physically damage it.

Where ACM is found to be damaged (i.e. FAIR or POOR condition), a recommendation to have the material cleaned-up, repaired, removed, enclosed, or encapsulated is offered. The recommendation will also indicate which asbestos procedure should be used to perform the remedial work (i.e. Type 1, Type 2, Type 3, or Glove Bag Removal Methods).

3.2 Lead

The investigation included the collection and analysis of all major paint colour applications for the presence of lead in the paint. Other materials that possibly contain lead were identified by known historic use, where relevant. For the purpose of this report, sampling for lead in mortar was also performed. The lead samples were analysed by EMSL Canada ("EMSL"), using atomic absorption spectrophotometry. EMSL is AIHA (American Industrial Hygiene Association) and NIOSH (National Institute of Occupational Safety and Health) accredited for this type of analysis. The Laboratory Analysis Report for lead in paint samples is included with this Report as Appendix II.

3.3 Mercury

The assessment included a visual identification of fluorescent light tubes, switches, electrical controls, heating system thermostats, thermometers, and other components historically known to contain mercury.

3.4 Other Designated Substances

Other materials listed in Section 1.0 of this Report were identified on a visual basis where present, as part of the current assessment. It should be noted that no manufacturing or heavy industrial activities are known by Maple to occur at the Site. Therefore, Designated Substances associated with these activities (i.e. those other than Asbestos, Lead, Mercury, and Silica) would not be expected to be present in the selected areas.

3.5 Mould

The assessment for mould was conducted in accordance with standard industry practice as set out in the Canadian Construction Association (CCA) "Mould Guidelines for the Canadian Construction Industry" for a visual assessment. Although there are no regulatory requirements in Ontario for such an assessment, the CCA Guidelines, and similar guidelines from other agencies have been accepted as the industry standard by most experts, consultants, the Ontario Ministry of Labour, and the Canadian Construction Association.

All guidelines and protocols for mould investigations indicate that investigations should be performed largely on a visual basis with limited collection of bulk and/or air samples. The Ontario Ministry of Labour has consistently enforced the removal of all mould from buildings regardless of mould genus or species, and therefore bulk samples or air samples for confirmation of mould are not typically collected for investigative purposes where mould is visible.

3.6 Polychlorinated Biphenyls

Manufacturers labels/codes collected from fluorescent lamp ballasts suspected of containing Polychlorinated Biphenyls ("PCBs") are compared with Environment Canada's document titled "Identification of Lamp Ballasts Containing PCBs", which identifies PCB-containing ballasts.

3.7 Limitations and Omissions from Scope

Due to the nature of building construction some limitations exist as to the possible thoroughness of any building materials inventory. The field observations, measurements, and analysis are considered sufficient in detail and scope to form a reasonable basis for the findings presented in this report. Maple 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 inventory.

It is possible that conditions may exist which could not be reasonably identified within the scope of the inventory or which were not apparent during the Site investigation. Maple believes that the information collected during the investigation concerning the property is reliable. No other warranties are implied or expressed.

During a standard ACM inventory performed for the purposes of regulatory compliance, it is industry practice to exclude certain suspect asbestos-containing materials from sampling. These materials are often excluded from sampling due to the risk of compromising the health and safety of the technician, other building occupants, or the integrity of the systems with which these materials are associated. Examples of such materials include; elevator brakes, roofing felts and mastics, high voltage wiring, mechanical packing and gaskets, underground services or piping, fire-doors, window caulking and levelling compound. Where observed, these materials were presumed to be ACM.

3.8 Drawings

Drawings included in Appendix III will indicate the locations of any major applications of an asbestos-containing material with the exception of mechanical insulations, drywall, plaster finishes and transite (which cannot be accurately depicted on drawings). The information depicted on the drawings is not to scale and is only meant to provide a general representation of the locations of asbestos-containing materials.

4.0 INVENTORY FINDINGS

The findings of the survey are presented separately below for each of the eleven Designated Substances as well as microbial growth (mould), and polychlorinated biphenyls. Asbestos is further detailed by typical applications of asbestos.

4.1 Asbestos

The following is a brief discussion of the extent to which ACM was identified in the surveyed area. The discussion is organized under the headings of materials that are generally suspected of containing asbestos. The sample numbers refer to the laboratory analysis report presented as Appendix I and summarised in Table 2 below. Thirty (30) bulk samples were collected for the determination of asbestos content and submitted to the lab to be analysed. Due to the presence of more than one phase of

material in some of the original samples the laboratory may have performed multiple analyses for some samples. As a result, a total of forty-seven (47) samples were analyzed.

Table 2- Analysis Summary of Asbestos Bulk Samples			
Sample No.	Room Name	Sample Description	Result
S-01A	Room 3050 A	White, Drywall Joint Compound	None Detected
S-01B	Lunchroom	White, Drywall Joint Compound	None Detected
S-01C	Room 1169	White, Drywall Joint Compound	None Detected
S-02A	Lunchroom	Blue, 12"x12" Vinyl Floor Tile	None Detected
S-02B	Lunchroom	Blue, 12"x12" Vinyl Floor Tile	None Detected
S-02C	Fitness Office Storage	Blue, 12"x12" Vinyl Floor Tile	None Detected
S-03A	Room 1098	Floor Levelling Compound	None Detected
S-03B	Room 1098	Floor Levelling Compound	None Detected
S-03C	Room 1098	Floor Levelling Compound	None Detected

No known sources of asbestos-containing materials (ACM) are present in the designated renovation areas surveyed at the time of the assessment.

It should be noted that due to the presence of solid walls and ceilings in the surveyed areas, access for viewing within the wall and ceiling cavities was not always possible. Suspect asbestos-containing materials may be present within wall and ceiling cavities that were not identified but are suspected to be present in this report. Caution should be taken when demolishing solid walls and ceilings within the areas being surveyed. Given the construction date of the building, the presence of asbestos materials in architectural finishes is not likely.

4.1.1 Sprayed Fireproofing (Friable)

No sprayed fireproofing was identified within the surveyed area at the time of the assessment.

4.1.2 Thermal Mechanical Insulation (Friable)

Non-asbestos mechanical insulations are present throughout the surveyed area.

Piping Systems:

Pipe systems observed within the surveyed area were not insulated, or insulated with fibreglass.

Duct Systems:

Duct systems observed throughout the surveyed area were observed to be un-insulated, or insulated with fibreglass.

Mechanical Equipment:

No mechanical equipment was identified within the work areas at the time of the assessment.

4.1.3 Texture Finish (Friable)

No textured finishes were identified within the surveyed area at the time of the assessment.

4.1.4 Acoustic Ceiling Tiles (Potentially Friable)

Non-asbestos acoustic ceiling tile systems were identified within the surveyed area at the time of the assessment.

One (1) visually distinct type of ceiling tile system were observed in the surveyed area. A brief description of each type of ceiling tile is outlined below.

- AT-01 (2'x4' small and medium pinhole with fissures):

AT-01 was observed to be present in throughout the building.

No bulk samples of AT-01 were collected as a date stamp manufacture code (09/03/10 and newer) was present on the backside of the tile indicating that the tiles were recently manufactured and therefore not suspected to contain asbestos.

4.1.5 Vinyl Sheet Flooring (Potentially Friable)

No vinyl sheet flooring finishes were identified within the surveyed area at the time of the assessment.

4.1.6 Vinyl Floor Tile (Non-Friable)

No vinyl floor tile systems were identified within the surveyed area at the time of the assessment.

4.1.7 Asbestos Cement Products "Transite" (Non-Friable)

No transite cement products were observed to be present in the surveyed area at the time of the assessment.

4.1.8 Drywall Joint Compound (DJC) (Potentially Friable)

Non-asbestos-containing drywall joint compound was identified within the surveyed area at the time of the assessment.

Interior drywall finishes were present in the form of wall finishes throughout the majority of the surveyed area.

Three (3) representative samples (Sample Set Asb-01) of drywall joint compound were collected and analyzed for determination of asbestos content. Analysis of Sample Set Asb-01 found that the material does not contain asbestos.

4.1.9 Plaster (Potentially Friable)

No plaster finishes were identified within the surveyed area.

4.1.10 Vermiculite (Friable)

No vermiculite insulation was observed to be present within the surveyed area at the time of the assessment. It should be noted that loose fill vermiculite insulation can often be present within voids of masonry and possibly some pre-manufactured surveyed area components that would not be identified during the course of this assessment.

4.2 Lead

Two (2) bulk paint samples and One (1) glazed ceramic tile sample were collected for determination of lead content and submitted to EMSL for analysis during the assessment. The sample number refers to the Certificate of Analysis Report presented as Appendix II and summarised in Table 3 below.

Table 3– Analysis Summary of Lead Samples			
Sample No.	Locations	Sample Description	Result
Pb-01	Men's Room, Room 2137	Ceramic Tile	<0.0072%
Pb-02	Room 1098	Off-White Wall Paint	<0.0064%
Pb-03	Room 1139	Beige Wall Paint	<0.012%

No regulations currently exist in Ontario defining the lower limit of lead-containing material. The Ontario Ministry of Labour (MOL) has issued a guideline for lead abatement, entitled Guideline – Lead on Construction Projects (2004) which is considered enforceable. The Guideline does not specify what constitutes a material as "lead-containing". Instead, it outlines procedures based on the concentration of airborne lead encountered during removal, as well as provides procedures and/or specific operations for lead-containing material removal. However, the Environmental Abatement Council of Canada (EACC) Lead Guideline for Construction, Renovation, Maintenance or Repair document classifies paint as either Low-Level, Lead-Containing, or Lead-Based as follows:

Table 4- EACC Classification of Lead	
Concentration of Lead	Definition
0.1% or less <u>OR</u> 1000 mg/Kg or less	Low Level Lead ("Virtually Safe")

Table 4- EACC Classification of Lead	
Concentration of Lead	Definition
Greater than 0.1% but less than 0.5% <u>OR</u> Greater than 1000 mg/Kg but less than 5000 mg/Kg	Lead-Containing
Greater than 0.5% <u>OR</u> Greater than 5000 mg/Kg	Lead-Based

Based on these criteria and the results of the sample analysis, all paints and ceramic tile sampled are considered to be Low-Level Lead ("virtually safe"). The representative ceramic wall tile sampled is found in most washrooms within the building.

4.3 Mercury

Mercury vapour is present in all fluorescent light tubes.

4.4 Silica

Free crystalline silica, present as common construction sand, is present in all concrete and masonry products where present in the Select areas surveyed.

4.5 Isocyanates

Free isocyanate compounds would not be expected to be found in a non-manufacturing facility.

4.6 Vinyl Chloride Monomer

Vinyl chloride monomer would not be expected to be found in a non-manufacturing facility.

4.7 Benzene

Benzene would not be expected to be found in a non-manufacturing facility.

4.8 Acrylonitrile

Acrylonitrile would not be expected to be found in a non-manufacturing facility.

4.9 Coke Oven Emissions

Coke oven emissions would not be expected to be found in a non-manufacturing facility.

4.10 Arsenic

Arsenic would not be expected to be found in a non-manufacturing facility.

4.11 Ethylene Oxide

Ethylene oxide would not be expected to be found in a non-manufacturing facility.

4.12 Mould

No visible mould growth was observed to be present within the surveyed area at the time of the assessment.

It is possible that mould growth is present in concealed areas such as wall or ceiling cavities, pipe chases, etc. or in areas not currently assessed by Maple. The client should notify Maple should any water damage or suspect mould growth be discovered.

4.13 Polychlorinated Biphenyls (PCBs)

The fluorescent lamp fixtures observed contained T8 fluorescent light tubes. T8 fixtures have electronic ballast and are considered as not containing PCB. Other fixtures were LED, and have ballasts that are not PCB containing.

5.0 RECOMMENDATIONS

5.1 Asbestos

No known sources of asbestos-containing materials were identified within the surveyed areas at the time of the assessment.

It should be noted that due to the presence of solid walls and ceilings in the surveyed areas, access for viewing within the wall and ceiling cavities was not always possible. Suspect asbestos-containing materials may be present within wall and ceiling cavities that were not identified but are suspected to be present in this report. Caution should be taken when demolishing solid walls and ceilings within the areas being surveyed. Given the construction date of the building, the presence of asbestos materials in architectural finishes is not likely.

5.2 Lead

Paints and mortar (0.1% or less and/or 1000 mg/Kg or less) sampled were found to be low level lead ("virtually safe").

Low Level Lead paints and mortar are considered virtually safe provided that;

- airborne lead concentrations are kept below 0.05 mg/m³
- general dust suppression and worker hygiene procedures are utilized
- torching or other activities that create fumes are not completed

5.4 Mercury

Recycle and reclaim mercury from fluorescent light tubes when taken out of service. Do not break lamps or separate liquid mercury from components. Liquid mercury is classified as a hazardous waste and must be disposed of in accordance with local regulations.

5.5 Silica

Proper dust suppression techniques and other safety precautions to control possible generation of silica dust from the demolition of concrete and masonry products present in the building should follow those outlined in the Ministry of Labour Guideline- Silica on Construction Projects, 2004.

5.6 Polychlorinated Biphenyls

Prior to disposal, all fluorescent lamp ballasts should be inspected and compared with Environment Canada's document titled "Identification of Lamp Ballasts Containing PCBs" for the presence of PCB's.

6.0 LIMITATIONS

Due to the nature of building construction some limitations exist as to the possible thoroughness of the subject investigation. The field observations are considered sufficient in detail and scope to form a reasonable basis for the findings presented in this report. Maple 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 assessment.

It is possible that conditions may exist which could not be reasonably identified within the scope of the investigation or which were not apparent during the site investigation. Maple believes that the information collected during the investigation period concerning the property is reliable. No other warranties are implied or expressed.

Information provided by Maple is intended for Client use ONLY. Any use by a third party, of reports or documents authored by Maple, 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. Maple accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted.

The liability of Maple or its staff will be limited to the lesser of the fees paid or actual damages incurred by the Client. Maple will not be responsible for any consequential or indirect damages. Maple will only be liable for damages resulting from negligence of Maple; all claims by the Client shall be deemed relinquished if not made within two years after last date of services provided.

Please contact Maple Environmental Inc. at (905) 257-4408 for inquiries regarding this project.

End of Report

Sincerely,

MAPLE ENVIRONMENTAL INC.
Environment, Health and Safety Consultants

Prepared By:



Jayden Leclerc
Project Technologist

Reviewed By:



Ken Reeves
Operations Manager

APPENDIX I
LABORATORY ANALYSIS REPORT - ASBESTOS

Laboratory Analysis Report

To:

Ken Reeves
Maple Environmental Inc.
482 South Service Road East, Suite 116
Oakville, Ontario
L6J 2X6

EMC LAB REPORT NUMBER: A125251
Job/Project Name: Peel Regional Police, 180 Derry Road
Analysis Method: Polarized Light Microscopy – EPA 600
Date Received: Sep 18/25 **Date Analyzed:** Sep 18/25
Analyst: Marco Costanza
Reviewed By: Malgorzata Sybydlo

No. of Phases Analyzed: 9
Job No: 22779
Number of Samples: 9
Date Reported: Sep 19/25

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
Asb-01A	A125251-1	Drywall joint compound, room 3050A	White, joint compound	ND			100
Asb-01B	A125251-2	Drywall joint compound, lunchroom	White, joint compound	ND			100
Asb-01C	A125251-3	Drywall joint compound, room 1169	White, joint compound	ND			100
Asb-02A	A125251-4	12"x12" bluish grey VFT, lunchroom	Blue, vinyl floor tile	ND			100
Asb-02B	A125251-5	12"x12" bluish grey VFT, lunchroom	Blue, vinyl floor tile	ND			100
Asb-02C	A125251-6	12"x12" bluish grey VFT, fitness office storage	Blue, vinyl floor tile	ND			100
Asb-03A	A125251-7	Floor levelling compound, room 1098	Grey, cementitious material	ND			100
Asb-03B	A125251-8	Floor levelling compound, room 1098	Grey, cementitious material	ND			100
Asb-03C	A125251-9	Floor levelling compound, room 1098	Grey, cementitious material	ND			100

Note:

1. Bulk samples are analyzed using Polarized Light Microscopy (PLM) and dispersion staining techniques. The analytical procedures are in accordance with EPA 600/R-93/116 method.
2. The results are only related to the samples analyzed. **ND** = None Detected (no asbestos fibres were observed), **NA** = Not Analyzed (analysis stopped due to a previous positive result).
3. This report may not be reproduced, except in full without the written approval of EMC Scientific Inc. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
4. The Ontario Regulatory Threshold for asbestos is 0.5%. The limit of quantification (LOQ) is 0.5%.
5. Vinyl floor tiles may contain very fine asbestos fibres which the PLM method cannot detect. TEM analysis may be necessary to confirm the absence of asbestos.

APPENDIX II

LABORATORY ANALYSIS REPORT – LEAD

**EMSL Canada Inc.**

2756 Slough Street, Mississauga, ON L4T 1G3

Phone/Fax: (289) 997-4602 / (289) 997-4607

<http://www.EMSL.com>torontolab@emsl.com

EMSL Canada Or 552516638

CustomerID: 55MAPL78

CustomerPO: 22779

ProjectID:

Attn: **K Reeves**
Maple Environmental, Inc.
482 South Service Road East
Suite 116
Oakville, ON L6J 2X6

Phone: (905) 257-4408
Fax: (905) 257-8865
Received: 9/18/2025 03:00 PM
Collected: 8/20/2025

Project: **Peel Regional Police, 180 Derry Road****Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)***

<i>Client Sample</i>	<i>Description</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Weight</i>	<i>RDL</i>	<i>Lead Concentration</i>
Pb-02 552516638-0001	Site: Off-White Wall Paint, Room 1098	8/20/2025	9/19/2025	0.2564 g	0.0064 % wt	<0.0064 % wt
Pb-03 552516638-0002	Site: Beige Wall Paint, Room 1139 Insufficient sample to reach reporting limit.	8/20/2025	9/19/2025	0.1381 g	0.012 % wt	<0.012 % wt

Rowena Fanto, Lead Supervisor
or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. * Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.0064% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.

Samples analyzed by EMSL Canada Inc. Mississauga, ON AIHA LAP, LLC-ELLAP Accredited #196142

Initial report from 09/19/2025 13:17:04

**EMSL Canada Inc.**

2756 Slough Street, Mississauga, ON L4T 1G3

Phone/Fax: (289) 997-4602 / (289) 997-4607

<http://www.EMSL.com>torontolab@emsl.com

EMSL Canada Or 552516638

CustomerID: 55MAPL78

CustomerPO: 22779

ProjectID:

Attn: **Ken Reeves**
Maple Environmental, Inc.
482 South Service Road East
Suite 116
Oakville, ON L6J 2X6

Phone: (905) 257-4408
Fax: (905) 257-8865
Received: 9/19/2025 02:29 PM
Collected: 8/20/2025

Project: **Peel Regional Police, 180 Derry Road****Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)***

<i>Client Sample</i>	<i>Description</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Weight</i>	<i>RDL</i>	<i>Lead Concentration</i>
Pb-01 552516638-0003	Site: Men's Washroom, Wall Tile Glaze, Room 2137 Traditional lead methods are not appropriate for determination of lead content in ceramic tile.	8/20/2025	9/22/2025	0.2207 g	0.0072 % wt	<0.0072 % wt

Rowena Fanto, Lead Supervisor
or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. * Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.0064% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.

Samples analyzed by EMSL Canada Inc. Mississauga, ON AIHA LAP, LLC-ELLAP Accredited #196142

Initial report from 09/22/2025 12:52:13

APPENDIX B

Peel Regional Police Network Cabling Specifications

12th of February 2019



**Peel Regional
Police**
A Safer Community

Brad Masterson C.E.T.
Supervisor - IT Infrastructure
Information Technology Services

Due to the competitive nature of this document, the information contained within is considered proprietary and confidential and shall not be copied, printed or otherwise reproduced without the express written permission of Peel Regional Police.



Specification Version History

Version #	Implemented	Revision	Approved	Approval	Reason
1	Brad Masterson C.E.T.				

Table of Contents

Section	Page #
I. General	4
A. Purpose of Document	4
B. Scope of Work – Typical	4
C. General Guidelines	5
D. Terminology from TIA 569	6
E. Applicable Regulatory References	8
F. Peel Regional Police Substitution Policy	9
G. Contractor Qualifications	9
H. Warranty	11
II. Subsystems and Components	13
A. Cabling Subsystem 1 – Horizontal Copper Cabling System	13
B. Cabling Subsystem 2 – Intrabuilding (Within Building) Fiber	16
C. Racks, Cabinets, and Cable Management	18
D. Communications Grounding Network	21
E. Network Infrastructure Labeling	25
F. Cabling Accessories	27
G. Rack Power Distribution Units	27
III. Testing and Acceptance	29
A. General	29
B. Copper Channel Testing	29
C. Fiber Testing	29
D. System Documentation	30
E. Inspection and Acceptance	31
F. Post Installation Maintenance Agreement	32
IV. Project Scope of work	33
A. Scope of Work	33
V. Appendix A – Materials List	34

I. General

A. Purpose of Document

1. This document is to provide a standard defining the structured communications cabling systems to be installed within Peel Regional Police facilities. It is geared toward leveraging our legacy cabling infrastructure while upgrading to more recent technologies in new installations. The goal is to accomplish this in the most economic and systematic fashion possible, and in a manner compliant with the latest codes, cabling standards, and industry best practices.
2. Within this document, the facilities owner is Peel Regional Police, and shall be referred to as such, or as Information Technology Services. Bidding low-voltage installers shall be referred to as "Installer" or "Contractor".
3. It is the responsibility of the installing Contractor to evaluate these general recommendations and adapt them effectively to actual projects. Contractor is responsible for identifying and bringing to the attention of Peel Regional Police any design directions that may be improved. All such changes shall be approved in writing from Information Technology Services.
4. This specification defines quality standards and practices common to all Peel Regional Police network cabling upgrades and Greenfield (new) projects. The system offered and quoted, shall incorporate all features and facilities listed in this specification.
5. In addition to this cabling standard, individual projects will also have associated documentation such Requests for Proposals (RFP), facility drawings, and project schedules pertaining to that particular job. Such collateral will be referred to in this document as "Project-specific Documentation", "Project Documentation", or simply "Construction Documents". Many of the requirements described herein may be detailed or expanded upon by such project-specific documents.
6. Any conflict between this general specification and any project-specific documentation shall be brought to the attention of Peel Regional Police and will be resolved by Peel Regional Police in writing.
7. Note that while many portions of this specification are addressed to "The Contractor", these requirements apply equally to architects, engineers, project managers, planning, or anyone doing network cabling and infrastructure work within Peel Regional Police facilities, whether those persons are outside contractors or persons directly employed by Peel Regional Police.

B. Scope of Work – Typical

1. Contractor shall be solely responsible for all parts, labor, testing, documentation, and all other processes and physical apparatus necessary to turn over the completed cabling system and associated infrastructure fully warranted and operational for acceptance by Peel Regional Police.

2. This specification includes structured cabling for the production Ethernet network, but may address other systems that have converged onto Ethernet-style cabling. These associated systems may include VoIP, Building Automation Systems (BAS), Building Access Control, Security Cameras and Audio Visual Systems.
3. The following cabling subsystems will be defined:
 - a. Cabling Subsystem 1 – Horizontal Copper Cabling
 - b. Cabling Subsystem 2 – Intrabuilding Fiber Backbone Cabling OM4 or OS1
 - c. Cabling Subsystem 3 – Interbuilding Fiber Backbone Cabling OS2
 - d. Racks and Cable Management
 - e. Bonding and Grounding
 - f. Cable Pathways
 - g. Network Labeling
 - h. Cabling Accessories
 - i. Cabling Subsystem 1 – Horizontal Copper Cabling
 - j. Cabling Subsystem 2 – Intrabuilding Fiber Backbone Cabling OM4 or OS1
 - k. Cabling Subsystem 3 – Interbuilding Fiber Backbone Cabling OS2
 - l. Racks and Cable Management
 - m. Bonding and Grounding
 - n. Cable Pathways
 - o. Network Labeling
 - p. Cabling Accessories
4. In the event that requirements of the project documents cannot be met during design or installation, a written description of the need for variance will be submitted to the Peel Regional Police Project Manager for review by the Information Technology Services Team.

C. General Guidelines

1. All voice telephony systems shall be VoIP unless otherwise specified in the project-specific documentation.
2. Any copper or fiber patch cords shall be factory terminated. Hand terminated patch cords will not be accepted.
3. All Greenfield (new) projects shall use Cat 6 cable or better.

4. On Brownfield (existing) installations, Contractor shall consult project documentation for guidance on the current Category of copper cable to be installed.
5. Any deviation from Cat 6 cabling shall be approved in writing by Brad Masterson C.E.T..
6. Wiring configuration on Cat 6 systems shall be T568A.
7. Any communications/IT consulting engineers retained by Peel Regional Police shall be at the sole discretion of Information Technology Services.

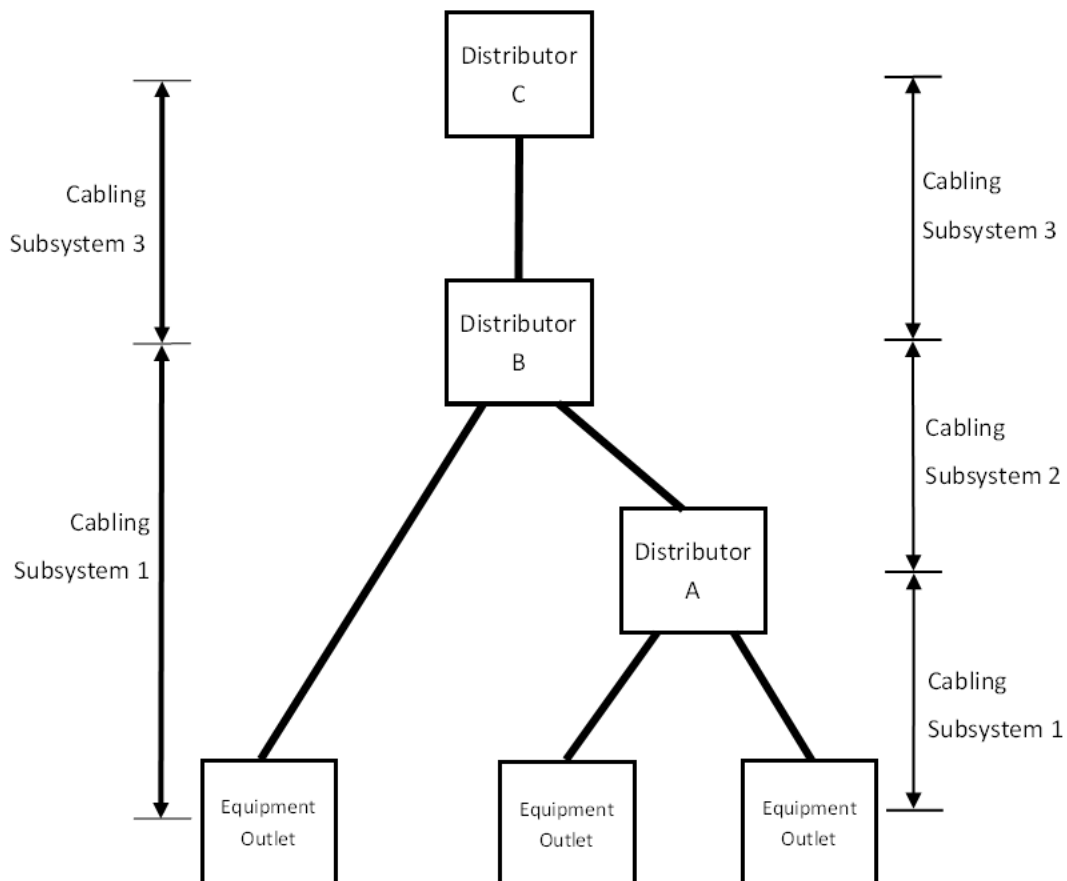
D. Terminology from TIA 569

1. New Terms for Telecommunications Spaces (Rooms)
 - a. This section reviews some of the current terminology for communications rooms and spaces as defined in TIA 569-D (April 2015).
 - b. Awareness of these new terms is important for communicating accurately and for clearly understanding language used in specifications and other documents.
 - c. This specification will use both new and old terms side-by-side for clarity.
 - d. The table below shows some of the most important new terms and how they relate to traditional terminology:

Old Term(s)	New Term
Entrance Facility.	Entrance Room
Telecommunications Room, Equipment Room.	Distributor Room
Telecommunications Room, Equipment Room.	Telecommunications Space
Cross-connect, Patching System, Optical Enclosure.	Distributor
Horizontal Cross-connect. Usually copper patch panels in enterprise installations.	Distributor A
Intermediate Cross-connect, Intermediate Distribution Frame. Usually multimode optical enclosure in enterprise installations. Can apply to intra and interbuilding fiber cabling subsystems.	Distributor B
Main Cross-connect, Main Distribution Frame. Usually singlemode optical enclosure in enterprise installations. Can apply to intra and interbuilding fiber cabling subsystems.	Distributor C
Faceplate, Surface Box, Work Area Appliance.	Equipment Outlet
Work Area.	Equipment Outlet Location
Horizontal Cabling. Extends from Equipment Outlet to Distributor A, B, or C depending on size of cable plant. Usually balanced twisted pair cable in enterprise installations.	Cabling Subsystem 1
Extends from Distributor A to Distributor B or C, depending on size of cable plant.	Cabling Subsystem 2

Old Term(s)	New Term
Usually 50-micron intra-building backbone fiber cable in enterprise installations. But may be singlemode fiber.	
Connects Distributor A to Distributor B. In enterprise installations, this is usually singlemode fiber between buildings.	Cabling Subsystem 3

Example of a logical cabling topology with the new terminology see illustration below:



E. Applicable Regulatory References

1. Contractor is responsible for knowledge and application of current versions of all applicable standards and codes.
2. ANSI/TIA:
 - a. ANSI/TIA 568 series, most recent revisions, addenda and systems bulletins. All applicable
 - b. ANSI/TIA-569 Telecommunications Pathways and Spaces, most recent revision including all relevant addenda and systems bulletins
 - c. ANSI/TIA-606 Administration Standard for Telecommunications Infrastructure, most recent revision including all addenda and systems bulletins
 - d. ANSI/TIA-607 Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises, most recent revision including all addenda and systems bulletins
 - e. ANSI/TIA-862 Structured Cabling Infrastructure Standard for Intelligent Building Systems, most recent revision including all addenda and systems bulletins
 - f. ANSI/TIA-942 Telecommunications Infrastructure Standard for Data Centers, most recent revision including all addenda and systems bulletins
 - g. ANSI/TIA-1179 Healthcare Facility Telecommunications Infrastructure Standard, most recent revision including all addenda and systems bulletins
 - h. ANSI/TIA-4966 Telecommunications Infrastructure Standard for Educational Facilities, most recent revision including all addenda and systems bulletins
 - i. TIA-TSB-162 Telecommunications Cabling Guidelines for Wireless Access Points, most recent revision including all addenda and systems bulletins
3. BICSI – Building Industry Consultative Services International – Manuals
 - a. Telecommunications Distribution Methods Manual, most recent edition
 - b. Information Transport Systems Installation Methods Manual (ITSIMM), most recent edition
4. National Electric Codes – all applicable
5. OSHA Standards and Regulations – all applicable
6. Local Codes and Standards – all applicable
7. Anywhere cabling standards conflict with one another or with electrical or safety codes, Contractor shall defer to the CEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either
8. Any violations of applicable standards or codes committed by the Contractor shall be remedied at the Contractor's expense

F. Peel Regional Police Substitution Policy

1. This is a performance-based specification developed from the experience of the Peel Regional Police Information Technology Services in providing exceptional solutions for all our facilities and departments. As such, substitution of specified products or systems named in this document is highly discouraged.
2. Any Contractor wishing to offer substitutions for any part of the systems specified herein shall be responsible for proving equivalency and shall follow the procedure below:
 - a. Contractor shall submit a request for product substitution to Peel Regional Police in writing no less than one week in advance of bid.
 - b. Contractor shall provide three (3) each samples of the product being offered for evaluation by Peel Regional Police
 - c. Samples of products offered for substitution shall be accompanied by product drawings, specification sheets and engineering documents proving equivalency in transmission performance (where applicable) and mechanical function.
 - d. Category Cat 6 cable and components offered in substitution to those specified shall be accompanied by third party test reports proving equal or better channel performance. Such test reports shall name exact products by part number and state channel results in worst-case connector links of maximum length that include both cross-connect and consolidation points.
3. Equivalent product acceptance must be received from Peel Regional Police in writing.
4. Contractor shall be responsible for and assume all costs for removal and replacement of any substituted product installed without prior written approval from Peel Regional Police. Such costs shall include but not be limited to labor, materials as well as any penalties, fees or costs incurred for late completion.

G. Contractor Qualifications

1. General
 - a. Contractor shall be a current Panduit OneSM Partner that has completed the Structured Cabling Deployment training (Panduit Certified Installer). A copy of the corporate Panduit manufacturer certification shall be included with all quotes.
 - b. Contractor shall have at least 5 years documented experience installing and testing structured cabling systems of similar type and size.
 - c. Contractor shall employ at least one BICSI Registered Communication Distribution Designer (RCDD) to sign-off on all designs offered, including stamping the design with their current BICSI/RCDD stamp.
 - d. Contractor shall have all necessary permits, licenses, and inspections required for the performance of data, voice, and fiber optic cable installations.



- e. At least 30 percent of the technicians installing low-voltage copper systems on the job shall have a current Panduit Certified Copper Technicians certificate or equivalent to be approved by Peel Police IT Services.
- f. At least 30 percent of the technicians installing any Fiber Distribution Systems shall have a current Panduit Certified Fiber Technicians certificate or equivalent to be approved by Peel Police IT Services..
- g. The Telecommunications contractor shall provide a Project Manager to serve as the single point of contact to manage the installation, speak for the contractor and provide the following functions:
 - Initiate and coordinate tasks with the Peel Regional Police Project Manager and others as specified by the project schedule.
 - Provide day-to-day direction and-site supervision of Contractor personnel.
 - Ensure conformance with all contract and warranty provisions.
 - Acknowledge and remediate findings of Peel Regional Police weekly site project meetings.
 - This individual will remain Project Manager for the duration of the project. The contractor may change Project Manager only with the written approval of Peel Regional Police.
- h. Contractor Project Manager on site shall have completed the Panduit Structured Cabling Deployment training and hold certificates for both copper and fiber.

2. References and Response Times

- a. Communication Contractor shall provide with bid, a list of four (4) reference accounts where similar Data, Voice, Fiber Optic Cable, and related equipment installation work was performed within the last year (twelve-month period).

3. Termination of Services

- a. Peel Regional Police reserves the right to terminate the Communication Contractor's services if at any time it is determined the Communication Contractor is not fulfilling their responsibilities as defined within this document and all associated project documentation.
- b. Upon termination, the Communications Contractor shall be restricted from the premises and compensated for the percentage of work completed satisfactorily.
- c. Contractor's appearance and work ethic shall be of a professional manner. Dress shall be appropriate to the work being performed.
- d. Conduct on Peel Regional Police property will be professional in nature.
- e. Any person in the Contractor's employ working on a Peel Regional Police project considered by Peel Regional Police to be incompetent, disorderly, or for any other reason unsatisfactory or undesirable to Information Technology Services, such person shall be removed from the Peel Regional Police project.

4. Other Contractor Responsibilities

- a. Confirmation of Pathway and Cable Manager sizing:



- Wherever cabling pathways or managers are installed, it is the Contractor's responsibility to confirm pathway or manager sizing to represent no more than 25% fill upon installation according to manufacturer's fill tables.
- Pathways deemed overfilled upon installation will not be accepted and shall be remedied at Contractor expense.
- b. Contractor is responsible for the removal and disposal of all installation and construction debris created in the process of the job.
- c. All work areas will be cleaned at the conclusion of the workday and no tools or materials shall be left in a manner as to pose a safety hazard.
- d. Projects are not considered finished and will not be paid by Peel Regional Police until all debris, dust, etc. has been cleaned and removed to the satisfaction of Peel Regional Police.
- e. Contractor shall remove all abandoned cable per Article 800 of the National Electrical Code and per TIA and BICSI standards, recycling these materials where possible. Removal of orphaned cable is mandatory. Contractors shall consider this when placing bids.
- f. Contractor shall abide by all Peel Regional Police Security Policies pertaining to access and conduct while on Peel Regional Police property.
- g. Contractor shall obey all posted speed limits and parking regulations at the Peel Regional Police facilities where the work is being performed.
- h. Contractor understands that illegally parked vehicles will be towed and Contractor is responsible for and will assume all costs associated with towing.

H. Warranty

1. Contractor shall provide a 25 year PanNet® System Warranty on all copper and fiber links and/or channels.
2. PanNet® System Warranty shall meet the following criteria:
 - a. A 25-year guarantee that the installed cabling system will pass the Commercial Building Telecommunications Standards cited in this document.
 - b. This warranty will cover all registered links and/or channels.
 - c. Contractor shall indicate in warranty documentation whether registered links are to be link or channel.
 - If links are covered, this warranty may be invoked only if the links are comprised entirely of Panduit components and cable.
 - If channels are covered, this warranty may be invoked only if entire channel links are comprised of continuous Panduit components and patch cables.
 - d. The communications Contractor will correct any problems and malfunctions that are warranty-related issues without charge for the entire warranty period.



- e. If the PanNet® System Warranty is needed by Peel Regional Police within the warranted period and the original installer is no longer in business, Panduit shall find a substitute Panduit ONESM (certified) contractor and assume costs to fulfill the obligations of the warranty.
- f. Upon acceptance of the warranty paperwork and test results from the Contractor, Panduit will mail a notification letter to the installer and a notification letter with warranty certificate to Peel Regional Police.
- g. The warranty period shall commence following the final acceptance of the project by Peel Regional Police and written confirmation of warranty from Panduit.

<END OF SECTION>

II. Subsystems and Components

A. Cabling Subsystem 1 – Horizontal Copper Cabling System

1. See Appendix A for Part Numbers
2. Installation Guidelines
 - a. Installation of horizontal cabling shall be compliant with most recent versions of all applicable standards, national and local codes, as well as the local Authority Having Jurisdiction (AHJ).
 - b. The cabling system and support hardware shall be installed so as not to obscure any valves, fire alarm conduit, boxes, or other control, security or life safety devices.
 - c. Contractor shall use the same Category of performance for both cable and connecting hardware through the entire horizontal channel.
 - d. Anywhere there is a conflict between standards, codes, installation specifications or project specific documentation contractor shall default to the most stringent.
 - e. If clarification is needed, contractor shall submit a written request for clarification to Peel Regional Police. Response from Peel Regional Police shall be in writing.
 - f. All cable pulled and terminated shall be Cat 6 unless specified otherwise in the project documentation.
 - g. Contractor is responsible for maintenance of maximum pulling tensions, minimum bend radius, and approved termination methods required by cited standards, as well as manufacturer's recommendations and industry accepted best practices.
 - h. Contractor shall use low to moderate force when pulling cable. Maximum tensile load may not exceed 25' lbs. maximum pulling force per 4 pair cable.
 - i. Bundles of cable shall be pulled using pulling socks to distribute the tensile force over all cables in the bundle.
 - j. Contractor shall take care not to knot, snag or otherwise deform the cable while pulling. The jacket on installed cable shall be continuous, free from pinholes, splits, blisters, burn holes or other imperfections. Damaged or deformed cable shall be removed and replaced at no cost to Peel Regional Police.
 - k. Bend radius on 4 pair cable shall never be below 4 times the cable outer diameter, or manufacturer's requirements, whichever is most stringent.
 - l. Cables shall not be attached to lighting support wires nor touch the drop-ceiling assembly. Any portion of the communications cabling making contact with ceiling structures shall be remedied at Contractor expense.
 - m. Cables shall be kept as far away from potential sources of EMI (electrical cables, transformers, light fixtures, etc.) as practical and in shall in no cases pass closer than recommended in cited TIA standards.



- n. When using miniature horizontal cable or small diameter patch cables, the channel length shall be derated per manufacturer's recommendations.
- o. Contractor shall take care to never deform the cable by over cinching with cable ties. All cable ties shall be cinched firmly, but not so firmly that the tie cannot be rotated or moved on the bundle by hand.
- p. Cable bundles in telecom spaces (rooms) shall be dressed using only hook and loop style cable ties. Plastic ties shall not be used in Peel Regional Police telecom rooms and shall be removed and replaced with hook and loop ties at Contractor expense.
- q. Cable ties on all cable bundles shall be applied at random intervals to avoid harmonic effects.
- r. All horizontal cabling installed shall include a cable slack loop of not less than 12 inches at the Equipment Outlet and not less than 36 inches in the horizontal telecom room.
- s. Equipment outlet cable slack shall be stored in the box behind the faceplate if there is room to do so without violating the bend radius of the cable according to manufacturer's recommendations.
- t. Contractor may affix 12 inch slack loop above ceiling using hook and loop cable ties if allowed in the project specific documentation or otherwise in writing from Peel Regional Police. Cable loops touching the drop ceiling shall not be accepted.
- u. Service loops in the telecommunications room may be wall mounted or contained in pathways or racking systems if done according to manufacturer and industry best practices.
- v. All terminations on new (Greenfield) Peel Regional Police projects shall be terminated using the T568A pin-out (wire map).
- w. All terminations in existing Peel Regional Police facilities (Brownfield), shall match the pin-out and Category of the legacy cable plant, unless otherwise specified in the project documentation.
- x. Contractor shall terminate twisted pairs so that the last twist is never more than ½ inch from the point of termination (insulation displacement clip). Maintaining the last twist closer than ½ inch is preferred.
- y. Contractor shall maintain the cable jacket as close as possible to the connecting hardware. Twisted pair conductors deemed by Peel Regional Police to be unnecessarily exposed shall be re-terminated at Contractor's expense.
- z. Contractor shall be responsible for using plenum cable, ties and appliances in any air-return (plenum) spaces as required by applicable codes, standards, and the local AHJ (Authority Having Jurisdiction).

3. Copper Horizontal Cable

- a. Copper cable shall have the following attributes:
 - Panduit Category 6 cable shall meet ANSI/TIA-568-C.2
 - IEC 61156-5 Category 6 standards
 - Conductors shall be 23 AWG
 - Construction with FEP/polyolefin (CMP)

- Plenum – NFPA 262 and CSA FT-6
- PoE compliance: Meets IEEE 802.3af and IEEE 802.3at for PoE applications
- Cable diameter: 0.203 in. (5.2mm) nominal
- Color Blue

4. Equipment Outlet Copper Connectors (Jacks)

a. Copper Connectors shall have the following attributes:

- Category 6/Class E, 8-position, UTP jack module shall terminate 4-pair, 22 – 26 AWG
- 100-ohm unshielded twisted pair cable and shall not require use of a punchdown tool
- PoE & PoH compliance: Rated for 2500 cycles with IEEE 802.3af / 802.3at and proposed 802.3bt type 3 and type 4. Supports Power over HDBaseT up to 100 watts
- Operating Temperature: -10°C to 65°C (14°F to 149°F)
- Wire cap compatible with 22 – 26 AWG solid or stranded cable with conductor insulation diameters of 0.060 in. max. and overall cable O.D. 0.200 in. to 0.330 in
- Color: Blue for work station and end-point devices such as printer or others
- Color: Yellow for Security cameras and related devices

5. Equipment Outlet Appliances – Faceplates

a. Faceplates shall have the following attributes:

- 2 ports decora
- Color White

6. Equipment Outlet Appliances – Surface Mount Boxes

a. Surface Mount Boxes shall have the following attributes:

- 2 ports
- Color White

7. Copper Horizontal Patch Panels (Distributor A)

a. Patch panels shall have the following attributes:

- 24 ports 1RU and 48 ports 2RU
- Modular accept Mini Com copper connectors
- Color Black



8. Copper Patch Cords – Work Area

- a. Copper patch cords shall have the following attributes:
 - Category 6, 24 AWG UTP patch cord with TX6™ Modular Plugs on each end.
 - Color Blue for workstation and other end-point devices
 - Color Yellow for Security cameras and other related devices

9. Copper Patch Cords – Telecom Room

- a. Copper patch cords shall have the following attributes:
 - Category 6, 28 AWG UTP patch cord with TX6-28™ Modular Plugs on each end.
 - Color blue for Workstation and other end-point devices
 - Color Yellow for Security cameras and other related devices

B. Cabling Subsystem 2 – Intrabuilding (Within Building) Fiber

1. See Appendix A for Part Numbers

2. Installation Guidelines (Applies to all Fiber Trunks)

- a. Fiber terminations shall be done according to recommendations of TIA, manufacturer's requirements, and accepted industry best practices.
- b. Fiber optic cabling system additions and upgrades to existing facilities (Brownfield) shall match the fiber type (OM/OS designation) of the system to which it is being installed. Contractor shall under no circumstances mix different OM/OS classes of cable or termination devices (connectors) within the same channel unless specifically instructed to do so within the project specific documentation.
- c. When installing fiber cable, Contractor shall maintain a minimum bend radius of 20 times the outer diameter of the cable when it is under load (being pulled).
- d. Fiber service loops shall be stored to maintain a minimum bend radius of 10 times the outer diameter of the cable.
- e. Optical fiber shall only be pulled using its internal strength member in conjunction with a properly rated multi-weave mesh grip and swivel pulling eye.
- f. All unjacketed fiber shall be contained within appropriate fiber enclosures. Exposed tight-buffered, fan-out or loose-tube strands will not be tolerated and shall be remedied at Contractor's expense.
- g. Direct connection of terminated fiber backbone links to equipment is not allowed. All fiber connections shall go through a fiber enclosure interconnect and connect to active equipment via fiber jumpers.
- h. Contractor shall perform fiber testing of all strands according to guidelines in the "Testing and Acceptance" section of this document.



- i. Service loop (slack) in telecommunications rooms shall be at least 3 meters. Consult project documentation for length of service loops and storage method within a specific telecom room or space.
- j. Slack shall be stored per manufacturer instructions inside the enclosure, or stored outside the enclosure using appliances built for that purpose. Consult project documentation for details on storage of service loops.
- k. Fiber pulls using multiple pull points shall use the “figure-8” technique any time excess cabling is piled on the floor as slack to supply the next pull-point.
- l. Cable shall be rolled off the spinning cable reel, not pulled off the end.
- m. During all fiber cable pulls Contractor shall have one person at each end of the pull to ensure proper cable pay out and pile up without damage to the fiber.
- n. Fiber backbone cables shall be installed separately from horizontal distribution cables. Under no circumstances may copper and fiber cables be pulled in common bundles.
- o. In pathways containing both fiber and copper cables, the fiber cable must either be of armored construction, or segregated in innerduct.
- p. Where cables are housed in sleeves or conduits, the backbone and horizontal cables shall be installed in separate conduits or the fiber segregated in separate innerduct within the conduits.
- q. Fiber shall be segregated within racks and patching systems unless instructed otherwise in the project documentation.
- r. Where possible fiber enclosures shall be mounted at the top of equipment racks and the fiber cable kept separate from copper cable.
- s. Contractor shall inspect fiber end faces with a fiber scope and clean the connectors (if needed) whenever plugging in a fiber connector.

3. Fiber Between Telecom Rooms

- a. Backbone fiber cable between telecoms rooms on the same floor within building shall have the following attributes:
 - 9um OS2 Singlemode
 - Minimum 12 Fiber Indoor Distribution Cable
 - Plenum (OFNP), 900um Buffered Fibers

4. Fiber Connectors

- a. Intrabuilding fiber connectors shall have the following attributes:
 - LC Cam-Style OptiCam® Connectors
 - 9/125µm OS1/OS2
 - Ferrule type: Zirconia ceramic with a pre-polished fiber stub



- Insertion loss: Ceramic: 0.3dB average (multimode and singlemode)
- Fiber cable size: 1.6mm – 2.0mm and 3.0mm jacketed cable with optional boots

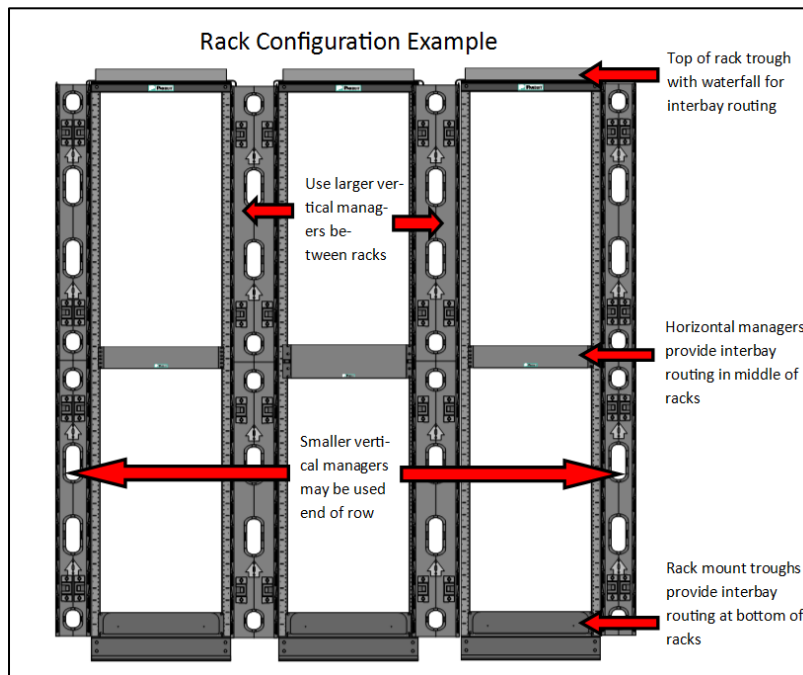
5. Fiber Enclosures

- a. Fiber enclosures shall have the following attributes:
 - Rack mount fiber enclosures shall house, organize, manage and protect fiber optic cable, terminations, splices, connectors and patch cords.
 - Enclosure shall accommodate all Panduit trunk cables, connectors, patch cords, fiber adapter panels (FAP) and fiber mount panels (FMP)
 - Fiber optic enclosures shall be constructed of steel material.
 - Molded front and back doors shall be removable for cabling and connector installation
 - 1 RU and 2 RU enclosures shall provide full front and rear access with a drawer that slides forward and backward.
- b. Fiber Adapter Panels shall have the following attributes:
 - Zirconia ceramic: OS1/OS2 singlemode adapters.
 - Snap quickly into Opticom® Fiber Adapter Patch Panels and Enclosures
- c. Fiber patch cords (jumpers) for shall have the following attributes:
 - SINGLEMODE
 - 1.6mm DUPLEX LC/LC
 - STANDARD IL

C. Racks, Cabinets, and Cable Management

1. See Appendix A for Part Numbers
2. Installation Guidelines
 - a. Racks shall be securely attached to the concrete floor using appropriate mounting hardware.
 - b. All racks shall be grounded to the telecommunications ground bus bar in accordance with cited standards the bonding and grounding section of this document.
 - c. Rack mount screws (#12-24) not used for installing fiber panels and other hardware shall be bagged and left with the rack upon completion of the installation
 - d. In telecommunications rooms with multi-bay rack rows, Contractor is responsible to include in design interbay routing pathways at the top, middle, and bottom of each rack to provide efficient and neat patch routing between any two points within rack rows.

- e. See the 2-post rack configuration example below for general guidelines for pathways between ganged racks:



- f. For bottom-of-rack interbay routing where cable quantities exceed capacity of interbay troughs, Contractor should substitute 4RU troughs.
- g. All racks shall be outfitted with a vertical grounding busbar along one rail, with all equipment bonded to ground according to the Bonding and Grounding Standards cited in this document. See Bonding and Grounding section of this document for details.
- h. Cabinets should be positioned to create aisle widths able to accommodate the movement and installation of the largest equipment anticipated.
- i. Minimum aisle width is 3 feet clearance in the front of the cabinet and not less than 2 feet of clearance in the rear. Consult project documentation for clearance requirements on a specific job.
- j. Cabinets shall be secured to the building structures according to the manufacturer's instructions and in compliance with applicable codes, standards, and the requirements of the local AHJ. Please also refer to project-specific documentation as appropriate.
- k. Racks and cabinets shall be individually electrically bonded to the communications earthing system according to the manufacturer's instructions and in compliance all applicable standards, codes and the requirements of the local AHJ.
- l. All cabinets shall be clearly identified at both the top and bottom of the in both the front and back of each cabinet with a large label (not less than 1" in height). Labels must be visible with the cabinet doors open or closed.



- m. Empty horizontal spaces in cabinets in equipment rooms may be blanked with panels or blanking shades to facilitate hot/cold aisle cooling strategies. Consult project documentation for blanking requirements.
- n. Cable entrances in tops of cabinets shall be sealed using preinstalled brushes or using the appropriate sized Panduit cool boot seals.

3. Two-Post Communications Racks

- a. Two-post communications racks shall have the following properties:
 - 16 gage steel, black powder coat finish
 - #12-24 threaded equipment mounting rails
 - 84.0"H x 20.3"W x 3"D, 45 RU
- b. Four-post communications racks shall have the following properties:
 - 16 gage steel, black powder coat finish
 - #12-24 threaded equipment mounting rails
 - 84.0"H x 20.3"W x 30.0"D, 45 RU

4. Rack-mounted Cable Management – Vertical Managers

- a. Contractor shall size vertical cable managers to represent not more than 25% fill by manufacturer tables based on worst cast density estimates.
- b. Contractor shall use larger vertical cable managers between racks as described elsewhere in this section.
- c. Rack-mounted cable management – vertical managers shall have the following properties:
 - The vertical cable manager shall consist of a metal backbone with cable management fingers that align with EIA rack spacing
 - The fingers shall be molded out of plastic and provide integral bend radius control throughout the entire length.
 - The backbone shall have pass through holes for front to back cabling, with the option to blank off with a plug
 - The manager shall accept a metal, hinged, push-to-close door that can open to the right or left.
 - The door support brackets shall be integrated into the manager with no assembly required

5. Rack-mounted Cable Management – Horizontal Managers

- a. Contractor shall size horizontal cable managers to represent not more than 25% fill by manufacturer tables based on worst cast density estimates.

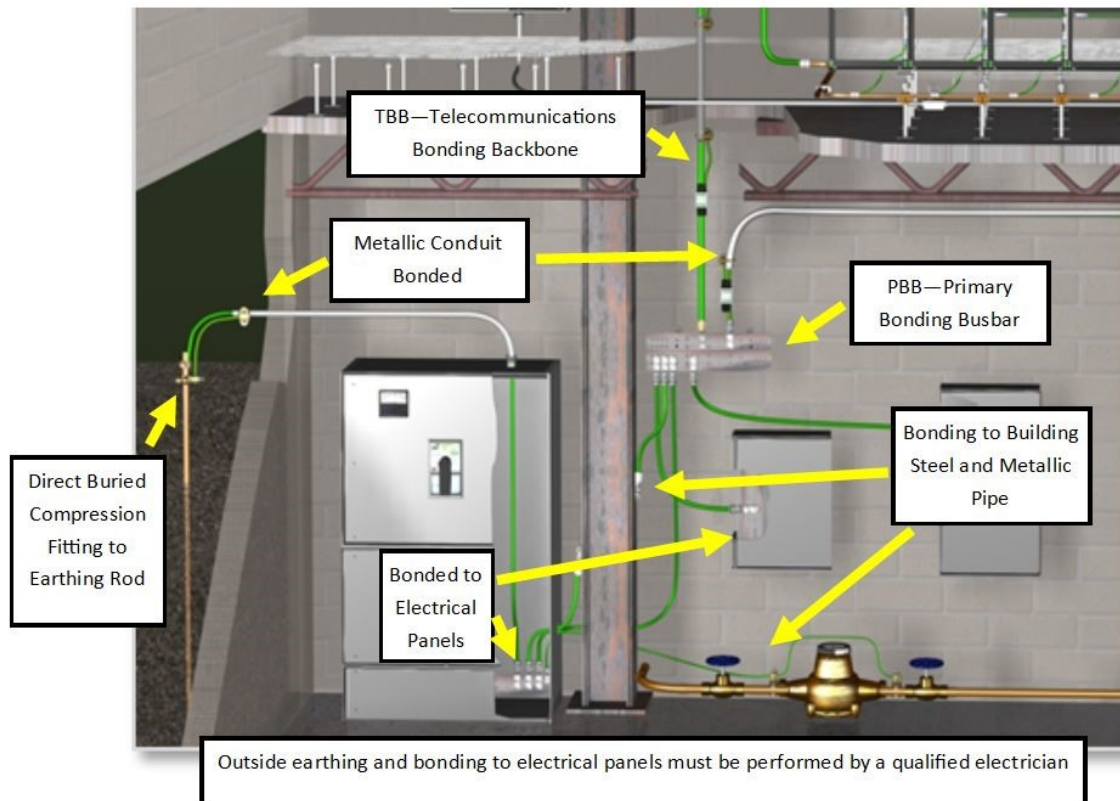


- b. Rack-mounted cable management – horizontal managers shall have the following properties:
 - The high capacity horizontal cable managers shall be capable of managing high performance cable on the front and rear of any 19" EIA rack
 - Inset fingers Fingers slope inward offering greater access to network cabling for easier moves, adds, and changes
 - Available in 1RU, 2RU, 3RU and 4RU

D. Communications Grounding Network

1. See Appendix A for Part Numbers
2. Installation Guidelines
 - a. Contractor is responsible for bonding to ground all newly placed equipment and installed racks or cabinets per the TIA Standards.
 - b. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. entering or residing in the entrance facility or distributor (telecom) rooms shall be grounded to the respective PBB (Primary Bonding Busbar otherwise known as TMGB – Telecommunications Main Grounding Busbar) or SBB (Secondary Bonding Busbar otherwise known as TGB – Telecommunication Grounding Busbar) using a minimum #6 AWG stranded copper bonding conductor and compression connectors.
 - c. Metallic panels attached to the rack or cabinet shall be bonded to the rack or cabinet using a green thread forming screw.
 - d. The copper conductor size shall be upgraded based on the largest power conductor feeding any rack-mount equipment.
 - e. All jacketed wires used for telecommunications grounding purposes should be identified with green or green with yellow stripe insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape.
 - f. All cables and busbars shall be identified and labeled in accordance with the labeling standards cited in the Regulatory References section of this specification.
 - g. The TBB (Telecommunications Bonding Backbone) shall adhere to the recommendations of the ANSI/TIA grounding and bonding standards cited in the Regulatory References section of this document and shall be installed in accordance with cited standards and best industry practices.
 - h. Installation and termination of the main bonding conductor to the building service entrance ground shall be performed by a licensed electrical contractor.
3. Entrance Room

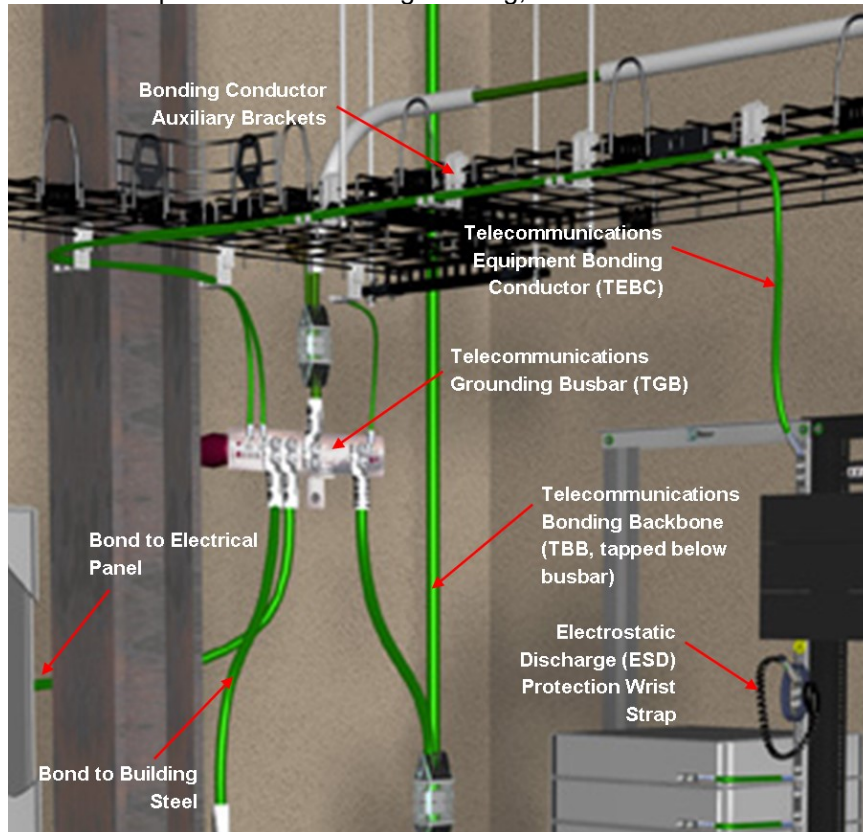
- a. The following figure illustrates the grounding in an Entrance Room.



4. Distributor (Telecommunications) Rooms

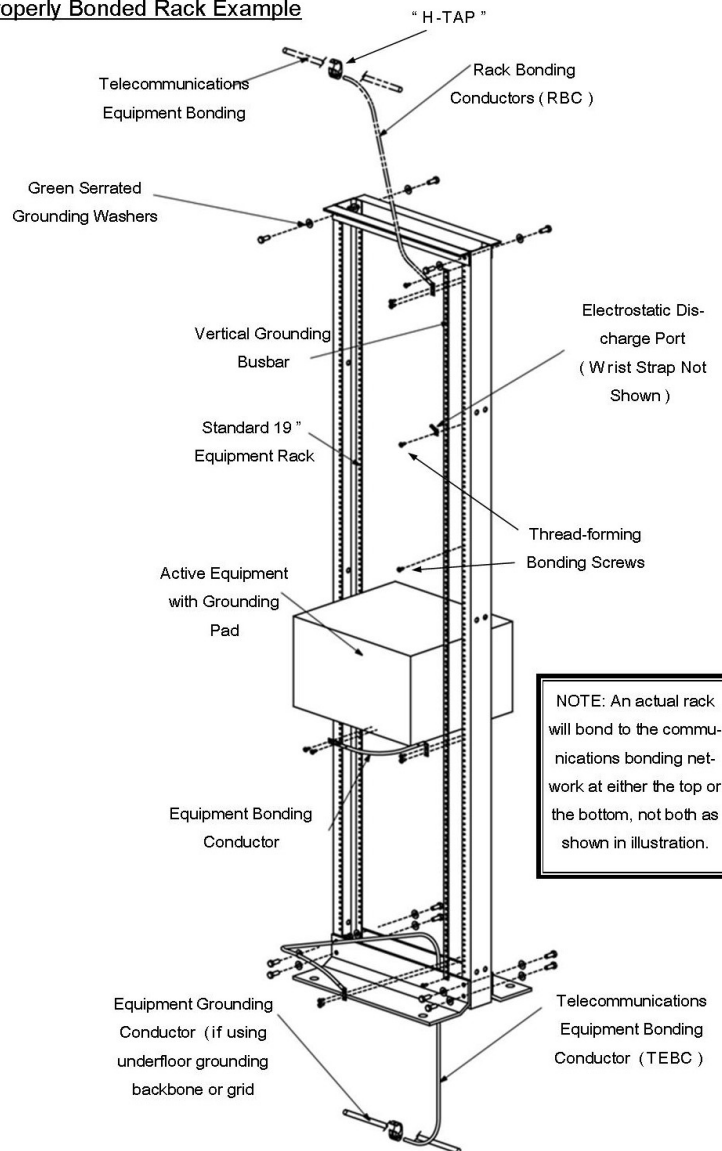
- Within the telecommunications rooms and data centers all pathways and racks shall be grounded and bonded as indicated in the diagram below.
- Contractor is responsible for properly grounding all network equipment, racks and cabinets and bonding them to the wall mounted busbars as described in the TIA 607 series of standards.
- All newly installed racks and cabinets shall have installed a Panduit vertical strip mounted along one equipment rail to serve as a clean, low-resistance bonding place for equipment grounding jumpers used to bond equipment such as chassis switches, that come equipped with a designated grounding pad, back to the rack.
- Smaller equipment without an integrated grounding pad shall be bonded to the vertical busbar through the use of a thread-forming grounding screw that is anodized green and includes serrations under the head to cut through oxidation or paint on the equipment flange.
- Larger equipment (chassis switches) with a designated grounding terminal shall be bonded to the vertical busbar with an EBC (equipment bonding conductor) kit built to that purpose.

- f. Contractor shall take care to clean (wire brush, Scotch Brite pads) any metallic surface to be bonded down to bare metal and apply a film of anti-oxidation paste to the surfaces prior to effecting the bond.
- g. All bonding lugs on racks and busbars shall be of two-hole irreversible compression type. Mechanical lugs and single-hole lugs will not be accepted and shall be removed and replaced at Contractor's expense.
- h. Every rack or cabinet shall have an individual bonding conductor into the grounding network, serially connecting (daisy-chaining) of racks is expressly forbidden and will not be accepted.
- i. Rack Bonding Conductors (RBC) may tap into an overhead or underfloor aisle ground, or may run to the wall-mounted grounding busbar in smaller Telecommunications rooms containing 5 racks or less.
- j. A minimum of every other rack or cabinet shall be outfitted with a properly installed and bonded ESD (electro-static discharge) port along with a wrist strap and lead to be used by any technicians servicing network equipment. On four post racks and cabinets these ESC ports and straps shall be provided on front and back to be accessible and able to reach any active equipment needing servicing.
- k. Armored cables shall be properly bonded to the earthing system on both ends with a kit built to that purpose.
- l. For an example of telecom room grounding, refer to the illustration that follows:

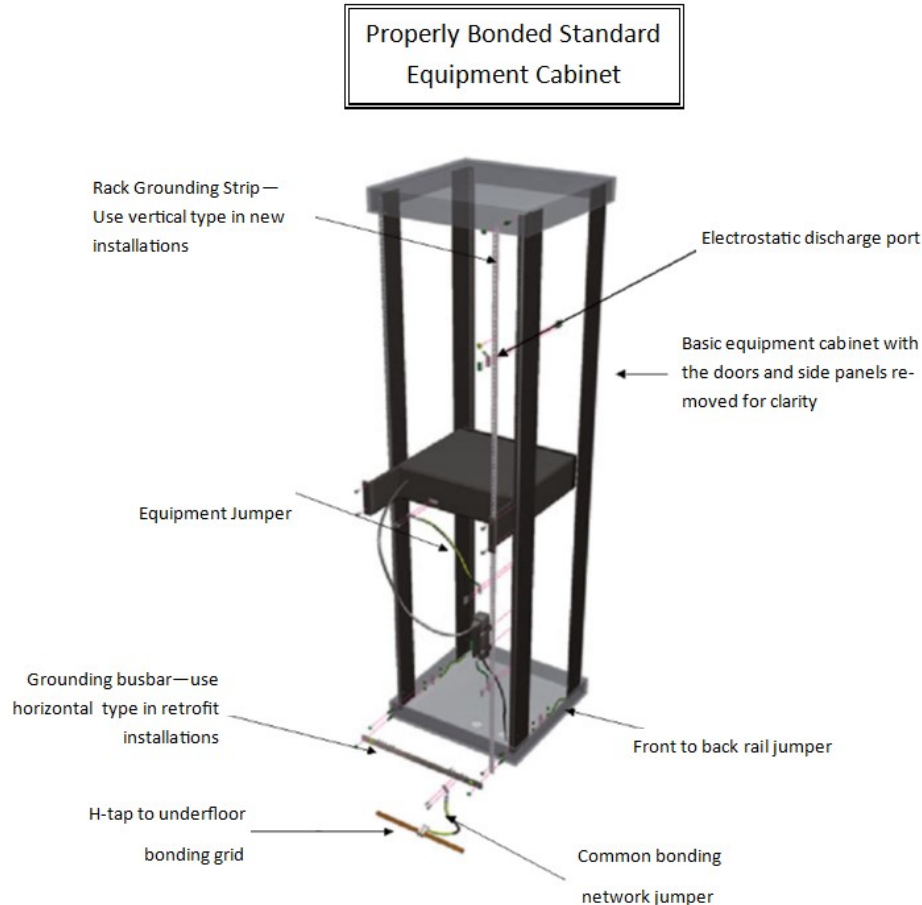


- m. For an example of proper rack grounding, see the illustration below:

Properly Bonded Rack Example



- n. For an example of proper cabinet grounding, see the illustration below:



E. Network Infrastructure Labeling

1. See Appendix A for Part Numbers
2. Installation Guidelines
 - a. Questions or comments regarding labeling strategies at Peel Regional Police may be sent to Brad Masterson C.E.T. at Peel Regional Police.
 - b. Contractor shall, wherever possible, pre-print labels using Panduit Easy-Mark software and desktop printer.
 - c. The Panduit PanTher LS8E (or equivalent) hand-held thermal transfer printer shall be used onsite to print labels that were unanticipated, or that become damaged in application.
 - d. Labels shall be legible and placed in a position that insures ease of visibility.
 - e. All newly installed cables shall be labeled within 3 inches at both ends using a permanent self-laminating cable labels built to that purpose and designed to outlast the cable to which they attach.



- f. Contractor is responsible for ordering the correct self-laminating cable labels appropriate to the cable outer diameter.
- g. Each end of the cable shall have the same label.
- h. The same identifier shall be contained in one line and repeated to be visible from all sides without having to rotate the cable to read it.
- i. All labels shall be machine printed, bold font and centered at the highest point that can fit all characters legibly. Hand written labels will not be accepted and shall be remedied at Contractor's expense.
- j. This labeling strategy shall, at a minimum, clearly identify all components of the system: racks, cables, panels and outlets, grounding, pathways and spaces like telecommunications rooms.
- k. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure.
- l. All test documents shall accurately reflect the labeling scheme.
- m. Outlet, patch panel and wiring block labels shall be installed on, or in, the space provided on the device.
- n. Machine-generated labels shall be installed behind the clear lens or cover on any device that provides such an option.
- o. All labels will be permanently affixed to installed cables, patch panels, racks, cabinets, and enclosures.
- p. Conduit shall be marked indicating the identification of the cable within.
- q. Consult project specific documentation for the labeling scheme for a particular project.

3. Communication and Systems Elements Requiring Labeling

- a. The following communications elements shall be labeled:
 - Equipment outlets – faceplates
 - Equipment outlets – surface boxes
 - Copper horizontal cable
 - Copper patch panels
 - Communications patch cords
 - Zone boxes (MUTOAs or consolidation points)
 - Equipment racks
 - Communications cabinets
 - Telecommunications rooms – (closets)
 - Fiber backbone cable
 - Fiber enclosures
 - Fiber optic patch cords (jumpers)

4. Other Systems Requiring Labeling

- a. The following systems shall be labeled:
 - Communications conduit and pathways
 - Firestopping locations
 - Grounding busbars
 - Grounding backbone

5. Labeling Records

- a. Contractor shall provide a spreadsheet showing link records that list all labeled elements, including jack numbers, patch ports and telecom space identifiers.
- b. All labeling information shall be recorded on the as-built drawings, and cross-reference sheets as described in project documentation.

F. Cabling Accessories

1. Refer to Appendix A for Part Numbers

2. Physical Security Devices

- a. Some portions of Peel Regional Police networks require additional physical security devices. These take three forms:
 - Devices that block-out copper and fiber ports in patch fields and faceplates that require a special tool for removal.
 - Devices that lock-in copper patch cords and require a special tool for removal of those patch cords.
 - Devices that temporarily or permanently block USB ports on laptops and computers.
- b. Areas where such devices are required will be called out in the project documentation.

G. Rack Power Distribution Units

1. Vertical Intelligent Power Distribution Unit

a. Plug Type

- i. NEMA L21-30P

b. Receptacle Type

- i. IEC C13, IEC C19, NEMA 5-20R

c. Plug & Play Sensors:



- i. Digital sensors not only allow for multiple sensors on the same bus; but also identify themselves to the controller to simplify setup & commissioning.
- d. Operating Temperature:
 - i. 60°C ambient at full load for operational reliability in high temperature areas
- e. 1GB Ethernet:
 - i. The 1G controller is compatible with the new Data Center Network switches being deployed - reducing special network configurations/resources required to support the iPDU

<END OF SECTION>

III. Testing and Acceptance

A. General

1. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions.
2. All copper pairs or optical fibers of each installed cable shall be tested and verified prior to system acceptance.
3. Any defect in the cabling system performance or installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors or fibers in all cables installed.
4. All cables shall be tested in accordance with this document, the ANSI/TIA Standards, the Panduit warranty guidelines, and industry best practice. If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.

B. Copper Channel Testing

1. All twisted-pair copper cable links shall be tested for compliance to the requirements in ANSI/TIA for the appropriate Category of cabling installed using a test unit meeting a minimum IEC IIIe level of accuracy.
2. All testers used must have been factory calibrated by the manufacturer within one year of use or according to factory calibration recommendations, whichever is more stringent.
3. Contractor shall set references according to manufacturer's recommendation prior to each day's testing and reset references anytime the tester unit shuts down due to inactivity.
4. Resetting references shall also be done whenever test results become sporadic or the tester demonstrates a consistent deterioration of test measurement performance.
5. Testing of any links that include field-terminated plugs shall follow the procedure outlined in Panduit document #PN614, available from the Panduit representative, or downloadable from www.panduit.com.

C. Fiber Testing

1. All installed fiber shall be tested for link-loss in accordance with ANSI/TIA standards cited in this document.
2. For horizontal cabling system using multimode optical fiber, attenuation should be measured in at least one direction, according to customer requirements, at either 850 nm (nanometer) or 1300 nm using an appropriate light source and power meter.
3. Fiber testing must be performed using reference grade test leads. Test results from tests using test leads that are not reference grade will not be accepted and must be retested at the Contractor's expense.

4. Backbone multimode fiber cabling should be tested at both 850 nm and 1300 nm (or 1310 and 1550 nm for singlemode) in both directions.
5. Test set-up and performance shall be conducted in accordance the Method B (One Jumper Method).
6. Where links are combined to complete a circuit between devices, the Contractor shall test each link from end to end to ensure the performance of the system. Only basic link loss testing (OLTS) is required, not OTDR testing. OTDR testing is optional as a secondary test method but, by itself, is not a valid means by which links or channels can be certified.
7. The contractor can optionally install Panduit patch cords to complete the circuit and then test the entire channel, though Panduit currently issues only a link warranty, not a channel warranty. The test method shall be the same used for the test described above.
8. Attenuation testing shall be performed with a stable launch condition using two-meter jumpers to attach the test equipment to the cable plant. The light source shall be left in place after calibration and the power meter moved to the far end to take measurements.
9. Qualification of the reference cords shall be completed after each reference and the insertion loss of the reference connectors shall be saved and presented as part of the testing documentation.
10. Panduit highly recommends utilizing the practice of individual end face inspection, cleaning if necessary then re-inspection before connecting any fiber end faces together in a link. This complete process should be performed BEFORE any OLTS testing takes place. For further process clarification, refer to Panduit Visual Inspection and Cleaning Best Practices #FS061.
11. Contractor shall further inspect, clean and re-inspect the Reference Lead connector end faces anytime testing shows inconsistent results. If this does not correct accuracy, contractor shall re-certify (test) the reference leads and replace them if necessary.

D. System Documentation

1. Documentation During Installation Phases
 - a. Peel Regional Police will provide floor plans in paper and electronic (DWG, AutoCAD) formats on which as-built construction information can be added. These documents will be modified accordingly by the telecommunications contractor to denote as-built information and returned to Peel Regional Police.
 - b. Documentation shall be submitted within ten (10) working days of the completion of each testing phase. This is inclusive of all test results and draft as-built drawings. The Contractor shall annotate the base drawings and return a hard copy (same plot size as originals) and electronic (AutoCAD) form.
 - c. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

- d. It is mandatory that the test results from each phase be delivered in the tester native format. At the request of the Peel Regional Police project lead, the telecommunications contractor shall provide copies of the original test results.
 - e. The As-Built drawings are to include cable routes and outlet locations. Their sequential number as defined elsewhere in this document shall identify outlet locations. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided.
2. Documentation at Project Completion
 - a. A final, complete set of all documentation shall be provided in electronic format within three weeks after the completion of the project.
 - b. The testing results shall also be provided to Panduit in raw data format (native tester format), along with all associated warranty paperwork for evaluation and issuance of warranty.
 - c. All documentation shall be clearly marked with the words "Project Test Documentation" plus the project name, and the date of completion.
 - d. The test documentation shall detail the test methods used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.
 - e. The test results shall further include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s).
 - f. The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document.
3. Unless the manufacturer specifies a more frequent calibration cycle, an annual factory calibration is mandatory on all test equipment used for the installation.
4. The project lead from Peel Regional Police may request that a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above.
5. If retest findings contradict the documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by the Project Lead, including a 100% re-test. This re-test shall be at no additional cost to Peel Regional Police.

E. Inspection and Acceptance

1. During Installation
 - a. The Peel Regional Police Project Lead will make periodic inspection of the project in progress.
 - b. One inspection will be performed at the conclusion of cable pulling, prior to closing of the drop ceiling, to inspect the method of cable routing and support, and the firestopping of penetrations.

- c. A second inspection will be performed at completion of cable termination to validate that cables were dressed and terminated in accordance with ANSI/TIA recommendations for jacket removal and pair untwist, compliance with Manufacturer's minimum bend radius, and that cable ends are dressed neatly and orderly.

2. Final Inspection

- a. Upon completion of the project, the Peel Regional Police Project Lead will perform a final inspection of the installed cabling system with the Contractor's project foreman.
- b. The final inspection will be performed to validate that all horizontal and backbone cables were installed as defined in the drawing package, and that the installation meets the technical performance and aesthetic expectations of the Peel Regional Police.

3. Live System Performance Verification

- a. During the three-week period between final inspection and delivery of the test and as-built documentation, Peel Regional Police will activate and validate operation of the cabling system.

4. Final Acceptance

- a. Final acceptance is possible after completion of the installation, in-progress and final inspections, receipt of the test results, receipt of the as-built documentation, and receipt of the manufacturer's system performance warranty and successful performance of the system for a three-week period.
- b. Acceptance of the installed system by Peel Regional Police must be in writing to be valid

F. Post Installation Maintenance Agreement

- 1. The Contractor shall furnish an hourly rate with the proposal submittal which shall be valid for a period of one year from the date of acceptance.
- 2. This rate will be used when cabling support is required to do moves, adds, and changes (MACs) to the system.
- 3. MACs shall not void the Contractor's nor Manufacturer's warranty.



IV. Project Scope of work

A. Scope of Work

Here place general synopsis for scope of work

1. Requirements

a. Attribute

b. Attribute

<END OF SECTION>



V. Appendix A – Materials List

Product Category	Part Number	Manufacturer	Part Description
Copper Cabling Products			
	PUP6C04BU-F	Panduit	Category 6 copper cable, 4-pair, 23AWG, U/UTP, CMP, Blue 1000 feet in a carton.
	CJ688TGBU	Panduit	The Category 6, RJ45, 8-position, 8-wire, UTP Mini-Com® universal jack module has TG-style termination and is blue
	CJ688TGYL	Panduit	Category 6, RJ45, 8-position, 8-wire universal module. Yellow.
	CFG2WH	Panduit	Mini Com rectangular adapter, mounts behind standard GFCI faceplates, accepts two Mini-Com® Module, White.
	CBX2WH-AY	Panduit	Mini-Com® surface mount box accepts two Mini-Com® Modules. Includes built-in removable blank. Supplied with mounting screws, adhesive backing and cable tie. White.
	CPPL48WBLY	Panduit	Mini Com 48-port modular patch panel with faceplates in black, with label and label covers, (2RU).
	CPPL24WBLY	Panduit	Mini Com 24-port modular patch panel with faceplates in black, with label and label covers, (1RU).
	UTPSP10BUY	Panduit	Category 6, UTP patch cord with TX6™ PLUS Modular Plugs on each end, 10 ft. Work Station
	UTP28SP7BU	Panduit	Category 6 Performance, 28 AWG UTP patch cord with TX6™ Modular Plugs on each end. Blue, 7 ft. Telecom room
	UTPSP1YLY	Panduit	Category 6, UTP patch cord with TX6™ PLUS Modular Plugs on each end. Yellow, 1 ft. Security camera
	UTP28SP7YL	Panduit	Category 6 Performance, 28 AWG UTP patch cord with TX6™ Modular Plugs on each end. Yellow, 7 ft. Telecom room
Fiber Cabling Products			
	FSDP912Y	Panduit	9um OS2 12 Fiber Indoor Distribution Cable, Plenum (OFNP), 900um Buffered Fibers



Product Category	Part Number	Manufacturer	Part Description
	FRME1U	Panduit	Rack Mount Fiber Enclosure ensures network reliability by housing, organizing, managing and protecting up to 72 fiber optic cable, terminations, splices, connectors and patch cords using up to 3 FAP or FMP adapter panels or FOSM splice modules.
	FAP6WBUDLCZ	Panduit	LC OS1/OS2 FAP loaded with six LC duplex singlemode fiber optic adapters (Blue) with zirconia ceramic split sleeves.
	FLCSSCBUY	Panduit	Pre-Polished LC Simplex OptiCam Style OS2 Connector, Natural Housing with 900um Blue Boot
	F92ERLNLNSNM003	Panduit	OS2 Singlemode Riser (OFNR) LC Duplex patch cord
Racks, Cabinets, and Cable Management			
	R2P	Panduit	The Panduit Two-post Rack System provides a reliable foundation for mounting telecommunication and data center equipment. Aluminum, 45 RU, #12-24 Threaded Mounting Holes, Black, 1pc + hardware kit and paint piercing bonding kit.
	PR2VFD06	Panduit	Patchrunner® 2 Vertical Cable Manager combines high-density capability and versatility, freeing up valuable floor space. The fully pre-assembled manager lowers overall costs and sets the standard for the entire cable management industry. Single-sided, Steel, 45RU, Black, 1pc, Includes one full-length metal, dual-hinging, push-to-close door.
		Panduit	
		Panduit	
Bonding and Grounding			
	RGRB19U	Panduit	Grounding busbar, 19" (483mm) length, tin-plated, twenty holes arranged for flexibility in mounting with twenty #12-24 x 1/2" hex head screws installed, mounting hole sets have 5/8" (15.9mm) spacing, provided with two each #12-24 x 1/2", M6 x 12mm thread-forming screws, and two #12 flat washers for mounting.
	RGTBSG-C	Panduit	Green thread-forming bonding screw, #12-24 x 1/2".



Product Category	Part Number	Manufacturer	Part Description
	RGCBNJ660P22	Panduit	#6 AWG (16mm ²) jumper, 60 (1.52m) length, 45° bent lug on grounding strip side, provided with .16 oz. (5cc) of antioxidant, two each #12-24 x 1/2, M6 x 12mm, #10-32 x 1/2 and M5 x 12mm thread-forming screws and a copper compression HTAP
Network Labeling			
	Labels	Panduit	See Panduit web site for options click here
Rack Power Distribution Unit			
	P30D02M	Panduit	SmartZone™ G5 Monitored Input (MI Series) Rack PDU, 30 A 3-Phase, 120/208V, (18) C13, (6) C19 and (6) 5-20R receptacles, NEMA L21-30P plug and measures 68.898"L x 2.047"W x 2.1"D (1750.1mm x 50.8mm x 53.3mm). Color: Black

<END OF APPENDIX A>

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