

703 Don Mills Fire Alarm Replacement

Specifications

Project No.: 230231500

Issued for Tender

Issued Date: 2024.08.14

Division 01	General Requirements
01 11 00	Summary of Work
01 31 19	Project Meetings
01 33 00	Submittal Procedures
01 74 00	Cleaning
01 74 21	Construction, Demolition, Waste Management and Disposal
01 77 00	Grounding Primary
Division 02	Existing Conditions
02 41 19	Selective Interior Demolition
Division 07	Thermal and Moisture Protection
07 84 00	Fire Stopping
07 92 00	Joint Sealants
Division 08	Openings
08 11 00	Metal Doors and Frames
08 14 16	Flush Wood Doors
08 71 00	Door Hardware
Division 09	Finishes
09 21 16	Gypsum Board Assemblies
09 22 16	Non-Structural Metal Framing
09 51 13	Acoustical Panel Ceilings
09 65 19	Resilient Tile Flooring
09 91 23	Interior Painting
Division 21	Fire Suppression
21 08 00	Integrated Systems Testing
Division 28	Electronic Safety and Security
28 46 00	Fire Detection and Alarm

END OF DOCUMENT

PART 1 - GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

1. In general, the Work of this Contract comprises general trades, mechanical, architectural, electrical, and fire alarm construction work for the installation of new addressable fire alarm systems and construction of a new CACF for the City of Toronto owned facility located at 703 Don Mills Road, Toronto, Ontario.
2. More specifically, the Contract Work is comprised the following items which are to be furnished, installed, tested, and commissioned by the Contractor:
 1. Installation of a new distributed two-stage addressable fire alarm system, complete with one way voice communication, and new graphic workstation.
 2. Installation of a new 2-hour rated fire alarm network in DCLC configuration.
 3. Installation of a new distributed antenna system (DAS), which is to be provided in lieu of the fire alarm systems emergency telephones.
 4. Installation of all new addressable initiating and supervisory field devices, conventional signaling devices.
 1. All new devices to be installed using new wiring, conduits, backboxes, junction boxes throughout the facility.
 5. All existing auxiliary systems and their functionality is to be on the new system, including:
 1. Elevators.
 2. Smoke Control Systems.
 3. Pre-Action Sprinkler Systems.
 4. Electromagnetic Locks.
 5. Access Control Systems
 6. Special suppression systems.
 6. Development of the building building's smoke control sequence. Documentation on the existing smoke control sequence being initiated by the building's fire alarm system is not known. The successful proponent must carry the base building fire alarm system contractor (Johnson Controls) to download and recreate the building smoke control system sequence.
 7. Construction of a new 1 hour rated central alarm and control facility (CACF), including the installation of new lighting and ventilation systems for the new CACF.
 8. Relocation of existing auxiliary system controls, including elevator controls, electromagnetic lock release and reset controls, to the new CACF.
 9. Construction of a new glass security barricade in the ground floor lobby.
 10. Demolition of all existing fire alarm system components, including but not limited to the control system, remote annunciator, all existing field devices.
 1. All existing fire alarm control equipment is to be handed over to the owner.

-
11. Repair of existing ceiling, wall, and other surface finishes that are modified as a result of the work under this contract.
 12. Verification, testing, commissioning, including Testing of Integrated Fire Protection and Life Safety Systems in accordance with CAN/ULC- S1001 for all work covered by the Contract.
 13. Warrant all labour and materials for this project for two-years. Warranty shall commence upon the date of system acceptance as deemed by the Consultant.

1.2 CONTRACT METHOD

1. Contract shall be Stipulated Sum, CCDC-2.

1.3 REFERENCE STANDARDS

1. All work shall conform to the applicable reference codes and standards herein.
2. Underwriters Laboratory of Canada (ULC)
 1. CAN/ULC-S1001-11 Standard for the Integrated Systems Testing of Fire Protection and Life Safety Systems.
 2. CAN/ULC-S524-14, Installation of Fire Alarm Systems.
 3. CAN/ULC-S537-13, Verification of Fire Alarm Systems.
3. National Fire Prevention Association (NFPA)
 1. NFPA 13-2013, Standard for the Installation of Sprinkler Systems.
 2. NFPA 14-2013, Standard for the Standpipe and Hose Systems.
 3. NFPA 20-2016, Standard for the Installation of Stationary Pumps for Fire Protection.
 4. NFPA 25-2014, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.
4. Government of Ontario Regulations
 1. O. Reg. 332/12, 2012 Ontario Building Code (OBC), as amended to date.
 2. O. Reg. 213/07, 2007 Ontario Fire Code (OFC), as amended to date.

1.4 WORK BY OTHERS

1. Co-operate with other Contractors in carrying out their respective works and carry out instructions from Consultant.
2. Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Consultant, in writing, any defects which may interfere with proper execution of Work.

1.5 WORK SEQUENCE

1. Construct Work in stages to accommodate Owner's continued use of existing premises during construction. Portions of facility will remain occupied 24/7 throughout the construction period. All work is to be carried out outside of core business hours, unless written authorization is received from the owner.
2. Co-ordinate progress schedule with Owner during construction. Provide a minimum six (6) week look ahead at all times.

3. The fire alarm system is to remain functional at all times during the construction period. In the event that the fire alarm system is not fully functional, the contractor is required to provide fire watch using bonded security.
4. The proposed sequence of work shall be as follows:
 1. The construction of the new CACF shall take precedence above all at the start of the construction.
 2. In parallel to the construction of the CACF, build new equipment in permanent locations as indicated on the drawings.
 3. Conduct audible and record audible test results throughout the building with the exception of the 9th floor. Record all results on floor plans, clearly identifying the results and exact location of the readings. The audibility test shall form the base performance level for future audible testing which must be maintained or exceeded.
 4. Install the new mechanical penthouse network node (transponder) including 120 VAC power supply as indicated on the drawings. The penthouse transponder will serve floors six through the mechanical penthouse.
 5. The work on the 9th floor shall be carefully coordinated with the Owner. A 6-day period shall be provided in the fall of 2024, during which initial installation, verification, testing and demolition work may be completed. The remainder of the working including a final Integrated Systems Test and Acceptance test shall be conducted during the scheduled Spring 2025 shut-down period, exact date to be determined. No further work shall be permitted to take place in these areas outside of the shut-down periods.
6. Outside of the 9th floor, the following process shall be carried out:
 1. Install new addressable field devices, isolators and backboxes on a floor-by-floor basis for areas served by the transponder.
 2. Install new conventional signaling devices on a floor-by-floor basis for areas served by the transponder.
 3. Install new field wiring and conduit from the penthouse transponder to the new devices.
 4. Install new interconnect wiring and conduit from the new transponder to the old fire alarm system. Any alarm initiated by portions of the newly installed system shall trigger a relay and result in an alarm on the old system, until the system is fully transferred.
 5. Conduct a CAN/ULC-S537 partial verification of the completed floor installation of a floor-by-floor basis. Prepare software comparison reports at each stage of verification in accordance with Chapter 7 "System Modifications". Summarize the report outcomes clearly identifying changes to the system programming in plain language. Data dumps shall not be accepted.
 6. Following the successful verification of a floor, demolish all existing fire alarm devices, including conduits, backboxes, junction boxes, terminating at the old transponder. Repair all building finishes including but not limited to walls, ceilings, and floors, to match original condition. Fire stop all penetrations through rated assemblies with ULC listed fire stop systems.
 7. Following the successful transfer of all devices from the existing node to the new node, demolish the existing node and turn over the equipment to the Owner.
7. Following the construction of the CACF room, install the new graphic workstation, fire alarm control panel, voice-communication system, 120 VAC power and transfer existing auxiliary system controls (elevator, smoke control, electromagnetic lock release) to the CACF as shown on the drawings.
8. Install new 2-hour rated fire alarm riser between the penthouse and future CACF.
9. Install, test and commission the new DAS system.
10. Install new security gate as shown on the drawings, re-use existing glass barriers and stanchions where possible.
11. The CACF room transponder will serve the basement through the fifth floors. Follow the work sequence as described in 1.5.6. for the remaining floors.
12. Compile and submit all verification, testing, commissioning and software compare report summaries to the Consultant for review.

-
13. Coordinate and schedule the S1001 Integrated Systems Test, with the owner and consultant. Functional tests of all integrated systems installed under the project shall be carried out in accordance with the retro-integrated system testing requirements of CAN/ULC-S1001.
 14. Retest system as required until deficiencies are resolved.

1.6 CONTRACTOR USE OF PREMISES

1. Area of work will be occupied by multiple contractors. The Contractor shall coordinate their with other contractors on the premises and in conjunction with City of Toronto operations.
2. Restricted use of site until Substantial Performance.
3. Limit use of premises for Work, access and storage, to allow:
 1. Owner occupancy
 2. Work by other contractors, if required.
4. Co-ordinate use of premises under direction of Owner.
5. Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
6. Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
7. Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Consultant.
8. At completion of operations condition of existing work shall be equal to or better than that which existed before new work started.

1.7 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING FACILITIES

1. Execute work with least possible interference or disturbance to occupants, building operations, and normal use of premises. Arrange with Owner to facilitate execution of work.

1.8 EXISTING SERVICES

1. Notify, Owner and Consultant of intended interruption of services and obtain required permission.
2. Where Work involves connecting to existing services, give Owner and Consultant 14 days' notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by Owner with minimum disturbance to operations.
3. Establish location and extent of service lines in area of work before starting Work. Notify Owner and Consultant of findings.
4. Contractor to prepare, in consultation with the Consultant and Owner, a base building standard Method of Procedure (MOP) providing details of work on any system, shut-down, or tie-in for approval prior to performing the work.
5. Submit schedule to and obtain approval from Owner and Consultant for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

6. Provide temporary services when directed by Owner and/or Consultant to maintain critical building and tenant systems.
7. Where unknown services are encountered, immediately advise Owner and Consultant and confirm findings in writing.

1.9 DOCUMENTS REQUIRED

1. Maintain at job site, one copy each document as follows:
 1. Contract Drawings.
 2. Specifications.
 3. Addenda.
 4. Reviewed Shop Drawings.
 5. List of Outstanding Shop Drawings.
 6. Change Orders.
 7. Other Modifications to Contract.
 8. Field Test Reports.
 9. Copy of Approved Work Schedule.
 10. Health and Safety Plan and Other Safety Related Documents.
 11. Other documents as specified.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 NOT USED

END OF SECTION

PART 1 - GENERAL

1.1 ADMINISTRATIVE

1. Schedule and administer project meetings throughout the progress of the work.
2. Prepare agenda for meetings.
3. Distribute written notice of each meeting four days in advance of meeting date to Consultant and Owner.
4. Provide physical space and make arrangements for meetings. Meetings may be held virtually at the discretion of the owner. Virtual meetings to be held via Microsoft Teams or other similar medium acceptable to the Owner.
5. Preside at meetings.
6. Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
7. Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants and affected parties not in attendance.
8. Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETING

1. Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
2. Owner, Consultant, Contractor, major Subcontractors, field inspectors and supervisors shall be in attendance.
3. Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
4. Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
5. Agenda to include:
 1. Appointment of official representative of participants in the Work.
 2. Schedule of Work: - Bar (GANTT) Chart
 3. Schedule of Values: including detailed breakdown of work and materials per discipline. The schedule of values will be used as a basis for future progress draws.
 4. Schedule of submission of shop drawings and samples. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

5. Requirements for temporary facilities, site sign, offices, storage sheds, utilities, or hoarding.
6. Delivery schedule of specified equipment.
7. Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
8. Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
9. Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
10. Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
11. Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
12. Monthly progress claims, administrative procedures, photographs, hold backs.
13. Appointment of inspection and testing agencies or firms.
14. Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

1. Schedule bi-weekly progress meetings during the course of Work.
2. Prepare and provide weekly progress updates, or as needed/requested by the City.
3. Contractor, major Subcontractors involved in Work, Consultant and Owner shall be in attendance.
4. Notify parties minimum 5 days prior to meetings.
5. Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.
6. Agenda to include the following:
 1. Review, approval of minutes of previous meeting.
 2. Review of Work progress since previous meeting.
 3. Field observations, problems, conflicts.
 4. Problems which impede construction schedule.
 5. Review of off-site fabrication delivery schedules.
 6. Corrective measures and procedures to regain projected schedule.
 7. Revision to construction schedule.
 8. Progress schedule, during succeeding work period.
 9. Review submittal schedules: expedite as required.
 10. Maintenance of quality standards.
 11. Review proposed changes for effect on construction schedule and on completion date.
 12. Other business

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 NOT USED

END OF SECTION

PART 1 - GENERAL

1.1 ADMINISTRATIVE

1. Submit to Consultant submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
2. Do not proceed with Work affected by submittal until review is complete.
3. Present fire suppression shop drawings, product data, samples and mock-ups in Imperial units.
 1. All other product data shall be in Metric units.
 2. Where items or information is not produced in Metric units converted values are acceptable.
4. Review submittals prior to submission to Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
5. Notify Consultant and Owner, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
6. Verify field measurements and affected adjacent Work are coordinated.
7. Prepare and submit a schedule of values, including detailed breakdown of work per discipline, and milestones.
8. Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review of submittals.
9. Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant's review.
10. Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

1. Refer to CCDC 2 GC 3.8
2. The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
3. Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.

4. Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
5. Allow 5 days for Consultant's review of each submission.
6. Adjustments made on shop drawings by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.
7. Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of revisions other than those requested.
8. Accompany submissions with transmittal letter, in [duplicate], containing:
 1. Date.
 2. Project title and number.
 3. Contractor's name and address.
 4. Identification and quantity of each shop drawing, product data and sample.
 5. Other pertinent data.
9. Submissions include:
 1. Date and revision dates.
 2. Project title and number.
 3. Name and address of:
 1. Subcontractor.
 2. Supplier.
 3. Manufacturer.
 4. Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 5. Details of appropriate portions of Work as applicable:
 1. Fabrication.
 2. Layout, showing dimensions, including identified field dimensions, and clearances.
 3. Setting or erection details.
 4. Capacities.
 5. Performance characteristics.
 6. Standards.
 7. Operating weight.
 8. Wiring diagrams.
 9. Single line and schematic diagrams.
 10. Relationship to adjacent work.

10. After Consultant's review, distribute copies.
11. Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.
12. Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.
13. Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Consultant.
 1. Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 2. Testing must have been within 3 years of date of contract award for project.
14. Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Consultant.
 1. Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 2. Certificates must be dated after award of project contract complete with project name.
15. Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by Consultant.
 1. Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
16. Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Consultant
17. Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
18. Submit 6 copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Consultant. Also submit this document in electronic format.
19. Delete information not applicable to project.
20. Supplement standard information to provide details applicable to project.
21. If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
22. The review of shop drawings by the Consultant is for sole purpose of ascertaining conformance with general concept.

1. This review shall not mean that Consultant approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
2. Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 SAMPLES

1. Submit for review samples in as requested in respective specification Sections. Label samples with origin and intended use.
2. Deliver samples prepaid to site office.
3. Notify Owner and Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.
4. Where colour, pattern or texture is criterion, submit full range of samples.
5. Adjustments made on samples by Owner and/or Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Owner and Consultant prior to proceeding with Work.
6. Make changes in samples which Owner and/or Consultant may require, consistent with Contract Documents.
7. Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 PHOTOGRAPHIC DOCUMENTATION

1. Submit electronic and hard copy of colour digital photography in jpg format, high resolution monthly with progress statement.
2. Project identification: name and number of project and date of exposure indicated.
3. Frequency of photographic documentation: weekly or as directed by Consultant and/or Owner, and upon completion of: excavation, foundation, framing and services before concealment, as directed by Owner and/or Consultant.

1.5 CERTIFICATES AND TRANSCRIPTS

1. Immediately after award of Contract, submit WSIB.
2. Submit transcription of insurance immediately after award of Contract.
3. All personnel on this project shall be required to complete obtain security clearance. Submit security clearance information for Contractors and Sub-Contractors assigned to the project.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 NOT USED

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

1. Canadian Construction Documents Committee (CCDC): CCDC 2-2020, Stipulated Price Contract.

1.2 PROJECT CLEANLINESS

1. Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
2. Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Owner or Consultant. Do not burn waste materials on site.
3. Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
4. Provide and use marked separate bins for recycling. Refer to Section 01 74 21 – Construction Demolition Waste Management and Disposal.
5. Clean interior areas prior to start of finishing work and maintain areas free of dust and other contaminants during finishing operations.
6. Store volatile waste in covered metal containers and remove from premises at end of each working day.
7. Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
8. Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
9. Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 FINAL CLEANING

1. Refer to CCDC 2, GC 12.1.
2. When Work is Ready-for-takeover remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
3. Remove waste products and debris other than that caused by others and leave Work clean and suitable for occupancy.
4. Prior to final review remove surplus products, tools, construction machinery and equipment.

5. Remove waste materials from site at regularly scheduled times or dispose of as directed by Owner or Consultant. Do not burn waste materials on site.
6. Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
7. Clean and polish glass, hardware, stainless steel, chrome, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
8. Remove stains, spots, marks and dirt from electrical and mechanical fixtures, fitments, walls, and floors.
9. Clean lighting reflectors, lenses, and other lighting surfaces.
10. Vacuum clean and dust building interiors, behind grilles, louvres, and screens.
11. Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
12. Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
13. Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

1.4 WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for recycling in accordance with Section 01 74 21- Construction Demolition Waste Management and Disposal

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 NOT USED

END OF SECTION

PART 1 - GENERAL

1.1 WASTE MANAGEMENT GOALS

1. Prior to start of Work conduct meeting with Owner and Consultant to review and discuss Contractor's proposed Waste Reduction Workplan for Construction waste to be project generated.
2. Minimize amount of non-hazardous solid waste generated by project and accomplish maximum source reduction, reuse and recycling of solid waste produced by the construction activities.
3. Protect the environment and prevent environmental pollution damage.

1.2 REFERENCE STANDARDS

1. Ontario Ministry of Environment
 1. Ontario Environmental Protection Act (EPA)
 1. Regulation 102/94, Waste Audits and Waste Reduction Workplans.
 2. Regulation 103/94, Source Separation Programs.
 2. Canadian Construction Association (CCA): CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.

1.3 DEFINITIONS

1. Approved/Authorized recycling facility: waste recycler approved by applicable provincial authority or other users of material for recycling approved by the Owner and Consultant.
2. Class III: non-hazardous waste - construction renovation and demolition waste.
3. Construction, Renovation and/or Demolition (CRD) Waste: Class III solid, non-hazardous waste materials generated during construction, demolition, and/or renovation activities
4. Waste Source Separation Program (WSSP): implementation and co-ordination of ongoing activities to ensure designated waste materials will be sorted into pre-defined categories and sent for recycling and reuse, maximizing diversion and potential to reduce disposal costs.
5. Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
6. Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
7. Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

8. Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

1. Submit in accordance with Section 01 33 00 - Submittal Procedures.
2. Prepare and submit following prior to project start-up one (1) copy and one (1) electronic copy of Waste Source Separation Program (WSSP).
3. Prepare and submit on monthly basis, throughout project or at intervals agreed to by Owner and Consultant the following:
 1. Receipts, scale tickets, waybills, and/or waste disposal receipts that show quantities and types of materials recycled, or disposed of.
 2. Written summary report detailing cumulative amounts of waste materials reused, recycled and landfilled, and brief status of ongoing waste management activities.
4. Submit prior to final payment the following:
 1. Waste Diversion Report, indicating final quantities by material types salvaged for reuse, recycling or disposal in landfill and recycling centres, re-use depots, landfills and other waste processors that received waste materials.
 2. Provide receipts, scale tickets, waybills, waste disposal receipts that confirm quantities and types of materials reused, recycled or disposed of and destination.

1.5 WASTE SOURCE SEPARATION PROGRAM (WSSP)

1. As part of Waste Reduction Workplan, prepare WSSP prior to project start-up.
2. WSSP will detail methodology and planned on-site activities for separation of reusable and recyclable materials from waste intended for landfill.
3. Provide list and drawings of locations that will be made available for sorting, collection, handling and storage of anticipated quantities of reusable and recyclable materials.
4. Provide sufficient on-site facilities and containers for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
5. Locate containers to facilitate deposit of materials without hindering daily operations.
6. Provide training for workers and subcontractors in handling and separation of materials for reuse and/or recycling.
7. Locate separated materials in area which minimizes material damage.
8. Clearly and securely label containers to identify types/conditions of materials accepted and assist sub-contractors in separating materials accordingly.

9. Monitor on-site waste management activities by conducting periodic site inspections to verify: state of signage, contamination levels, bin locations and condition, personnel participation, use of waste tracking forms and collection of waybills, receipts and invoices.

1.6 USE OF SITE AND FACILITIES

1. Execute Work with minimal interference and disturbance to normal use of premises.
2. Maintain security measures established by facility provide temporary security measures approved by Owner

1.7 STORAGE, HANDLING AND PROTECTION

1. Store, materials to be recycled in locations as directed by Owner or Consultant.
2. Unless specified otherwise, materials for removal become Contractor's property.
3. Transport and deliver non-salvageable items to a licensed disposal facility.
4. Protect structural components not removed and salvaged materials from movement or damage.
5. Protect surface drainage from damage and blockage.
6. Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.
7. Separate and store materials produced during project in designated areas.
8. Prevent contamination of materials to be recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
 1. On-site source separation is recommended.
 2. Remove co-mingled materials to off site processing facility for separation.
 3. Materials reused on-site are considered to be diverted from landfill and as such are to be included in all reporting.

1.8 DISPOSAL OF WASTES

1. Do not bury rubbish or waste materials.
2. Do not dispose of oil/petroleum products, volatile materials, mineral spirits, paint thinner waste into storm, or sanitary sewers.
3. Keep records of construction waste including:
 1. Number and size of bins.
 2. Waste type of each bin.
 3. Total tonnage generated.

4. Tonnage reused or recycled.
5. Reused or recycled waste destination.
4. Remove materials on-site as Work progresses.

1.9 SCHEDULING

1. Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 APPLICATION

1. Carry out Work in compliance with WSSP.
2. Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

1. Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning: Leave Work area clean at end of each day.
2. Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
3. Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 1. Remove recycling containers and bins from site and dispose of materials at appropriate facility.
 2. Source separate materials to be reused/recycled into specified sort areas.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCE DOCUMENTS

1. Canadian Construction Documents Committee (CCDC) CCDC 2-2020, Stipulated Price Contract.

1.2 ADMINISTRATIVE REQUIREMENTS

1. Acceptance of Work Procedures:
 1. Contractor's Inspection: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 1. Notify Owner and Consultant in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 2. Request Consultant's and Owner's inspection.
 2. Owner's and Consultant's Inspection:
 1. Consultant and Owner to inspect Work and identify defects and deficiencies.
 2. Contractor to correct Work as directed.
 3. Completion Tasks: submit written certificates that tasks have been performed as follows:
 1. Work: completed and inspected for compliance with Contract Documents.
 2. Defects: corrected and deficiencies completed.
 3. Equipment and systems: verified, tested, adjusted and fully operational.
 4. Certificates required by regulatory agencies: submitted.
 5. Operation of systems: demonstrated to Owner's personnel.
 6. Work: complete and ready for final inspection.
 4. Submission of Close-out Documents in accordance with Section 01 33 00 -Submittal Procedures. Prepare and submit 1 hard copy in a three-ring indexed binder, and digital copies on three USB drives. t:
 1. As-built drawings.
 2. O&M Manuals.
 3. Commissioning, verification, and test reports.
 4. S1001 Test Plan.
 5. Warranties.
 6. Training materials.
 5. Final Inspection:
 1. When completion tasks are done, request final inspection of Work by Consultant and Owner.
 2. When Work is incomplete according to Owner or Consultant, complete outstanding items and request re-inspection.
 6. Consultant Witness Test & S1001 Testing

1. Following final inspection and rectification of any outstanding items arising from the final inspection, and/or, re-inspection. Coordinate with the Consultant, Owner, and all sub trades as needed for an S1001 Integrated Fire Protection and Life Safety Systems Test. Refer to Section 21 08 00 – Commissioning of Fire System.
7. Declaration of Substantial Performance: when Owner and Consultant determine deficiencies and defects corrected, and requirements of Contract, including S1001 Testing, have been substantially performed, make application for Certificate of Substantial Performance.
8. Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
9. Final Payment:
 1. When Owner and Consultant considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
 2. When Work deemed incomplete by Owner or Consultant, complete outstanding items and request re-inspection.
10. Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.3 FINAL CLEANING

1. Clean in accordance with Section 01 74 00 – Cleaning: Remove surplus materials, excess materials, rubbish, tools and equipment.
2. Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 NOT USED

END OF SECTION

PART - 1 GENERAL

1.1 SUMMARY

- .1 This Section includes:
 - .1 Demolition and removal of selected portions of interior building components and finishes.
 - .2 Repair procedures for selective demolition operations.
- .2 This section does not include:
 - .1 Removal of hazardous materials or asbestos abatement.
 - .2 Demolition of exterior building components or structural elements.
 - .3 Mechanical or electrical equipment, except as required to make minor modifications to allow the work to be completed.

1.2 RELATED SECTIONS

- .1 Summary of Work.....Section 01 11 00.
- .2 Health and Safety Requirements.....Section 01 35 29.06.
- .3 Environmental ProceduresSection 01 35 43.
- .4 Dust Control ProceduresSection 01 35 99.
- .5 Construction FacilitiesSection 01 52 00.
- .6 Temporary Barriers and EnclosuresSection 01 56 00.
- .7 Construction/Demolition Waste Management and DisposalSection 01 74 21.

1.3 REFERENCES

- .1 American National Standards Institute (ANSI)
 - .1 ANSI A10.8, Safety Requirements for Scaffolding.
- .2 CSA Group (CSA)
 - .1 CSA S350, Code of Practice for Safety in Demolition of Structures.
- .3 National Fire Protection Association (NFPA)
 - .1 NFPA 241 13, Standard for Safeguarding Construction, Alteration, and Demolition Operations

1.4 DEFINATIONS

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

- .3 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- .4 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed, removed, and salvaged, or removed and reinstalled.
- .5 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities, and hazardous products may include asbestos, mercury and lead, PCB s, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by the Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property. Demolished materials shall become Contractor's property and shall be removed from Project site.
- .2 Coordinate selective demolition work so that work of this Section adheres to aesthetic criteria established by the Drawings and specified dimensions with all elements in planes as drawn, maintaining their relationships with all other building elements.
- .3 Pre-Demolition Meeting: Convene pre-installation meeting one (1) week prior to beginning work of this Section, with Owner to:
 - .1 Confirm extent of salvaged and demolished materials.
 - .2 Review Contractor's demolition plan:
 - .1 Verify existing site conditions adjacent to demolition work.
 - .2 Coordination with other construction sub trades.

1.6 ACTION AND INFORMATION SUBMITTALS

- .1 Provide the following submittals before starting any work of this Section:
 - .1 Schedule of Selective Demolition Activities:
 - .1 Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
 - .2 Coordinate with Owner ongoing site operations and limit the number of interruptions during regular business hours.
 - .3 Interruption of utility services.
 - .4 Coordination for shutoff, capping, and continuation of utility services.
 - .5 Use of elevator and stairs.
 - .6 Locations of temporary partitions and means of egress, including for others affected by selective demolition operations.
 - .7 Coordination with Owner continuing occupancy of portions of existing building and of partial occupancy of completed Work.

- .2 Demolition Plan: Submit a plan of demolition area indicating extent of temporary facilities and supports, methods of removal and demolition prepared by a professional engineer in accordance with requirements of Authority Having Jurisdiction, and as follows:
 - .1 Proposed Noise Control and Dust Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Owner reserves the right to make modifications where proposed methods interfere with the Owner's ongoing operation.
 - .2 Inventory: Submit a list of items that have been removed and salvaged after selective demolition is complete.

1.7 SITE CONDITIONS

- .1 Owner will occupy portions of building immediately adjacent to selective demolition area:
 - .1 Conduct selective demolition so that Owner's operations will not be disrupted.
 - .2 Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- .2 Maintain access to existing means of egress, walkways, corridors, exits, and other adjacent occupied or used facilities:
 - .1 Do not close or obstruct means of egress, walkways, corridors, exits, or other occupied or used facilities without written acceptance from authorities having jurisdiction.
- .3 Discovery of Hazardous Substances:
 - .1 It is not expected that Hazardous Substances will be encountered in the Work. Immediately notify Owner if materials suspected of containing hazardous substances are encountered.

PART - 2 PRODUCTS

2.1 DESCRIPTION

- .1 This section of the Work includes, but is not necessarily limited to, the following:
 - .1 Demolition, removal completely from site, and disposal of all identified components, materials, equipment, and debris.
 - .2 Selective demolition to allow new walls, bulkheads, ceilings, and other materials to meet existing construction as indicated.
 - .3 All material from demolition shall be removed from site immediately with no salvage, selling, sorting, or burning permitted on site.
 - .4 Retain items indicated on drawings for re use in new construction.

2.2 DEBRIS

- .1 Make all arrangements for transport and disposal of all demolished materials from the site.

2.3 EQUIPMENT

- .1 Provide all equipment required for safe and proper demolition of the building interiors indicated.

2.4 REPAIR MATERIALS

- .1 Use repair materials identical to existing materials:
 - .1 If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - .2 Use a material whose installed performance equals or surpasses that of existing material.
 - .3 Comply with material and installation requirements specified in individual Specification Sections.
- .2 Floor Patching and Levelling Compounds: Cement based, trowelable, self levelling compounds compatible with specified floor finishes; gypsum-based products are not acceptable for work of this Section.
- .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.
- .4 Gypsum Board Patching Compounds: Joint compound to ASTM C475/C475M, 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 Assemblies.
- .5 Hoarding and Dust Screens: Refer to Sections 01 35 99 – Dust Control Procedures and 01 56 00 - Temporary Barriers and Enclosures for stud framing and gypsum board sheathing materials.

2.5 EXISTING MATERIALS

- .1 Items to be retained for re use in new construction include, but are not limited to the following:
 - .1 Security glass panel as indicated on the drawings.

PART - 3 EXECUTION

3.1 EXAMINATION

- .1 Verify that utilities have been disconnected and capped.

- .2 Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- .3 Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- .4 Notify the Owner where existing mechanical, electrical, or structural elements conflict with intended function or design:
 - .1 Investigate and measure the nature and extent of conflict and submit a written report to Consultant.
 - .2 Consultant will issue additional instructions or revise drawings as required to correct conflict.
- .5 Perform surveys as the work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

- .1 Coordinate existing services indicated to remain and protect them against damage during selective demolition operations.
- .2 Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.
 - .1 Arrange to shut off affected utilities with utility companies.
 - .2 If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
 - .3 Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
 - .4 Cut off pipe or conduit to a minimum of 25 mm below slab and remove concrete mound. Patch concrete using cementitious grout.
- .3 Coordinate with Mechanical and Electrical Divisions for shutting off, disconnecting, removing, and sealing or capping utilities.
- .4 Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

- .1 Identify and mark all equipment and materials identified to be retained by Owner or to be reused in subsequent construction. Separate and store items to be retained in an area away from area of demolition and protect from accidental disposal.
- .2 Post warning signs on electrical lines and equipment that must remain energized to serve other areas during period of demolition.
- .3 Confirm that all electrical and telephone service lines entering buildings are not disconnected.

- .4 Do not disrupt active or energized utilities crossing the demolition site.
- .5 Provide and maintain barricades, warning signs, protection for workmen and the public during the full extent of the Work. Read drawings carefully to ascertain extent of protection required.
- .6 Mark all materials required to be re used, store in a safe place until ready for re installation.
- .7 Adjust all junction boxes, receptacles, and switch boxes flush with new wall construction where additional layers to existing construction are indicated.
- .8 Remove permanent marker lines used or found on exposed surfaces and at surfaces indicated for subsequent finish materials. Mechanically remove permanent marker lines and associated substrates where permanent marker lines occur and patch surface. Sealing or priming over permanent marker lines is not acceptable.

3.4 SELECTIVE DEMOLITION

- .1 Demolish and dismantle work in a neat and orderly manner and in strict accordance with all regulations.
- .2 At end of each day's work, leave Work in safe condition so that no part is in danger of toppling or falling.
- .3 Demolish in a manner to minimize dusting and to prevent migration of dust.
- .4 Selling or burning of materials on the site is not permitted.
- .5 Fill all openings in concrete block walls with concrete masonry units, coursing to match existing, prepare ready to receive new finishes to match existing.
 - .1 Provide bond beams in new openings cut into existing concrete masonry unit walls.
 - .2 Provide finished end masonry units to patch and repair for new jamb sections in existing concrete masonry unit walls.
- .6 Fill all openings in gypsum board walls with gypsum board and steel framing to match existing, skim coat to make wall smooth and even.
- .7 Demolish existing carpet, resilient flooring and adhesive remnants as follows:
 - .1 Vacuum existing carpet thoroughly, prior to removal, using vacuum equipped with power head/sweeper.
 - .2 Apply fine mist water spray to carpet as required to minimize dust generation during removal. Avoid spraying near electrical outlets.
 - .3 Demolish existing carpet and resilient floor finishes, remove and dispose of offsite.
 - .4 Remove adhesive to the greatest extent possible using scrapping tools and as follows:
 - .1 Do not use solvent based cleaners to remove adhesive remnants.
 - .2 Vacuum floor ready for application of skim coating.

- .3 Repair all slab depressions and damage with cementitious patching compound.
- .4 Skim coat floor with minimum 1 mm thick cementitious floor underlayment compatible with new flooring materials.
- .5 Floor substrate shall be smooth, free from ridges and depressions, and adhesive remnants that could telegraph through resilient flooring materials and carpets.
- .8 Demolish completely all ceiling panels and grid as indicated.
- .9 Remove all wall coverings scheduled for demolition. Patch and repair wall surfaces with skim coat of gypsum board joint compound leaving wall surfaces smooth and even ready for new wall finishes.
- .10 Patch and repair all walls, floor and ceilings damaged during demolition with material matching adjacent walls, prepare ready for new finishes.
- .11 Patch and repair all mechanical and electrical equipment and fixtures damaged or exposed during demolition to match adjacent finished surfaces.

3.5 PATCHING AND REPAIRING

- .1 Floors and Walls:
 - .1 Where walls or partitions that are demolished extend from one finished area into another, patch and repair floor and wall surfaces in the new space.
 - .2 Provide a level and smooth surface having uniform finish colour, texture, and appearance.
 - .3 Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform colour and appearance.
 - .4 Patch with durable seams that are as invisible as possible.
 - .5 Provide materials and comply with installation requirements specified in other Sections of these Specifications.
 - .6 Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.
 - .7 Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
- .2 Ceilings: patch, repair, or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.6 PROTECTION

- .1 Protect mechanical and electrical systems and services that must remain in operation from debris.

- .2 Arrange demolition and shoring work so that interference with the use of adjoining areas by the Owner and users is minimized.
- .3 Maintain safe access to and egress from occupied areas adjoining.
- .4 Provide and maintain fire prevention equipment and alarms accessible during demolition.

3.7 CLEANING

- .1 Promptly as the Work progresses, and on completion, clean up and remove from the site all rubbish and surplus material. Remove rubbish resulting from demolition work daily.
- .2 Maintain access to exits clean and free of obstruction during removal of debris.
- .3 Keep surrounding and adjoining roads, lanes, sidewalks, municipal rights of way clean and free of dirt, soil or debris that may be a hazard to vehicles or persons.

END OF SECTION

PART - 1 GENERAL

1.1 DESCRIPTION OF WORK

- .1 This section includes design, labour, products, and services for fire stopping and smoke sealing including through fire rated assemblies to match fire rating of such structures, in accordance with the Contract Documents, including but not limited to the following locations:
 - .1 Penetrations through fire resistance rated masonry and gypsum board walls.
 - .2 Top of fire resistance rated masonry walls and gypsum board walls.
 - .3 Intersection of fire resistance rated masonry walls and gypsum board walls.
 - .4 Openings and sleeves installed for future use in fire resistance rated separations.
 - .5 Process and building services penetrations through fire rated floors and walls.
 - .6 Openings around structural framing required for seismic loads.
 - .7 Ensure all penetrations through required fire separations are appropriately sealed and fire stopped.
- .2 All requirements of Division 01 apply to this section and are to be read in conjunction.
- .3 Fire stopping and smoke seals within mechanical assemblies (i.e. inside ducts, dampers) and electrical assemblies (i.e. inside cable trays) are specified on Mechanical and Electrical drawings respectively.

1.2 RELATED SECTIONS

- .1 Joint Sealants Section 07 92 00.
- .2 Metal Doors and Frames..... Section 08 11 00.
- .3 Gypsum Board Assemblies Section 09 21 16.

1.3 REFERENCES

- .1 ASTM E814-11a – Standard Test Method for Fire Tests of Through Penetration Fire Stops.
- .2 CAN4-S115-M, Standard Method of Fire Tests of Firestop Systems.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .4 Underwriter's Laboratories of Canada (ULC)
 - .1 ULC-S115-1995, Fire Tests of Fire stop Systems.

1.4 DEFINITIONS

- .1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.
- .2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
- .3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.
- .4 Tightly Fitted; (ref: NBC Part 3.1.9.1.1 and 9.10.9.6.1): penetrating items that are cast in place in buildings of noncombustible construction or have "0" annular space in buildings of combustible construction.
 - .1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

1.5 DESIGN CRITERIA

- .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.
- .2 Provide seals to form draft tight barriers to retard the passage of flame and smoke, and, except where specified otherwise, firefighter's hose stream and the passage of liquids.
- .3 Installed seals shall provide and maintain the fire resistance rating of the adjacent floor, wall or other fire separation assembly to the requirements of and acceptable to the authorities having jurisdiction and the Consultant.
- .4 Firestopping and smoke seals within mechanical (i.e. inside ducts, dampers) and electrical assemblies (i.e. inside bus ducts) shall be provided as part of the work of Mechanical and Electrical Divisions, respectively. Firestopping and smoke seals around the outside of such mechanical and electrical assemblies where they penetrate rated fire separations shall be part of the work of this Section.

1.6 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

- .1 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.
- .2 Submit copies of current ULC listings for each system and certified copies of test reports verifying that fire stopping and smoke seals meet or exceed specified requirements.
- .3 Shop Drawings:
 - .1 Submit shop drawings indicating the ULC assembly number for each condition, required temperature rise and flame rating, hose stream rating, thickness, minimum and maximum annular space sizes with appropriate listing for each category of sizes, installation methods and materials of fire stopping and smoke seals, damming materials, reinforcements, anchorages and fastenings, adjacent materials and number of penetrations.
 - .2 Construction details should accurately reflect actual job conditions.
- .4 Samples:
 - .1 Submit samples of each type of fire stopping and smoke seal material indicating location(s) where system or material is to be used.
- .5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
 - .1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.
 - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.
 - .4 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.7 QUALITY ASSURANCE

- .1 Fire stopping and smoke seal materials shall conform to both the temperature and flame ratings of ULC S115 and, where applicable, to ASTM E814, and other requirements of authorities having jurisdiction.
- .2 Qualifications:

- .1 Installer: company specializing in fire stopping installations approved and trained by the material or system manufacturer with minimum five (5) years of documented experience.
- .3 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative Owner and Consultant in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM) to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.
- .4 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
 - .1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling, and unloading:
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer and ULC markings.
- .2 Storage and Protection:
 - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area. Protect from damage and environmental conditions in accordance with manufacturer's recommendations.
 - .2 Replace defective or damaged materials with new.
- .3 Waste Management and Disposal:
 - .1 Separate waste materials for reuse/recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.9 SITE CONDITIONS

- .1 Conform to manufacturer's requirements and maintain a minimum temperature of 5° C for a minimum period of twenty-four (24) hours before application, during application, and until application is fully cured.

PART - 2 PRODUCTS

2.1 MANUFACTURERS

- .1 Products: Subject to compliance with requirements, provide one of the through-penetration fire-stop systems indicated for each application on Drawings.
 - .1 Firestops Systems Inc.
 - .2 A/D Fire Protection Systems Inc.
 - .3 Grace, W. R. & Co.
 - .4 Hilti, Inc.
 - .5 Tremco.
 - .6 3M; Fire Protection Products Division.
 - .7 Nelson Fire-stop Products.
 - .8 Johns Manville; or.
 - .9 Approved alternate.
- .2 All Fire stopping material shall be free of asbestos.

2.2 MATERIALS

- .1 Fire stopping and smoke seal systems: Certified and listed by ULC in accordance with ULC S115 and bearing ULC label.
 - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended and conforming to specified special requirements specified in Part 3.
- .2 Fire stopping shall not exceed opening sizes for which they are tested.
- .3 Fire stop system rating: FTH.
- .4 Service penetration assemblies: systems tested to CAN-ULC-S115 and listed in ULC Guide No.40 U19.
- .5 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115 and listed in ULC Guide No.40 U19.13 and ULC Guide No.40 U19.15 under the Label Service of ULC.
- .6 Fire-resistance rating of installed fire stopping assembly in accordance with the National Building Code (NBC) and shall be not less than fire resistance rating of surrounding floor and wall assembly.

- .7 All listed system designs used must provide flame (F), temperature (T) and hose steam (H) rating in accordance with those outlined in the NBC including any additional requirements noted in this section.
- .8 Fire stopping systems must be installed in accordance with the listed system design limitations unless a technical evaluation is approved by an acceptable third-party agency.
- .9 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric or re-enterable cementitious matrix or putty seal; do not use a non-re-enterable cementitious seal at such locations seal.
- .10 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal, do not use a cementitious or rigid seal at such locations.
- .11 Fire stopping and smoke seals at joints and spaces designed and required to allow movement such as building movement joints, deflection spaces, control joints, expansion joints, and similar locations: A flexible, elastomeric seal suitable to withstand the required movement and capable of returning to original configuration without damage to the seal and without adhesive or cohesive failure; do not use a cementitious or rigid seal at such locations.
- .12 All fire stopping materials that will come directly in contact with plastic pipe shall have undergone material compatibility testing by the manufacturer and/or the pipe manufacturer.
- .13 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .14 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .15 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .16 Intumescent blocks: 'Hilti FS 657 Fire Block' with 'FS-One' intumescent fire stop sealant and 'FS 635' trowable fire stop compound by Hilti (Canada) Limited.
- .17 Re-enterable cementitious grout matrix: 'FlameSafe Mortar Seal' by Grace Construction Products, 'Firebarrier Mortar' by A/D Fire Protection Systems Inc.
- .18 Intumescent pads: Permanently pliable type, 'FlameSafe Pillows' by Grace Construction Products, 'FlameSafe FSP 100 Putty' by Grace Construction Products, or other approved manufacturer.
- .19 Intumescent composite sheet: Composite sheet, strip or precut shapes, 'Firebarrier Intumescent Composite Sheet' by 3M Canada Inc., 'FlameSafe Intumescent Sleeve, Wrap Strips and Devices' by Grace Construction Products, or other approved manufacturer.
- .20 Fire stopping: Non-combustible, semi-rigid mineral wool batts, sized in accordance with ULC test requirements, 'Fire barrier' by A/D Fire Protection Systems Inc. or other approved manufacturer.

- .21 Smoke seal: One component silicone base chemical curing fire stopping sealant, self-leveling, 'Fyre-Sil' fire stop sealant by Tremco Incorporated, Fire barrier Silicone SL' by A/D Fire Protection Systems Inc., or other approved manufacturer.
- .22 Smoke seal: One component silicone base chemical curing fire stopping sealant, gun-grade, non-sagging consistency, 'Fyre-Sil' fire stop sealant by Tremco Incorporated, 'Fire barrier Silicone' by A/D Fire Protection Systems Inc., or other approved manufacturer.
- .23 Do not use spray applied smoke seals, except where permitted otherwise.
- .24 Sealants for vertical joints: non-sagging.
- .25 Materials and products shall not cause stress, chemical or physical reaction, or other damage to penetrating items or adjacent materials. Materials and products shall be compatible with abutting dissimilar architectural coatings, finishes at floors, walls, ceilings, waterproofing membranes and similar components. Verify with finish data and manufacturer of selected systems installed.

2.3 SYSTEMS

- .1 Fire stopping and smoke seals: ULC or Warnock Hersey listed Products and systems in accordance with CAN4-S115 suitable to actual application and installation conditions.
- .2 Do not use products containing asbestos.

2.4 ACCESSORIES

- .1 Damming, back-up, supports, and anchorage: In accordance with manufacturer's fire rated systems and to acceptance of authorities having jurisdiction.
- .2 Primer: As recommended by manufacturer.

PART - 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 EXAMINATION

- .1 Verify condition and dimensions of previously installed work upon which this section depends. Report defects to the Consultant. Commencement of Work means acceptance of existing conditions.
- .2 Verify that substrates and surfaces to receive fire stopping and smoke seals are clean, dry, and frost free.

3.3 FIRESTOP AND SMOKE SEAL LOCATIONS AND RATINGS

- .1 Install ULC fire stop systems rated to match fire design rating of assemblies into which they are installed.

- .2 Install fire stop and smoke seal systems. Use systems with required ratings at following typical locations, including but not limited to:
 - .1 ULC FH rating:
 - .1 Gaps at intersections of fire-resistance rated masonry partitions.
 - .2 Control and sway joints in fire-resistance rated walls and masonry partitions.
 - .3 Gaps at top of fire-resistance rated masonry partitions.
 - .4 Penetrations through fire-resistance rated walls and partitions including mechanical and electrical services and openings and sleeves for future use.
 - .5 Perimeter of retaining angles on rigid ducts greater than 0.012 m², fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

3.4 PREPARATION

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Prepare, modify, and adjust void sizes, proportions, and conditions to conform to fire rated assembly requirements such as assembly opening size and dimensional restrictions.
 - .1 Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.5 INSTALLATION

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing to establish continuity and integrity of fire separations.
- .2 Install primers as recommended by fire stop product manufacturers.
- .3 Install temporary forming, damming, back-up as required, remove after materials have achieved initial cure and will resist displacement.
- .4 Use resilient, elastomeric fire stopping systems in following locations:
 - .1 Openings and sleeves for future use.
 - .2 Penetration systems subject to vibration or thermal movement.
 - .3 Penetration systems in acoustical containment enclosures.

- .5 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- .6 Tool or trowel exposed fire stop Product surfaces to uniform, smooth finish.
- .7 Ensure any fire stop product does not come in contact with adhesives used for flooring.
- .8 Remove excess compound promptly as work progresses and upon completion.
- .9 Repair damaged fire-stopped surfaces to acceptance of the Owner and Consultant.
- .10 Install fire-stop filler in horizontal joints with two impaling clips per 4'-0" length, maximum.
- .11 Identify each fire stop penetration assembly with permanent label listing following:
 - .1 Assembly and rating in hours.
 - .2 Date of installation.
 - .3 Installing company's name and telephone number.

3.6 SEQUENCES OF OPERATION

- .1 Proceed with installation only when submittals have been reviewed by Owner and Consultant.
- .2 Install floor fire stopping before interior partition erections.
- .3 Metal deck bonding: fire stopping to precede spray applied fireproofing to ensure required bonding.
- .4 Mechanical pipe insulation: certified fire stop system component.
 - .1 Ensure pipe insulation installation precedes fire stopping.

3.7 FIELD QUALITY CONTROL

- .1 Inspections: notify Owner and Consultant when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.
- .2 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.8 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.

- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

3.9 SCHEDULE

- .1 Fire stop and smoke seal at:
 - .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 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
 - .5 Openings and sleeves installed for future use through fire separations.
 - .6 Around mechanical and electrical assemblies penetrating fire separations.
 - .7 Rigid ducts: greater than 129 cm² : fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

.2 TABLE A: THROUGH PENETRATION AND FIRE RESISITIVE JOINT SYSTEMS
SCHEDULE

MATERIAL: CONCRETE			
PENETRATING ITEM	DETAILS	F-RATING	UL/cUL TESTED SYSTEM NUMBER
METALLIC PIPE	30" STEEL IRON, 6" CONDUIT, COPPER TUBE, COPPER PIPE, 4" EMT; OPTIONAL SLEEVE, 3-1/2" MINERAL WOOL; W RATING (CLASS 1)	2, 3 & 4 HR	CAJ 1064
PLASTIC PIPE	4" PVC, 3"ccPVC, ABS, ccABS, FRPP; 50Pa	2 HR	TL/PHV 120-05
INSULATED METALLIC PIPE	8" STEEL, IRON, 6" COPPER TUBE, COPPER PIPE; W/1", 2" OR 3" FIBREGLASS, 3-1/2" MINERAL WOOL	2 & 3 HR	CAJ 5121
CABLE BUNDLES	CABLES (25% CROSS-SECTIONAL AREA OF OPENING)	4 HR	CAJ 3237
CABLE TRAY	24"x6" CABLE TRAY, CABLES (40% OF CROSS-SECTIONAL AREA)	2 HR	CAJ 4075
REPENETRABLE CABLE BUNDLES	TREMSTOP QUICKCOMM SLEEVE	2 HR	C-AJ-3270
REPENETRABLE CABLE TRAY	TREMSTOP QUICKCOMM	2 HR	F-A-4006
BLANK OPENING	24" BLANK OPENING, 3-1/2" MINERAL WOOL	2 HR	CAJ 0011
MULTIPLE ITEMS	4" STEEL, IRON, CONDUIT, EMT, 2" COPPER TUBE, COPPER PIPE; W/1" FIBERGLASS, 3/4" AB/PVC, 4-1/4" MINERAL WOOL, MULTIPLE PENETRANTS	3 HR	CAJ 8134
SINGLE VENT DUCT	8" ROUND DUCT; 4-1/4" MINERAL WOOL	2 HR	CAJ 7090 (UP TO 200mm DIA ROUND PROFILE)
	14"x18" DUCT; OPTIONAL BACKER ROD	3 HR	CAJ 7002 (UP TO 320 SQ.IN SQUARE PROFILE)
BUS DUCT	23" BUSWAY IN 330 IN² OPENING; 4" MINERAL WOOL	2 & 3 HR	CAJ 6007

MATERIAL: GYPSUM			
PENETRATING ITEM	DETAILS	F-RATING	UL/cUL TESTED SYSTEM NUMBER
METALLIC PIPE	12" STEEL, IRON, 6" CONDUIT, 4" EMT, COPPER TUBE, COPPER PIPE; OPTIONAL BACKER ROD, OPTIONAL SLEEVE	1 & 2 HR	WL 1158
PLASTIC PIPE	4" PVC, ccPVC, ABS, ccABS, 3" FRPP;,, 2" CPVC; 50Pa		TLPV 120-06
INSULATED METALLIC PIPE	4" STEEL, IRON, COPPER TUBE, COPPER PIPE; W/ 3/4" AB/PVC, OPTIONAL BACKER ROD	1 & 2 HR	WL 5081
CABLE BUNDLES	CABLES (2% OF CROSS-SECTIONAL AREA) OVERSIZED OPENING	1 & 2 HR	WL 3043
CABLE TRAY	24"x6" CABLE TRAY, CABLES (31% CROSS-SECTIONAL AREA OF OPENING) AND OPTICAL FIBER RACEWAYS	1 & 2 HR	WL 4056
REPENETRABLE CABLE BUNDLES	TREMSTOP QUICKCOMM SLEEVE	2 HR	W-L-3318
REPENETRABLE CABLE TRAY	TREMSTOP QUICKCOMM SIZED TO ACCOMODATE TRAY OR OPENING	1 & 2 HR	W-L-4070
BLANK OPENING	TREMSTOP QUICKCOMM SLEEVE	2 HR	W-L-0025
MULTIPLE ITEMS	1" STEEL, IRON COPPER OR EMT SOME WITH 3/4" AB/PVC FOAM & CABLES, A/C LINESET	1 & 2 HR	WL 8036
SINGLE VENT DUCT	16" ROUND DUCT, 8"x8" RECTANGULAR DUCT; OPTIONAL BACKER ROD	1 & 2 HR	WL 7039
BUS DUCT			CAJ 6007 W/ENGINEERED JUDGEMENT OR PROPRIETARY PRODUCT FROM BUS DUCT MANUFACTURER

DETAIL: HEAD OF WALL	DETAIL	UL/cUL RATING FOR JOINT SYTEM
GYPSUM WALL TO CONCRETE DECK	1" JOINT (-25% MOVEMENT); CLASS II & III; GYP WALL TO CONC FLOOR, OPTIONAL BACKER ROD OR MINERAL WOOL	HW-D-0016
GYPSUM WALL TO METAL PAN DECK	1" JOINT (%%P25% MOVEMENT), CLASS II & III; GYP. WALL TO CONC FLOOR, METAL DECK; MINERAL WOOL, OPTIONAL DEFLECTION CHANNEL	HW-D-0091

END OF SECTION

PART - 1 GENERAL

1.1 DESCRIPTION OF WORK

- .1 This section includes design, labour, products, and services necessary for caulking and sealant work, in accordance with the Contract Documents.
- .2 All requirements of Division 01 apply to this section and are to be read in conjunction.

1.2 RELATED SECTIONS

- .1 Fire Stopping..... Section 07 84 00.
- .2 Metal Doors and Frames..... Section 08 11 00.
- .3 Gypsum Board Assemblies..... Section 09 21 16.

1.3 REFERENCES

- .1 ASTM International
 - .1 ASTM C919-08, Standard Practice for Use of Sealants in Acoustical Applications.
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
 - .2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
 - .3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
 - .4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
 - .5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.4 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.

- .2 Manufacturer's product to describe:
 - .1 Caulking compound.
 - .2 Primers.
 - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
- .3 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.
- .3 Samples:
 - .1 Submit 2 samples of each type of material and colour.
 - .2 Cured samples of exposed sealants for each colour where required to match adjacent material.
- .4 Manufacturer's Instructions:
 - .1 Submit instructions to include installation instructions for each product used.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

1.7 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Proceed with installation of joint sealants only when:
 - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
 - .2 Joint substrates are dry.
 - .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

- .2 Joint-Width Conditions:
 - .1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.
- .3 Joint-Substrate Conditions:
 - .1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 ENVIRONMENTAL REQUIREMENTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Health Canada.

1.9 EXTENDED WARRANTY

- .1 Warrant sealant Work in accordance with General Conditions, except that warranty period is extended for a period of 10 years against defects and deficiencies. Promptly correct to satisfaction of Owner and at no expense to the Owner, any defects or deficiencies which become apparent within warranty period. Defects include, but are not limited to cracking, crumbling, melting, shrinkage, sag, failure in adhesion, cohesion or reversion, air and moisture leakage, marbling or streaking due to improper mixing, discolouration due to dirt pick-up during curing and staining of adjacent materials spalling or visible evidence of cracking, except for hairline shrinkage cracks. Warranty shall cover complete replacement.

1.10 QUALITY ASSURANCE

- .1 Qualifications: Execute Work by applicators trained and approved by manufacturer having five (5) years proven experience.

1.11 MOCK-UP

- .1 Construct mock-up to show location, size, shape, and depth of joints complete with bond breaker, joint backing, primer and sealant. Accepted mock-up may become part of finished Work.
- .2 Allow 48 hours for review of mock-up by Consultant before proceeding with sealant Work.

1.12 PRE-INSTALLATION MEETINGS

- .1 Arrange with manufacturer's representative to inspect substrates, and to review installation procedures 48 hours in advance of installation.
- .2 Review conditions under which Work will be done.
- .3 Joint condition and profile.
- .4 Weather conditions.

PART - 2 PRODUCTS

2.1 SEALANT MATERIALS

- .1 Do not use caulking that emits strong odours, contains toxic chemicals, or is not certified as mold resistant in air handling units.
- .2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.
- .3 Where sealants are qualified with primers use only these primers.
- .4 Sealants used on fire rated assemblies must conform to UL/ULC requirements.

2.2 SEALANT MATERIAL DESIGNATIONS

- .1 ASTM C920 Designation:
 - .1 Type S – Single Component Sealant.
 - .2 Type M – Multicomponent Sealant.
 - .3 Grade NS – Non-sag, suitable for vertical joints.
 - .4 Class 25 – Adhesion / Cohesion withstands min 25% increase / decrease of joint width.
 - .5 Class 12.5 - Adhesion / Cohesion withstands min 12 ½ % increase / decrease of joint width.
 - .6 NT – Non traffic areas.
 - .7 M – Mortar.
- .2 CAN/CGSB-19.13 M Sealant Classification
 - .1 Substrate of major use:
 - .1 Class M - Metal
 - .2 Class C - Concrete or masonry
 - .2 Rheological properties:
 - .1 Class 1 - Self-levelling
 - .2 Class 2 - Non-sag
 - .3 Movement:
 - .1 Class 25 - ±25%
 - .2 Class 40 - ±40%
 - .4 Temperature:
 - .1 Class N - Min application temp. 5 deg.
- .3 CAN/CGSB 19.24 M Sealant Classification:
 - .1 Type 2 - Non-sag
 - .2 Class B - Non-glazing application

2.3 SEALANT SELECTION

- .1 Silicone Sealant Type E:
 - .1 CAN/CGSB 19.13-M, MCG-2-40-B-N, ASTM C920: Type S, Grade N S, Class 25, use NT, M, G, A; one component, structural glazing, glazing, weatherproofing, 100% silicone base chemical curing, in standard colours selected.
- .2 Silicone Sealant Type F:
 - .1 CAN/CGSB 19.13-M, MCG-2-40-B-N, ASTM C920: Type S, Grade NS, use T, NT, M, Class 25; one component, weatherproofing, 100% silicone base chemical curing, in standard colours selected.

2.4 JOINT CLEANER

- .1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.
- .2 Primer: in accordance with sealant manufacturer's written recommendations.

2.5 PRIMERS:

- .1 Type recommended by material manufacturers for various substrates, to promote adhesion and to prevent staining of adjacent surfaces for conditions encountered on project.

2.6 JOINT BACKING:

- .1 Round, solid section, skinned surface, soft polyethylene foam gasket stock, compatible with primer and sealant materials, 30 to 50% oversized, Shore A hardness of 20, tensile strength 140 to 200 kPa. Bond breaker type surface.

2.7 BOND BREAKER:

- .1 Type recommended by material manufacturers to prevent bonding of sealant to back of recess.

PART - 3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for joint sealants installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Owner and Consultant.
 - .2 Inform Owner and Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Owner and Consultant.

3.2 SURFACE PREPARATION

- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
- .2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.
- .3 Do not apply sealants to joint surfaces 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 Ensure joint surfaces are dry and frost free.
- .5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

- .1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
- .2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

- .1 Apply bond breaker tape where required to manufacturer's instructions.
- .2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

- .1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 APPLICATION

- .1 Sealant:
 - .1 Apply sealant in accordance with manufacturer's written instructions.
 - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
 - .3 Apply sealant in continuous beads.
 - .4 Apply sealant using gun with proper size nozzle.
 - .5 Use sufficient pressure to fill voids and joints solid.
 - .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
 - .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
 - .8 Remove excess compound promptly as work progresses and upon completion.

- .2 Curing:
 - .1 Cure sealants in accordance with sealant manufacturer's instructions.
 - .2 Do not cover up sealants until proper curing has taken place.

3.7 SCHEDULE OF LOCATIONS

- .1 Following sealant location schedule is included for convenience and may not be complete. Examine Contract documents and determine entire extent of Work of this Section. Generally seal following locations:
- .2 Sealant Type E:
 - .1 Expansion joints for new and remedial applications.
 - .2 Primarily glazing sealant, structural glazing and perimeter sealing of doors and window frames.
 - .3 Suitable as well for wood, vinyl, aluminum surfaces.
 - .4 Not suitable for below grade applications, brass, surfaces continuously immersed in water, interior penetration fire stop, building materials that bleed oils (impregnated wood, oil-based caulks, vulcanized rubber gaskets or tapes or bituminous below grade waterproofing and asphalt-impregnated fibreboard), totally confined spaces, surfaces to be painted, surfaces in direct contact with wood.
- .3 Sealant Type F:
 - .1 Expansion and control joints for new and remedial applications.
 - .2 Primarily for joints in building materials, and masonry and remedial applications.
 - .3 Suitable as well for glass, metal and plastics in glazing and curtainwall assemblies.
 - .4 Not suitable for below grade applications, brass, surfaces continuously immersed in water, interior penetration fire stop, building materials that bleed oils (impregnated wood, oil-based caulks, vulcanized rubber gaskets or tapes or bituminous below grade waterproofing and asphalt-impregnated fibreboard), totally confined spaces, surfaces to be painted, surfaces in direct contact with wood.

3.8 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by joint sealants installation.

3.9 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Clean adjacent surfaces immediately.

- .3 Remove excess and droppings, using recommended cleaners as work progresses.
- .4 Remove masking tape after initial set of sealant.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 11 - Cleaning.

3.10 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by joint sealants installation.

END OF SECTION

PART - 1 GENERAL

1.1 DESCRIPTION OF WORK

- .1 This section includes design, labour, products, and services necessary for exterior and interior metal door frames in accordance with the Contract Documents.
- .2 All requirements of Division 01 apply to this section and are to be read in conjunction.

1.2 RELATED SECTIONS

- .1 Joint Sealants..... Section 07 92 00.
- .2 Flush Wood Doors..... Section 08 14 16.
- .3 Door Hardware..... Section 08 71 00.
- .4 Gypsum Board Assemblies..... Section 09 21 16.
- .5 Interior Painting..... Section 09 91 23.

1.3 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A653/A653M-06a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM C553-13, Standard Specification for Mineral Fibre Blanket Insulation for Commercial and Industrial Applications.
 - .3 ASTM C578-14a, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 - .4 ASTM C591-13, Specification for Un-Faced Pre-formed Rigid Cellular Polyisocyanurate Thermal Insulation.
 - .5 ASTM C1289-14a, Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W59-03, Welded Steel Construction (Metal Arc Welding).
- .4 Canadian Steel Door Manufacturers' Association (CSDMA)
 - .1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2006.

- .2 CSDMA, Selection and Usage Guide for Commercial Steel Doors, 2009.
- .5 National Fire Protection Association (NFPA)
 - .1 NFPA 80-99, Standard for Fire Doors and Fire Windows.
 - .2 NFPA 252-03, Standard Methods of Fire Tests of Door Assemblies.
- .6 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S702-14, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
 - .2 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
 - .3 CAN4-S104-10, Standard Method for Fire Tests of Door Assemblies.
 - .4 CAN4-S105-09, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.4 SYSTEM DESCRIPTION

- .1 Design Requirements:
 - .1 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104 NFPA 252 for ratings specified or indicated.
 - .2 Provide fire labelled frames for openings requiring fire protection ratings. Test products in conformance with CAN4-S104, ASTM E152 and NFPA 252 and listed by nationally recognized agency having factory inspection services.

1.5 QUALIFICATIONS

- .1 Approved Manufacturers:
 - .1 Fleming Door Products,
 - .2 Dean Steel,
 - .3 Daybar Industries Ltd. or,
 - .4 Approved alternate.

1.6 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .2 Indicate each type of frame frame, material, reinforcements, location of anchors and exposed fastenings, reinforcing and fire rating finishes.

- .3 Submit test and engineering data, and installation instructions.
- .3 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Submit one 12" x 12" (300 x 300 mm) corner sample of each type of frame.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.8 WARRANTY

- .1 Minimum ten (10) years warranty.

PART - 2 PRODUCTS

2.1 MATERIALS

- .1 Hot dipped galvanized steel sheet: to ASTM A653M, ZF75, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.
- .2 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653M, ZF75.
- .3 Minimum Thicknesses

	Gauge No	Equivalent Inches	Thickness Millimeters
Frames	16	0.060	1.52
Doors-Hollow steel construction			
Door faces	18	0.048	1.21
Top and bottom end channels	18	0.048	1.21
Vertical stiffeners	20	0.036	0.91
Accessories			
Lock and strike reinforcements	16	0.060	1.52
Hinge reinforcements	10	0.135	3.42
Flush bolt reinforcements	16	0.060	1.52
Reinforcements for surface applied hardware	12	0.105	2.66
Door closer or holder reinforcements	12	0.105	2.66
Wall Anchors			
Steel stud strap type	16	0.060	1.52

Jamb floor anchors	16	0.060	1.52
Jamb spreaders	18	0.048	1.21
Mortar guard boxes	22	0.030	0.76

2.2 PRIMER

- .1 Touch-up prime CAN/CGSB-1.181.
- .1 Maximum VOC limit 50 g/L to GC-03.

2.3 PAINT

- .1 Field paint steel doors and frames in accordance with Sections 09 91 23 - Interior Painting and 09 91 13 - Exterior Painting. Protect weatherstrips from paint. Provide final finish free of scratches or other blemishes.
- .1 Maximum VOC emission level 50 g/L to GS-11.

2.4 ACCESSORIES

- .1 Door silencers: single stud rubber/neoprene type.
- .2 Exterior, interior, top and bottom caps: conforming to CGSB 41-GP-19Ma steel.
- .3 Door bottom seal: Automatic door bottom.
- .4 Metallic paste filler: to manufacturer's standard.
- .5 Fire labels: metal riveted.
- .6 Sealant: in accordance with Section 07 92 00 – Joint Sealants.
- .1 Maximum VOC limit 250 g/L.

2.5 FRAMES FABRICATION GENERAL

- .1 Fabricate frames in accordance with CSDMA specifications.
- .2 Fabricate frames to profiles and maximum face sizes as indicated.
- .3 Interior frames: 1.2 mm welded type construction.
- .4 Blank, reinforce, drill and tap frames for mortised, templated hardware, electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.
- .5 Protect mortised cutouts with steel guard boxes.
- .6 Prepare frame for door silencers, 3 for single door.
- .7 Manufacturer's nameplates on frames and screens are not permitted.
- .8 Conceal fastenings except where exposed fastenings are indicated.
- .9 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.
- .10 Insulate exterior frame components with polyurethane insulation.

- .11 Prepare frames to receive electronic monitoring and security devices. Refer to Section 08 71 00 – Door Hardware. Coordinate frame preparation with Electrical Divisions 26 and 28.

2.6 FRAME ANCHORAGE

- .1 Provide appropriate anchorage to floor and wall construction.
- .2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.
- .3 Provide 2 anchors for rebate opening heights up to 5'-0" (1520 mm) and 1 additional anchor for each additional 2'-6" (760 mm) of height or fraction thereof.
- .4 Locate anchors for frames in existing openings not more than 6" (150 mm) from top and bottom of each jambs and intermediate at 26" (660 mm) on centre maximum.

2.7 FRAMES: WELDED TYPE

- .1 Welding in accordance with CSA W59.
- .2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.
- .3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.
- .4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.
- .5 Securely attach floor anchors to inside of each jamb profile.
- .6 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

2.8 DOOR FABRICATION

- .1 Door construction, fabrication, materials and finishes in accordance with Section 08 14 16 - Flush Wood Doors.

PART - 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION GENERAL

- .1 Install labelled steel fire rated doors and frames to NFPA 80 except where specified otherwise.
- .2 Install doors and frames to CSDMA Installation Guide.

3.3 FRAME INSTALLATION

- .1 Set frames plumb, square, level and at correct elevation.
- .2 Secure anchorages and connections to adjacent construction.
- .3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 4'-0" (1200 mm) wide. Remove temporary spreaders after frames are built-in.
- .4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.
- .5 Apply sealant at perimeter of frames between frame and adjacent material.

3.4 DOOR INSTALLATION

- .1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 - Door Hardware.
- .2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
 - .1 Hinge side: 1.0 mm.
 - .2 Latch side and head: 1.5 mm.
 - .3 Finished floor, noncombustible sill and thresholds: 3/8" (10 mm).
- .3 Adjust operable parts for correct function.

3.5 FINISH REPAIRS

- .1 Touch up with primer finishes damaged during installation.
- .2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

END OF SECTION

PART - 1 GENERAL

1.1 DESCRIPTION OF WORK

- .1 This Section includes labour, products, equipment, and services necessary to complete the Work of this Section.
- .2 All requirements of Division 01 apply to this section and are to be read in conjunction.

1.2 RELATED REQUIREMENTS

- .1 Metal Doors and Frames Section 08 11 00.
- .2 Door Hardware..... Section 08 71 00.
- .3 Interior Painting..... Section 09 91 23.

1.3 REFERENCES

- .1 Ontario 2012 Building Code.
- .2 Architectural Woodwork Manufacturers Association of Canada (AWMAC).
 - .1 Quality Standards for Architectural Woodwork 2003.
- .3 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-71.19-M88, Adhesive, Contact, Sprayable.
 - .2 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.
- .4 Canadian Standards Association (CSA International).
 - .1 CSA A440.2-98, Energy Performance of Windows and Other Fenestration Systems.
 - .2 CSA O115-M1982 (R2001), Hardwood and Decorative Plywood.
 - .3 CAN3-O188.1-M, Interior Mat Formed Wood Particleboard.
 - .4 CAN/CSA O132.2 Series-90(R1998), Wood Flush Doors.
 - .5 CAN/CSA-O132.5-M1992 (R1998), Stile and Rail Wood Doors.
 - .6 CAN/CSA-Z808-[96], A Sustainable Forest Management System: Guidance Document.
 - .7 CSA Certification Program for Windows and Doors 00.
- .5 Environmental Choice Program (ECP).
 - .1 CCD-045-92, Sealants and Caulking Compounds.
 - .2 CCD-046-92, Adhesives.
- .6 National Fire Protection Association (NFPA).
 - .1 NFPA 80-1999, Standard for Fire Doors and Fire Windows.
 - .2 NFPA 252-1999, Standard Method of Fire Tests of Door Assemblies.

- .7 Underwriters' Laboratories of Canada (ULC).
 - .1 CAN-4S104M-80 (R1985), Fire Tests of Door Assemblies.
 - .2 CAN4-S105M-85 (R1992), Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.4 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications, and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:
 - .1 For caulking materials during application and curing.
 - .2 For door materials and adhesives. Confirm that adhesives used do not contain urea-formaldehyde.
- .2 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit shop drawings showing large scale construction details, service outlets, connections and anchoring, sizes and species of stiles, top rails, bottom rails and lock blocks.
 - .1 Indicate door types, sizes, core construction, and cutouts.
 - .2 Show construction and materials used in cores, size and species of edge strip, thickness and species of cross-banding, and thickness and species of face veneer.
 - .3 Show locations, sizes and types of all doors to be supplied, referenced to the Door and Hardware Schedule.
 - .4 Indicate elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for factory finishing and other pertinent data.
 - .5 Include finishing specifications for doors to receive factory-applied finish.
 - .6 Include certifications as required to show compliance with specifications.
 - .3 Provide the Consultant with a certificate from the door manufacturer declaring that doors meet AWMAC Architectural Grade Standards.

1.5 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit one 300 x 300 mm corner sample of each type of wood door.
- .3 Show door construction, core, and faces.
- .4 Manufacturer's Instructions:

- .1 Submit manufacturer's installation instructions.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 Wood fire rated doors: labelled and listed by an organization accredited by Standards Council of Canada.
 - .2 Fabricate doors in accordance with Architectural Woodwork Manufacturers Association of Canada (AWMAC) Quality Standards for Architectural Woodwork, Part 4 Wood Doors, as a minimum, or such higher standards as specified herein.
- .2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Doors to be delivered to the site when all gypsum board and concrete work is dry and the building is closed to the weather.
- .2 Stack doors flat on carefully levelled supports consisting of three 2 x 4's placed the full width of the doors, one across the centre and the other two 12 inches (305 mm) in from each end, covered with a sheet of plywood or heavy cardboard to protect the face of the bottom door. Cover the top door in a similar manner. Keep doors entirely covered as partially covered doors may be "sunburned" (stained) by the light or warped.
- .3 Storage space to be dry and well ventilated. Doors not to be subject to rapid humidity and temperatures changes. Humidity over 60% or under 30% may cause permanent damage and will void manufacturer's warranty. Keep doors a minimum of 4 feet (1220 mm) away from heating sources or direct sunlight.
- .4 Condition doors to the average humidity of the site before hanging. If doors are to be stored more than a few days, all edges shall be sealed with moisture sealer, NOT sanding sealer.
- .5 When moving doors, lift straight up. Do not drag them one across another.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Dispose of packaging material in appropriate on-site bin for recycling in accordance with site waste management program.
- .3 Divert unused adhesive material from landfill to official hazardous material collections site approved by Owner and Consultant.

- .4 Do not dispose of unused paint materials into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

1.9 WARRANTY

- .1 Provide manufacturer's standard Lifetime door warranty with additional riders, if necessary, as described herein.
- .2 Doors shall be guaranteed against warpage or twisting to zero tolerance across face of door, in accordance with manufacturer's warranty.
- .3 Replace doors showing defects including warping, twisting, splitting, delamination, bubbling, sagging or showing core ghost lines occurring within the warranty period.
- .4 The standard warranty will apply from date of Substantial Performance.

PART - 2 PRODUCTS

2.1 WOOD FLUSH DOORS

- .1 Dry lumber to an average moisture content of between 6% and 12% maximum at time of manufacture.
- .2 Metal door frames: Refer to Section 08 11 00 – Hollow Metal Doors and Frames
- .3 Wood Veneer Faced Doors: 1-3/4 inch (45 mm) thick 7 Ply, Premium Grade, Anti-Warping Door having AWMAC No. 3 edge constructed in accordance with CAN/CSA O132.2 as a minimum, and as follows:
 - .1 Solid Core: non-combustible composite mineral core having minimum density of 454 kg/m³ (28 lbs/ft³) in accordance with CSA O188, and minimum compressive strength of 1724 kPa (250 lb/in²).
 - .2 Rails: non-combustible composite mineral firestop top rail at a minimum width of 5" (127mm) and bottom rail at a minimum width of 1 inch (25.40mm). provide mid rail for internal blocking to allow hardware to be screwed into the door.
 - .3 Edges: solid wood to match door face, at a minimum width of 7/8" (22.23mm), bonded to inner stile or mineral core (if inner stile is not required).
 - .4 Edge Profile: Single Acting Swing Doors: bevel 1/8 inch (3 mm) in 2 inches (50 mm).
 - .5 Adhesive: Hot-pressed, water-resistant type conforming to glue line requirements of CAN/CSA O132.2 Series. Adhesives must not contain urea-formaldehyde.
 - .6 Cross Ply: 1/8 inch (3 mm), 3-ply birch plywood, glued to core and stiles, cold pressed Type 1 PVA cross-linked glue.

- .7 Wood Veneer Faces: Match veneer type and species in existing wood doors. Joint occurring in the centre of the face panel, parallel to the door edges, veneers supplied from same source manufacturer:
 - .1 Finish: Three coat transparent stained factory applied system, A veneer grade both sides of door, matched veneers, no end matching allowed within face of door species, match and face symmetry as follows:
 - .1 Flat sliced, quarter cut, slip matched, centre balanced, maximum 8 flitches for each face of door, no exceptions.
 - .2 Veneer: Minimum 1/50 inch (0.50 mm) Clear and bright in colour with minimum of pin knots, mineral or sugar streaks, no open defects, heartwood, or wild grain, and minimal colour variation between flitches, meeting the requirements for Canadian Hardwood Plywood Association (CHPA) or Hardwood Plywood and Veneer Association (HPVA) quality grade and hardwood species as indicated.
- .8 Sealer: Compatible with field applied finish. Match existing wood door finish. Coordinate with Section 09 91 23 – Interior Painting. In an unpainted condition, sealer to be visually recognizable for ease of inspection in the field.
- .9 Hardware preparation: all hardware preparation must be completed by manufacturer. Fire rated doors shall not be altered after certification by manufacturer.
- .10 Fire rating: as indicated in the contract documents.

2.2 FABRICATION

- .1 Fabricate units under conditions which permit a balance control of the moisture content of all component parts to within range of 6% to 12 %.
- .2 Vertical edge strips to match face veneer.
- .3 Radius vertical edges of double acting doors to 2-3/8 inches (60 mm) radius.
- .4 No cut-outs permitted within 5 inch (127 mm) of sides and top of door or 10 inch (254 mm) from bottom of door.
- .5 Doors shall be pre-fitted, beveled, and machined at the factory for all mortise hardware items as per templates and approved hardware schedules provided.
- .6 Clearance between the door and frame shall be minimum 1/16" (1.5 mm) on the hinge side and 1/8" (3 mm) on the lock set side and top edge.
- .7 Bevel door edge so that door does not bind in frame.
- .8 Factory Machining:
 - .1 Coordinate with allied trades and perform factory machining.
 - .2 Undercut doors to accommodate carpet floor finish and bevel edges as required.

- .3 Do preparation, accurately cut openings for and pre-fit mortise hardware in accordance with hardware manufacturer's templates and finish hardware schedule.

PART - 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 INSTALLATION

- .1 Unwrap and protect doors in accordance with CAN/CSA-O132.2 Series, Appendix A.
- .2 Install labelled fire rated doors to NFPA 80.
- .3 Install doors and hardware in accordance with manufacturer's printed instructions and CAN/CSA-O132.2 Series, Appendix A.
- .4 Adjust hardware for correct function.

3.3 ADJUSTMENT

- .1 Re-adjust doors and hardware just prior to completion of building to function freely and properly.

3.4 CLEANING

- .1 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .2 Remove traces of primer, caulking, clean doors and frames.
- .3 On completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

PART - 1 GENERAL

1.1 DESCRIPTION OF WORK

- .1 This section includes design, labour, products, and services necessary for door hardware, in accordance with the Contract Documents.
- .2 All requirements of Division 01 apply to this section and are to be read in conjunction.

1.2 RELATED REQUIREMENTS

- .1 Metal Doors and Frames..... Section 08 11 00.
- .2 Flush Wood Doors..... Section 08 14 16.

1.3 REFERENCES

- .1 Ontario 2012 Building Code.
- .2 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
 - .1 ANSI/BHMA A156.1-2000, American National Standard for Butts and Hinges.
 - .2 ANSI/BHMA A156.2-2003, Bored and Preassembled Locks and Latches.
 - .3 ANSI/BHMA A156.4-2000, Door Controls - Closers.
 - .4 ANSI/BHMA A156.5-2001, Auxiliary Locks and Associated Products.
 - .5 ANSI/BHMA A156.6-2005, Architectural Door Trim.
 - .6 ANSI/BHMA A156.8-2005, Door Controls - Overhead Stops and Holders.
 - .7 ANSI/BHMA A156.13-2002, Mortise Locks and Latches Series 1000.
 - .8 ANSI/BHMA A156.16-2002, Auxiliary Hardware.
 - .9 ANSI/BHMA A156.18-2006, Materials and Finishes.
- .3 Canadian Steel Door and Frame Manufacturers' Association (CSDMA)
 - .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.

1.4 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for door hardware and include product characteristics, performance criteria, physical size, finish, and limitations.
- .3 Samples:
 - .1 Submit for review and acceptance of each unit.

- .2 Samples will be returned for inclusion into work.
- .3 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish, and hardware package number.
- .4 After approval samples will be returned for incorporation in Work.
- .4 Hardware List:
 - .1 Submit contract hardware list.
 - .2 Indicate specified hardware, including make, model, material, function, size, finish, and other pertinent information.
- .5 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .6 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for door hardware for incorporation into manual.

1.6 MAINTENANCE MATERIALS SUBMITTALS

- .1 Extra Stock Materials:
 - .1 Supply maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Tools:
 - .1 Supply 2 sets of wrenches for door closers and locksets.

1.7 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.
- .4 Storage and Handling Requirements:

- .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect door hardware from nicks, scratches, and blemishes.
- .3 Protect prefinished surfaces with wrapping and strippable coating.
- .4 Replace defective or damaged materials with new.
- .5 Develop Construction Waste Management Plan related to Work of this Section.
- .6 Packaging Waste Management: remove for reuse of packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART - 2 PRODUCTS

2.1 HARDWARE ITEMS

- .1 Use one manufacturer's products only for similar items.
- .2 Approved Manufacturers
 - .1 Butts and Hinges: Hager Hinge or Stanley or McKinney
 - .2 Locksets, Latchsets: Corbin Russwin, Sargent
 - .3 Floor/Wall Stops: Glynn-Johnson, Rockwood
 - .4 Kickplates: K.N. Crowder Mfg. Co., Rockwood
 - .5 Door Closers: L.C.N. Door Closers, Norton, Sargent
 - .6 Overhead door stops and Holders Glynn-Johnson Ltd., Rixson
 - .7 Automatic door bottom: K.N. Crowder Mfg. Co., Pemko
 - .8 Or Approved alternates.

2.2 DOOR HARDWARE

- .1 Locks and latches:
 - .1 All mortise sets to come complete with three-point anti-friction latchbolt, thru-bolted trim. Mortise locks and latches: to ANSI/BHMA A156.13, designed for function and keyed as stated in Hardware Schedule.
 - .2 Lever handles:
 - .1 Assa Abloy Lockwood 1220 Series, Brass Round Rose door handle, Lever 70 in Satin Chromed Brushed – SC finish.
 - .2 Or approved alternative to match existing.
 - .3 Escutcheons: round.
 - .4 Provide hardware finish:
 - .1 626 Satin Chrome finish.

- .2 Keying
 - .1 Provide a quantity of Master Keys/Misc. Keys/Key Blanks, as called for by Owner.
 - .2 All locking devices, without exception, shall be subject to established Corbin Russwin Grand Master system. Multiplex 6D4.
 - .3 Keying shall be as follows:
 - .4 All cylinders subject to line Grand Master Key.
 - .5 All cylinders subject to Construction Master Key.
 - .6 Construction cylinders to be supplied by Contractor for use during construction of new facilities.
 - .7 Keying system shall be based on owner's requirements.
- .3 Butts and hinges:
 - .1 Butts and hinges: to ANSI/BHMA A156.1, designated by letter A and numeral identifiers, followed by size and finish, listed in Door and Hardware Schedule.
- .4 Door Closers and Accessories:
 - .1 Door controls (closers): to ANSI/BHMA A156.4, designated in Door and Hardware Schedule, size in accordance with ANSI/BHMA A156.4, table A1.
 - .2 All surface mounted door closers to be fastened with through bolts and grommet or hex bolts and machine screws.
 - .3 Doors and frames must be reinforced as required.
- .5 Door Controls
 - .1 Overhead Stops/Holders - Overhead stops to be Glynn-Johnson or Rixson 1 Series, or approved alternate concealed type, ULC listing where required.
 - .2 Finish to be 626 Satin Chrome except where fitted to doors which have special finishes or coatings in which case the stop is to be the same finish, ULC listing where required.
- .6 Architectural door trim to ANSI/BHMA A156.6, designated by letter J and numeral identifiers listed in Hardware Schedule as listed below:
 - .1 Door protection plates: kick plate, 1.27 mm thick stainless steel.
 - .1 Sweep:
 - .1 Automatic door bottom: Extruded clear anodized Aluminum with Neoprene.
 - .2 Or approved alternative.

2.3 FASTENINGS

- .1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.
- .2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

- .3 Exposed fastening devices to match finish of hardware.
- .4 Use fasteners compatible with material through which they pass.

PART - 3 INSTALLATION

3.1 EXAMINATION

- .1 Before supplying materials, ensure by a check of drawings, shop drawings and details prepared for the project, that listed hardware is suitable by dimension and function for intended purposes.

3.2 INSTALLATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Supply metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
- .3 Supply manufacturers' instructions for proper installation of each hardware component.
- .4 Install hardware to standard hardware location dimensions in accordance with CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).
- .5 Where door stop contacts door pulls, mount stop to strike bottom of pull.
- .6 Use only manufacturer's supplied fasteners.
 - .1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.
- .7 Remove construction locks when directed by Owner and Consultant.
 - .1 Install permanent cores and ensure locks operate correctly.

3.3 ADJUSTING

- .1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.
- .2 Lubricate hardware, operating equipment, and other moving parts.
- .3 Adjust door hardware to ensure tight fit at contact points with frames.
- .4 Upon occupancy of building arrange an appointment with Owner's designated representative to instruct this person in the proper use, servicing, adjusting and maintenance of hardware.

3.4 MOUNTING HEIGHTS

- .1 The following is a schedule based on Ontario 2012 Building Code:

- .1 Locks/Latches: not less than 36 inch (900 mm) and not more than 43 inch (1100 mm) from center of strike to finished floor.
- .2 The above mounting heights are to be considered a general guide. the Installer must carefully check manufacturer's installation instructions packed with hardware products.
- .3 Conform to the requirements of the Ontario Building Code Section 3.8 and C.S.A. Standard CAN/CSA-B651-M90 for mounting hardware for barrier-free access routes and areas.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
 - .3 Remove protective material from hardware items where present.
 - .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 DEMONSTRATION

- .1 Keying System Setup:
 - .1 Set up key control system with file key tags, duplicate key tags, numerical index, alphabetical index and key change index, label shields, control book and key receipt cards.
 - .2 Turn over key to Owner and Consultant.
- .2 Maintenance Staff Briefing:
 - .1 Brief maintenance staff regarding:
 - .1 Proper care, cleaning, and general maintenance of projects complete hardware.
 - .2 Description, use, handling, and storage of keys.
 - .3 Use, application, and storage of wrenches for door closers, and locksets.
- .3 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.7 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by door hardware installation.

3.8 SCHEDULE

- .1 See Door and Hardware Schedule on Architectural drawings.

END OF SECTION

PART - 1 GENERAL

1.1 DESCRIPTION OF WORK

- .1 The work in this section includes design, labour, products, and services necessary for walls and partitions work in accordance with the Contract Documents.
- .2 All requirements of Division 01 apply to this section and are to be read in conjunction.

1.2 RELATED SECTIONS

- .1 Fire Stopping..... Section 07 84 00.
- .2 Joint Sealants..... Section 07 92 00.
- .3 Metal Doors and Frames..... Section 08 11 00.
- .4 Non-Structural Metal Framing..... Section 09 22 16.
- .5 Acoustical Panel Ceilings..... Section 09 51 13.
- .6 Resilient Tile Flooring..... Section 09 65 19.
- .7 Interior Painting..... Section 09 91 23.

1.3 REFERENCES

- .1 Ontario 2012 Building Code.
- .2 Aluminum Association (AA)
 - .1 AA DAF 45-03 (R2009), Designation System for Aluminum Finishes.
- .3 ASTM International
 - .1 ASTM C475-02 (2007), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - .2 ASTM C514-04(2009e1), Standard Specification for Nails for the Application of Gypsum Board.
 - .3 ASTM C840-08, Standard Specification for Application and Finishing of Gypsum Board.
 - .4 ASTM C954-07, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
 - .5 ASTM C1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 - .6 ASTM C1047-09, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - .7 ASTM C1280-99, Standard Specification for Application of Gypsum Sheathing.

- .8 ASTM C1177/C1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- .9 ASTM C1178/C1178M-08, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Board.
- .10 ASTM C1396/C1396M-09a, Standard Specification for Gypsum Wallboard.
- .4 Association of the Wall and Ceilings Industries International (AWCI)
 - .1 AWCI Levels of Gypsum Board Finish-97.
- .5 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-71.25-M88, Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.
- .6 Green Seal Environmental Standards (GS)
 - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .7 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102-07, Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.

1.4 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum board assemblies and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Submit duplicate 12 x 12 inches (300 x 300 mm) size samples of vinyl faced gypsum board and 12 inches (300 mm) long samples of corner and casing beads textured finishes.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store gypsum board assemblies' materials indoors and in dry location, in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

- .2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.
- .3 Protect from weather, elements and damage from construction operations.
- .4 Handle gypsum boards to prevent damage to edges, ends or surfaces.
- .5 Protect prefinished aluminum surfaces with wrapping strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
- .6 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 -Construction/Demolition Waste Management and Disposal.

1.6 AMBIENT CONDITIONS

- .1 Maintain temperature 10 degrees C minimum, 21 degrees C maximum for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimum after completion of joint treatment.
- .2 Apply board and joint treatment to dry, frost free surfaces.
- .3 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

PART - 2 PRODUCTS

2.1 MATERIALS

- .1 Gypsum Board: to ASTM C1396/C1396M
 - .1 Regular type: 5/8 inch (15.9 mm) thick, 4 feet (1200 mm) wide x maximum practical length, ends square cut, edges squared.
 - .1 Acceptable materials: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - .1 CGC Inc., Sheetrock;
 - .2 Georgia-Pacific Canada, Inc., Toughrock Gypsum Wallboard;
 - .3 CertainTeed, ProRoc Wallboard.
 - .2 Fire Resistive type: 5/8 inch (15.9 mm) thick minimum, 4 feet (1200 mm) wide x maximum practical length, ends square cut, edges squared; location where indicated for fire resistance rated assembly.
 - .1 Acceptable materials:
 - .1 CGC Inc., Sheetrock Firecode;
 - .2 Georgia Pacific Canada, Inc., Toughrock Fireguard;
 - .3 CertainTeed Inc., ProRoc Type X.

- .2 Metal furring runners, hangers, tie wires, inserts, and anchors.
- .3 Nails: to ASTM C514.
- .4 Steel drill screws: to ASTM C1002.
- .5 Stud adhesive: to CAN/CGSB-71.25 and ASTM C557.
- .6 Laminating compound: as recommended by manufacturer, asbestos-free.
- .7 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, metal, zinc-coated by hot-dip process, 0.5 mm base thickness, perforated flanges, one piece length per location.
- .8 Section 07 92 00 - Joint Sealants:
 - .1 VOC limit 250 g/L maximum.
 - .2 Acoustic sealant: in accordance with Section 07 92 00 - Joint Sealants.
- .9 Polyethylene: to CAN/CGSB-51.34, Type 2.
- .10 Insulating strip: rubberized, moisture resistant, 1/8 inch (3 mm) thick closed cell neoprene strip, 1/2 inch (12.7 mm) wide, with self-sticking permanent adhesive on one face, lengths as required.
- .11 Joint compound: to ASTM C475, asbestos-free.

2.2 FINISHES

- .1 Smooth finish: asbestos-free standard white texture coating and primer-sealer, recommended by gypsum board manufacturer.
 - .1 Primer: VOC limit 50 g/L maximum to GS-11.

PART - 3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for gypsum board assemblies' installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Owner and Consultant.
 - .2 Inform Owner and Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Owner and Consultant.

3.2 ERECTION

- .1 Do application and finishing of gypsum board to ASTM C840 except where specified otherwise.
- .2 Do application of gypsum sheathing to ASTM C1280.

- .3 Install work level to tolerance of 1:1200.
- .4 Install wall furring for gypsum board wall finishes to ASTM C840, except where specified otherwise.

3.3 APPLICATION

- .1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work have been approved.
- .2 Apply layers gypsum board as indicated to metal furring or framing using screw fasteners. Maximum spacing of screws 12 inches (300 mm) on centre.
- .3 Apply single layer gypsum board to concrete or concrete block surfaces, where indicated, using mechanical fasteners.
 - .1 Comply with gypsum board manufacturer's recommendations.
 - .2 Mechanically fasten gypsum board at top and bottom of each sheet.
- .4 Apply 1/2 inch (12 mm) diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts, and other penetrations, in partitions where perimeter sealed with acoustic sealant.
- .5 Install gypsum board on walls vertically to avoid end-butt joints, except where local codes or fire-rated assemblies require horizontal application.
- .6 Install gypsum board with face side out.
- .7 Do not install damaged or damp boards.
- .8 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.4 INSTALLATION

- .1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 6 inches (150) mm on centre.
- .2 Install casing beads around perimeter of suspended ceilings.
- .3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.
- .4 Construct control joints of back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint.
- .5 Provide continuous polyethylene dust barrier behind and across control joints.
- .6 Locate control joints at approximate 30 feet (10 m) spacing on long corridor runs and at approximate 45 feet (15 m) spacing on ceilings.
- .7 Install control joints straight and true.

- .8 Construct expansion joints, at building expansion and construction joints. Provide continuous dust barrier.
- .9 Install expansion joint straight and true.
- .10 Splice corners and intersections together and secure to each member with 3 screws.
- .11 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.
- .12 Gypsum Board Finish: finish gypsum board walls to following levels in accordance with AWCI Levels of Gypsum Board Finish:
 - .1 Levels of finish:
 - .1 Level 0: (for temporary construction) no tapping, finishing or accessories required.
 - .2 Level 5: (for areas to receive gloss, semi-gloss, enamel, or non-textural flat paints) embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; apply a thin skim coat of joint compound to entire surface; surfaces smooth and free of tool marks and ridges.
- .13 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.
- .14 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.
- .15 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
- .16 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.
- .17 Apply one coat of white primer sealer over surface to be textured. When dry apply textured finish in accordance with manufacturer's instructions.
- .18 Mix joint compound slightly thinner than for joint taping.
- .19 Apply thin coat to entire surface using trowel or drywall broad knife to fill surface texture differences, variations or tool marks.
- .20 Allow skim coat to dry completely.
- .21 Remove ridges by light sanding or wiping with damp cloth.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by gypsum board assemblies' installation.

END OF SECTION

PART - 1 GENERAL

1.1 DESCRIPTION OF WORK

- .1 This Section includes the requirements for the supply and installation of all non-load-bearing steel stud framing members for the following applications:
- .2 Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.).
- .3 All requirements of Division 01 apply to this section and to be read in conjunction.

1.2 RELATED SECTIONS

- .1 Fire Stopping..... Section 07 84 00.
- .2 Joint Sealants..... Section 07 92 00.
- .3 Metal Doors and Frames..... Section 08 11 00.
- .4 Gypsum Board Assemblies..... Section 09 21 16.

1.3 REFERENCES

- .1 Ontario 2012 Building Code.
- .2 CSA S136 North American Specification for the Design of Cold-Formed Steel Structural Members
- .3 ICC-ES-AC86, Acceptance criteria for Cold Formed Steel Framing Members – Interior Non-Loadbearing Wall Assemblies
- .4 ASTM International:
 - .1 ASTM A641/A641M Standard Specification for Zinc-Coated (Galvanized), Carbon Steel Wire
 - .2 ASTM C645-11a, Standard Specification for Nonstructural Steel Framing Members.
 - .3 ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - .4 ASTM A792/A792M Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
 - .5 ASTM A1003 Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-coated for Cold-Formed Framing Members
 - .6 ASTM C754-11, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
 - .7 ASTM C840 Standard Specification for Application and Finishing of Gypsum Board
 - .8 ASTM C1002 Standard Specification for Steel-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster bases to Wood Studs or Steel Studs

- .9 ASTM E119-20 Standard Test Methods for Fire Tests of Building Construction and Materials
- .10 ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
- .11 ASTM E413 Classification for Rating Sound Insulation
- .5 CAN/ULC S101 Standard Methods of Fire Endurance Tests of Building Construction and Materials
- .6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

1.4 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for metal framing and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit duplicate 12 inch (300 mm) long samples of non-structural metal framing.

1.5 QUALITY ASSURANCE

- .1 Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load bearing interior steel framing, provide materials and construction identical to those tested in assembly indicated according to CAN/ULC-S101.
- .2 STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413.
- .3 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 DESIGN CRITERIA

- .1 Conform to the requirements of fire-rated assemblies indicated on drawings which have been tested in accordance with CAN/ULC-S101 and provide fire resistance rating of 1 hour.
- .2 For Interior non-load bearing studs, conform to minimum design thickness:
 - .1 Web Depth: 92.1 mm (3.625 inch)

- .2 Flange Width: 41.3 mm (1.625 inch)
- .3 Base Steel Thickness: 0.455 mm (25 ga)
- .3 A non-load bearing (non-structural) member is defined as a member in a steel-framed system which is limited to transverse (out-of-plane) load of not more than 480 PA, a superimposed axial load, exclusive of sheathing materials, of not more than 1460 N/m, or a superimposed axial load of not more than 890 N.
- .4 A load bearing (structural) stud may be used in a non-load bearing application; however, non-load bearing members (studs or track) may never be used in a load bearing (axial and/or wind loading) applications.

1.7 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for metal framing and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit duplicate 12 inch (300 mm) long samples of non-structural metal framing.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect metal framing from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section.
- .5 Packaging Waste Management: remove for reuse of packaging materials as specified in Construction Waste Management Plan.

PART - 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- .1 Provide non-load bearing steel stud framing and accessories as manufactured by Bailey Metal Products or approved equal.

2.2 MATERIALS

- .1 Non-load bearing Steel Framing, General
 - .1 Steel sheet components shall comply with ASTM C645 requirements for metal, unless otherwise indicated.
 - .2 Steel for non-load bearing members shall have metallic coatings that conform to ASTM A653M or ASTM A792M with minimum metallic coating weights (mass) of Z120 and AZM150 respectively. Alternative coatings shall be permitted to be used if proven to have equivalent corrosion protection.
 - .3 Framing members shall comply with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) for conditions indicated.
- .2 Suspension System Components
 - .1 Tie wire shall comply with ASTM A641/A641M zinc-coated, soft-annealed, 1.21 mm minimum diameter, or of a material and size having equivalent corrosion resistance and strength.
 - .3 Hanger wire shall comply with ASTM A641/A641M zinc-coated, soft-annealed, 3.77 mm minimum diameter, or of a material and size having equivalent corrosion resistance and strength.
- .4 Carrying Channels
 - .1 Channels shall conform to ASTM C754 and shall be cold-formed from steel with minimum 228 MPa yield strength and 1.37 mm base steel thickness.
 - .2 Channels shall have a minimum coating of Z120 galvanizing in accordance with ASTM A653/A653M. Other coatings (eg. Aluminum-zinc alloy to ASTM A792/A792M) providing Equal or better corrosion protection may also be used.
 - .3 Carrying channels shall have minimum 12.7 mm wide flanges and minimum depth of 38 mm.
- .5 Furring Members
 - .1 Steel stud shall be manufactured from steel in accordance with the AISI North America Standard for Cold-Formed Steel Framing (Product Data) and shall have a minimum base Steel thickness of 0.455 mm and a depth of 92.1 mm.
- .6 Steel Framing for Framed Assemblies
 - .1 Steel studs and track shall be in accordance with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) and shall have minimum base steel thickness of 0.455 mm and a depth of 92.1 mm.
 - .2 Slip-Type Head Joints, provide one of the following:
 - .1 Deflection Track: steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than 0.455 mm for studs and width to accommodate depth of studs.
 - .2 Single Long-Leg Track: track complying with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) with 50.8 mm deep flanges in thickness not less than indicated for studs, installed with

- studs friction-fit into top track and with continuous bridging located within 305 mm of the top studs to provide lateral bracing.
- .3 Double-Track System: track complying with AISI North American Standard for Cold-Formed Steel Framing (Product Data), inside track with 50.8 mm deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction fit inside track.
- .3 Flat Strap and Backing Plate
 - .1 Sheet steel for blocking and bracing in length and width to coordinate with equipment sizes.
 - .2 Minimum base steel thickness is 0.455 mm.
- .4 Channel bridging shall comply with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) and shall have a minimum base steel thickness of 0.455 mm with minimum 12.7 mm wide flanges and depth of 19.1 mm.
- .7 Fasteners for Metal Framing: of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates in accordance with ASTM C1002.

PART - 3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for non-structural metal framing application in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Owner and Consultant.
 - .2 Inform Owner and Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Owner and Consultant.

3.2 PREPARATION

- .1 Coordination with Sprayed Fire-Resistive Materials
 - .1 Where existing sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load bearing steel framing.
 - .2 Attach offset anchor plates or ceiling track to surfaces and reapply the same sprayed fire-resistive materials as existing or accepted alternative, to reinstate the existing fire rating of the assemblies.
 - .3 Do not reduce thickness of existing fire-resistive materials and protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION

- .1 General

- .1 Installation Standard:
 - .1 ASTM C754, except comply with framing sizes and spacing indicated.
 - .2 Gypsum Board Assemblies: Also comply with requirements in ASTM C841 that apply to framing installation.
- .2 Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- .3 Attach gypsum board and/or exterior sheathing where noted, securely with tight fitting joints.
- .4 Install bracing at terminations in assemblies.
- .5 Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.
- .2 Installing Framed Assemblies
 - .1 Where studs are installed directly against dissimilar metals, install isolation strip between studs and dissimilar metals.
 - .2 Install studs so flanges within framing system point in same direction.
 - .1 Space studs vertically at 400 mm (16 inch) on centre and not more than 50 mm (2 inch) from abutting walls, and at each side of openings and corners.
 - .2 Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.
 - .3 Install track floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings. Continue framing around ducts penetrating portions of structure.
 - .1 Slip-Type Head Joints: where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies due to deflection of structure.
 - .2 Door Openings: screw vertical studs at jambs to jamb anchor clips to door frames; install track section (for cripple studs) at head and secure to jamb studs.
 - .1 Install two studs at each jamb, unless otherwise indicated.
 - .2 Install cripple studs at head adjacent to each jamb stud, with a minimum 12.7 mm (1/2 inch) clearance from jamb stud to allow for installation of control joint in finished assembly.
 - .3 Fire-Resistance-Rated Partitions: install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure. Attach studs to bottom and ceiling track using screws and crimp method.
 - .4 Sound-Rated Partitions: install framing to comply with sound-rated assembly indicated.
 - .4 Direct Furring

- .1 Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or power-driven fasteners spaced 610 mm (24 inch) o.c.
- .5 Installation Tolerance: install each framing member so fastening surfaces vary not more than 3 mm (1/8 inch) from the plane formed by faces adjacent framing.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by non-structural metal framing application.

END OF SECTION

PART - 1 GENERAL

1.1 DESCRIPTION OF WORK

- .1 The work in this section includes:
 - .1 Materials and application of acoustical units for direct application or for application and installation within a suspended ceiling, in accordance with the Contract Documents materials.
- .2 All requirements of Division 01 apply to this section and are to be read in conjunction.

1.2 RELATED SECTIONS

- .1 Gypsum Board Assemblies..... Section 09 21 16
- .2 Non-Structural Metal Framing..... Section 09 22 16

1.3 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C423-02a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 - .2 ASTM E1264-98, Standard Classification for Acoustical Ceiling Products.
 - .3 ASTM E1477-98a (2003), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .5 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102-2003, Surface Burning Characteristics of Building Materials and Assemblies.

1.4 SUBMITTALS

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit duplicate full-size samples of each type of acoustical units.

1.5 QUALITY ASSURANCE

- .1 Regulatory Requirements:

- .1 Fire-resistance rated wall, floor, and ceiling assembly: certified by Canadian Certification Organization accredited by Standards Council of Canada.
- .2 Mock-up:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .2 Construct mock-up 16 square feet (1.48 m²) minimum of each type of acoustical tile ceiling including one inside corner and one outside corner.
 - .3 Construct mock-up where directed.
 - .4 Allow 24 hours for inspection of mock-up by Owner and Consultant before proceeding with ceiling work.
 - .5 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.
- .3 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Protect on site stored or installed absorptive material from moisture damage.
- .2 Store extra materials required for maintenance, where directed by Owner and Consultant.
- .3 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction /Demolition Waste Management and Disposal.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

1.7 ENVIRONMENTAL REQUIREMENTS

- .1 Permit wet work to dry before beginning to install.
- .2 Maintain uniform minimum temperature of 21 degrees C and humidity of 20% - 40% before and during installation.
- .3 Store materials in work area 48 hours prior to installation.

1.8 EXTRA MATERIALS

- .1 Provide extra materials of acoustic units in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Provide acoustical units amounting to 2% of gross ceiling area for each pattern and type required for project.
- .3 Ensure extra materials are from same production run as installed materials.
- .4 Clearly identify each type of acoustic unit, including colour and texture.

- .5 Deliver to Owner, upon completion of the work of this section.

PART - 2 PRODUCTS

2.1 MATERIALS

- .1 Acoustic Lay-in Panels:
 - .1 2'-0" x 4'-0" x 3/4" (610 mm x 1220 mm x 19 mm), Class A, non-combustible mineral fiber, square edge, white factory-painted exposed surface, minimum 0.65 NRC rating, and minimum 35 CAC rating.
- .2 Manufacturer:
 - .1 CGC Inc.
 - .2 Armstrong World Industries.
 - .3 Approved alternate.
- .3 CAN/ULC-S102 & ASTM E-84.
- .4 Smoke developed 50 or less in accordance with CAN/ULC-S102.
- .5 Staples, nails and screws: to CSA B111 non-corrosive finish as recommended by acoustic unit manufacturer.
- .6 Panel hold down clips: purpose made clips to secure tile to suspension system, approved for use in fire-rated systems.
- .7 Acoustic units for suspended ceiling system: to CAN/CGSB-92.1 & ASTM E1264; Class A.

2.2 METAL SUSPENSION SYSTEM

- .1 Metal Suspension System: Manufacturer's standard direct hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C635 requirements and as supplied by same materials supplier as acoustic panels for intermediate duty, exposed tee bar and as follows:
 - .1 Tee bar grid face width: 15/16" (24 mm) flange x 1-1/2" (38 mm) leg zinc coated cold rolled steel, factory finished satin white.
 - .2 Module: Sized as appropriate to acoustic panel size.
 - .3 Hangers, Braces and Ties: minimum 2.78 mm, 12 ga dia. steel wire, galvanized.
 - .4 Exposed Finish: Manufacturer's standard satin, white finish.
 - .5 Metal Closures and Trim: Bonderized and with factory-applied white baked enamel finish. Use anchors standard with manufacturer.
 - .6 Edge mouldings: by CGC or Bailey to compliment ceiling grid, and installed around ceiling perimeters, in factory finished satin white on zinc coated cold rolled steel.
 - .7 Corrosion Resistance: Hot dip galvanized or stainless steel components.

- .8 Acceptable materials: materials to match products specified, use only materials from same manufacturers of panel products.
- .9 Adhesive: Low VOC type recommended by acoustic unit manufacturer

PART - 3 EXECUTION

3.1 EXAMINATION

- .1 Inspect substrates to determine suitability and completeness. Correct failure of this work due to unsatisfactory existing conditions at no increase in Contract Price. Similarly, if the work needs to be removed to correct defects in substrates or previously place work, perform both removal and replacement at no increase in Contract Price.
- .2 Do not install acoustical panels and tiles until work above ceiling has been inspected by Owner and Consultant.

3.2 INSTALLATION

- .1 Install acoustical panels and tiles in ceiling suspension system in accordance with the manufacturer's printed instructions. Match the appearance and construction of the accepted mock-ups.
- .2 Install suspension systems in accordance with ASTM C636, insofar as it is consistent with other requirements of this specification.
- .3 Install ceilings in the indicated locations, level to within a tolerance of 1/8 inch in 12 feet.
- .4 Attach hangers directly to the structure wherever possible. Elsewhere attach them in V Pairs, or to nested carrying channels suspended below the obstruction. Do not kink or bend suspension wires to fit around obstructions or to adjust ceiling height.
- .5 Do not use powder actuated fasteners. Ensure that fastening methods used cannot damage building structure.
- .6 Furnish additional hangers at lay in electrical fixtures furnish additional hangers, one at each corner and, if required, stabilizer bars to prevent overloading or rotation of the suspension members.
- .7 Unless otherwise indicated centre pattern of board in room or area so that perimeter board not less than half the panel size.
- .8 Use sheet metal fillers where any face dimension of a piece of acoustic board, measured from centre of Tee to face of wall is less than 3 inches.
- .9 All cuts in ceiling panels are to be edge banded to minimize loose fibres getting airborne. Strictly adhere to manufacturer's printed instructions.
- .10 Secure panels with panel manufacturer recommended hold-down clips.

3.3 APPLICATION

- .1 Install adhesive bonded acoustic units to clean, dry and firm substrate.

- .2 Install acoustical units parallel to building lines with edge unit not less than 50% of unit width with directional pattern running in same direction. Refer to reflected ceiling plan.
- .3 Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding.

3.4 INTERFACE WITH OTHER WORK

- .1 Co-ordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.

3.5 SCHEDULE

- .1 Refer to Room Finish Schedule.

3.6 ADJUSTING AND CLEANING

- .1 After interior finishing work has been substantially completed, or when directed by Owner and Consultant, inspect acoustical treatment work. Replace broken, chipped or damaged work, reset loose units or units out of place, and touch up marred surfaces with matching paint. Upon completion of the Project, clean acoustical surfaces free from dirt and other markings and in good condition acceptable to Owner and Consultant.

END OF SECTION

PART - 1 GENERAL

1.1 DESCRIPTION OF WORK

- .1 This section includes design, labour, products, and services necessary for resilient tile flooring work, in accordance with the Contract Documents.
- .2 All requirements of Division 01 apply to this section and are to be read in conjunction.

1.2 RELATED REQUIREMENTS

- .1 Metal Doors and Frames..... Section 08 11 00.
- .2 Gypsum Board Assemblies Section 09 21 16.
- .3 Interior Painting..... Section 09 91 23.

1.3 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
 - .2 ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
 - .3 ASTM F 1066 Standard Specification for Vinyl Composition Tile.
 - .4 ASTM F 1861 Standard Specification for Resilient Wall Base.
 - .5 ASTM F 1869 Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- .2 National Fire Protection Association (NFPA):
 - .1 NFPA 253 Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
 - .2 NFPA 258 Standard Test Method for Measuring the Smoke Generated by Solid Materials
- .3 Canadian Standards
 - .1 CAN/ULC-S102.2 Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.4 SYSTEM DESCRIPTION

- .1 Performance Requirements: Provide flooring which has been manufactured, fabricated, and installed to performance criteria certified by manufacturer without defects, damage, or failure.

- .2 Administrative Requirements
 - .1 Pre-installation Meeting: Conduct an on-site pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Section 01 31 19 – Project Meetings.
 - .2 Pre-installation Testing: Conduct pre-installation testing as follows: moisture tests, bond test, pH test, etc. as required by manufacturer.
- .3 Test Installations/Mock-ups: Install at the project site a job mock-up using acceptable products and manufacturer approved installation methods, including concrete substrate testing. Obtain Owner's and Consultant's acceptance of finish color, texture and pattern, and workmanship standards.
 - .1 Mock-Up Size: 16 sq. ft. (1.48 sq. m.)
 - .2 Incorporation: Mock-up may be incorporated into the final construction with Owner's approval.
- .4 Sequencing and Scheduling
 - .1 Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring.
 - .2 Do not install flooring over concrete slabs until they are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond, moisture tests and pH test.

1.5 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide product data, including Safety Data Sheets (SDS), in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Provide the manufacturer's standard samples showing the required colors for flooring and applicable accessories in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit duplicate tile in size specified, base, nosing, feature strips, treads, edge strips 12" (300 mm) long.
- .4 Submit shop drawings, seaming plan, coving details, and manufacturer's technical data, installation and maintenance instructions for flooring and accessories in accordance with Section 01 33 00 - Submittal Procedures.
- .5 If required, submit the manufacturer's certification that the flooring has been tested by an independent laboratory and complies with the required fire tests.
- .6 Closeout Submittals:
 - .1 Provide operation and maintenance data for resilient flooring for installed products for incorporation into manual specified in Section 01 78 00 - Closeout Submittals. Include methods for maintaining installed products, and

precautions against cleaning materials and methods detrimental to finishes and performance.

- .2 Warranty: provide the manufacturer's Warranty documents for the installed products.

1.6 QUALITY ASSURANCE

- .1 Single-Source Responsibility: provide types of flooring and accessories supplied by one manufacturer, including moisture mitigation systems, primers, leveling and patching compounds, and adhesives.
- .2 Select an installer who is experienced and competent in the installation of resilient vinyl composition tile flooring and the subfloor preparation products.
 - .1 Engage installers certified by the manufacturer.
 - .2 Confirm installer's certification by requesting their credentials.
- .3 Fire Performance Characteristics: Provide resilient vinyl composition tile flooring with the following fire performance characteristics as determined by testing material in accordance with ASTM test methods indicated below by a certified testing laboratory or other testing agency acceptable to authorities having jurisdiction:
 - .1 ASTM E 648 Critical Radiant Flux of 0.45 watts per sq. cm. or greater, Class I
 - .2 ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or less
 - .3 CAN/ULC-S102.2 – Flame Spread Rating and Smoke Developed – Results as tested.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- .3 Deliver materials in good condition to the jobsite in the manufacturer's original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.
- .4 Store materials in a clean, dry, enclosed space off the ground, protected from harmful weather conditions and at temperature and humidity conditions recommended by the manufacturer. Protect adhesives from freezing. Store flooring, adhesives, and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.
- .5 Waste Management and Disposal:
 - .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.8 ENVIRONMENTAL CONDITIONS

- .1 Maintain a minimum temperature in the spaces to receive the flooring and accessories of 65° F (18° C) and a maximum temperature of 100° F (38° C) for at least 48 hours before, during, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55° F (13° C) in areas where work is completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances. Refer to product installation recommendations for a complete guide on project conditions.

1.9 MAINTENANCE

- .1 Extra Materials: Deliver extra materials to Owner. Furnish extra materials from same production run as products installed. Packaged with protective covering for storage and identified with appropriate labels.
 - .1 Provide maintenance materials of resilient tile flooring, base, and adhesive in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Provide 45 sq. ft. (4.18 m2) of each colour, pattern and type flooring material installed, for maintenance use.
 - .3 Extra materials from same production run as installed materials.
 - .4 Identify each container of floor tile and each container of adhesive.
 - .5 Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage, and protection of extra material.

PART - 2 PRODUCTS

2.1 MATERIALS

- .1 Provide Vinyl Composition Tile:
 - .1 Description: Tile composed of polyvinyl chloride resin, plasticizers, fillers, stabilizers and pigments with colors and texture dispersed uniformly throughout its entire thickness.
 - .2 Vinyl composition tile shall conform to the requirements of ASTM F 1066, Composition 1 - non asbestos Class 1 - thorough pattern.
 - .3 Pattern and Color: in currently available range of standard colour selected by Owner and Consultant.
 - .4 Size: 12 in. x 12 in. (305 x 305 mm)
 - .5 Thickness: 1/8 in. (3.2 mm)
 - .6 Slip Resistant: ADA compliant
 - .7 Flammability: ASTM E 648, Class 1>0.45 CRF
 - .8 Acceptable manufacturer: Armstrong or Tarkett or approved equivalent.
 - .1 Manufacturer must have a headquarters in Canada.

- .2 For top set wall base: Provide 1/8 in. (3.2 mm) thick, 4 in. (101.6 mm) high wall base with a matte finish, conforming to ASTM F 1861, Rubber, Thermoplastic, Solid, Cove including premoulded end stops and external corners for coved base only, of colours selected by Owner and Consultant.
 - .1 Acceptable product: Armstrong or Johnsonite, Color-Integrated Vinyl Wall Base, Colour: as selected by Consultant from manufacturer's currently available standard colours, or approved equivalent.
- .3 Primers and adhesives: waterproof, recommended by flooring manufacturer for specific material on applicable substrate, above, at or below grade.
 - .1 Flooring adhesives:
 - .1 Adhesive: maximum VOC limit 50 g/L.
 - .2 Cove base adhesives:
 - .1 Adhesive: maximum VOC limit 50 g/L.
- .4 Sub-floor filler and leveller: 2-part latex-type filler requiring no water as recommended by flooring manufacturer for use with their product.
- .5 Sealer: to CAN/CGSB-25.20, Type 2-water based recommended by flooring manufacturer.
 - .1 Sealant:
 - .1 Sealant: maximum VOC limit 50 g/L.
- .6 Wax: to CAN/CGSB-25.21 recommended by flooring manufacturer.

PART - 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSPECTION

- .1 Ensure concrete floors are dry, by using test methods recommended by tile manufacturer.

3.3 SUB-FLOOR TREATMENT

- .1 Remove existing flooring finish where available.
- .2 Remove or treat old adhesives to prevent residual, old flooring adhesives from bleeding through to new flooring and/or interfering with the bonding of new adhesives.
- .3 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.
- .4 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.

- .5 Seal concrete sub-floor to flooring manufacturer's printed instructions.

3.4 TILE APPLICATION

- .1 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least one month following building occupation.
- .2 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 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles minimum half tile width.
- .4 Install flooring to square grid pattern with joints aligned.
- .5 As installation progresses, and after installation, roll flooring in 2 directions except including resilient tile with 45 kg minimum roller to ensure full adhesion.
- .6 Cut tile and fit neatly around fixed objects.
- .7 Install feature strips and floor markings where indicated. Fit joints tightly.
- .8 Install flooring in pan type floor access covers. Maintain floor pattern.
- .9 Continue flooring through areas to receive movable type partitions without interrupting floor pattern.
- .10 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.
- .11 Install transition strips at unprotected or exposed edges where flooring terminates.

3.5 WALL BASE APPLICATION

- .1 Lay out wall base to keep number of joints at minimum. Base joints at maximum length available or at internal or premoulded corners.
- .2 Clean substrate and prime with one coat of adhesive.
- .3 Apply adhesive to back of base.
- .4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.
- .5 Install straight and level to variation of 1:1000.
- .6 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.
- .7 Cope internal corners. Use premoulded corner units for right angle external corners. Use formed straight base material for external corners of other angles, minimum 12" (300 mm) each leg. Wrap around toeless base at external corners.
- .8 Install toeless type base before installation of carpet on floors.

3.6 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.7 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Remove excess adhesive from floor, base and wall surfaces without damage.
- .3 Clean, seal and wax floor and base surface to flooring manufacturer's instructions. In carpeted areas clean, seal and wax base surface before carpet installation.

3.8 PROTECTION

- .1 Protect installed flooring from time of final set of adhesives until final inspection, as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.
- .2 Prohibit traffic on floor for 48 hours after installation.

END OF SECTION

PART - 1 GENERAL

1.1 DESCRIPTION OF WORK

- .1 Section Includes:
 - .1 The work of this section is for the painting and finishing of all areas as the Contract drawings and specifications, but not limited to the following surfaces: drywall, and metal door frames.
 - .2 All requirements of Division 01 apply to this section and are to be read in conjunction.

1.2 RELATED SECTIONS

- .1 Joint Sealants..... Section 07 92 00.
- .2 Hollow Metal Doors and Frames..... Section 08 11 00.
- .3 Gypsum Board Assemblies..... Section 09 21 16.

1.3 REFERENCES

- .1 CAN/CGSB-1.57, Interior Alkyd Semigloss Enamel.
- .2 CAN/CGSB-1.60, Interior Alkyd Gloss Enamel.
- .3 CAN/CGSB-1.100, Interior Flat Latex Paint.
- .4 CAN/CGSB-1.119, Interior Latex Primer-Sealer.
- .5 CAN/CGSB-1.188, Emulsion Filler for Masonry Block.
- .6 CAN/CGSB-1.195, Interior Latex Semigloss Paint.
- .7 CAN/CGSB 85-GP-10M, Protective Coating for Metals.
- .8 CAN/CGSB 85-GP-100M, Painting.
- .9 Canadian/Ontario Painting Contractors' Association (CPCA/OPCA) Painting Specification Manual.
- .10 Environmental Protection Agency (EPA)
 - .1 EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 - [1995], (for Surface Coatings).
- .11 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .12 Master Painters Institute (MPI)
 - .1 MPI Architectural Painting Specifications Manual, 2004.
- .13 National Fire Code of Canada - 2010
- .14 Society for Protective Coatings (SSPC)

- .1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.

1.4 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Conform to the standards contained in the MPI Manual.
 - .1 Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and as follows:
 - .1 Have a minimum of five (5) years proven satisfactory experience and shall show proof before commencement of work that he will maintain a qualified crew of painters throughout the duration of the work.
 - .2 When requested provide a list of the last three comparable jobs including, name and location, specifying authority, start and completion dates and cost amount of the painting work.
 - .3 Only qualified journeymen who have a Tradesman Qualification Certificate of Proficiency shall be engaged in painting and decorating work.
 - .4 Apprentices may be employed provided they work under the direct supervision of a qualified journeyman in accordance with trade regulations.
 - .2 Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats and as follows:
 - .1 Use only paint manufacturers and products as listed under the Approved Products section of the MPI Manual Architectural Painting Specification Manual.
 - .3 Mock-Ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .1 Provide 6'-0" x 6'-0" mock-up. Prepare and paint designated surface, area, room or item (in each colour scheme) to specified requirements, with specified paint or coating showing selected colours, gloss/sheen, and textures.
 - .2 Mock-up will be used:
 - .1 To judge workmanship, substrate preparation, operation of equipment and material application and workmanship to MPI Architectural Painting Specification Manual standards.
 - .3 Locate where directed. Allow 24 hours for inspection of mock-up before proceeding with work.
 - .4 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may not remain

as part of finished work. Remove mock-up and dispose of materials when no longer required and when directed by Owner and Consultant.

- .4 Pre-Installation Meeting:
 - .1 Convene pre-installation meeting one week prior to beginning work of this Section on-site installations.
 - .2 Verify project requirements.
 - .3 Review installation and substrate conditions.
 - .4 Coordination with other building subtrades.
 - .5 Review manufacturer's installation instructions and warranty requirements.

1.5 SCHEDULING

- .1 Submit work schedule for various stages of painting to Owner and Consultant for review. Submit schedule minimum of 48 hours in advance of proposed operations.
- .2 Obtain written authorization from Owner and Consultant for changes in work schedule.
- .3 Schedule painting operations to prevent disruption of occupants.

1.6 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit product data and instructions for each paint and coating product to be used.
 - .2 Submit product data for the use and application of paint thinner.
 - .3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOCs during application and curing.
- .3 Samples:
 - .1 List of Materials - A list of materials proposed for use on the work, prepared by the paint manufacturer, shall be submitted in writing to the Consultant for approval at least thirty (30) days before the materials are required. The list shall bear the manufacturers official certification that the materials listed thereon are the best quality made by the company.
 - .2 Submit full range colour sample chips to indicate where colour availability is restricted.
 - .3 Provide three (3) 12" x 12" colour samples of each type of finish specified with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:

- .1 1/8 inch plate steel for finishes over metal surfaces.
- .2 1/2 inch gypsum board for finishes over gypsum board and other smooth surfaces.
- .4 Submit samples to Consultant for acceptance. Clearly identify colour samples with location of intended application.
- .5 Retain accepted colour and finish samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
- .6 Test reports: submit certified test reports for paint from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
 - .1 Lead, cadmium and chromium: presence of and amounts.
 - .2 Mercury: presence of and amounts.
 - .3 Organochlorines and PCBs: presence of and amounts.
- .7 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .8 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation [application] instructions.
- .9 Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals include following:
 - .1 Product name, type and use.
 - .2 Manufacturer's product number.
 - .3 Colour numbers.
 - .4 MPI Environmentally Friendly classification system rating.

1.7 MAINTENANCE

- .1 Extra Materials:
 - .1 Deliver to extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 00 - Closeout Submittals.
 - .2 Quantity: provide four litres can of each type and colour of primer stain and finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
 - .3 Delivery, storage, and protection: comply with Owner and Consultant requirements for delivery and storage of extra materials.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Packing, Shipping, Handling and Unloading:
 - .1 Pack, ship, handle, and unload materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's written instructions.

- .2 Acceptance at Site:
 - .1 Identify products and materials with labels indicating:
 - .1 Manufacturer's name and address.
 - .2 Type of paint or coating.
 - .3 Compliance with applicable standard.
 - .4 Colour number in accordance with established colour schedule.
- .3 Remove damaged, opened, and rejected materials from site.
- .4 Storage and Protection:
 - .1 Provide and maintain dry, temperature controlled, secure storage.
 - .2 Store materials and supplies away from heat generating devices.
 - .3 Store materials and equipment in well-ventilated area with temperature range 7 degrees C to 30 degrees C.
- .5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
- .6 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.
- .7 Remove paint materials from storage only in quantities required for same day use.
- .8 Fire Safety Requirements:
 - .1 Provide one 20 lbs. (9 kg) capacity CO2 fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers, and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.
- .9 Waste Management and Disposal:
 - .1 Separate waste materials for [reuse] [recycling] in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
 - .3 Collect and separate for disposal all packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan (WMP).
 - .4 Separate for recycling and place in designated containers Metal and Plastic waste in accordance with Waste Management Plan (WMP).
 - .5 Place materials defined as hazardous or toxic in designated containers.
 - .6 Handle and dispose of hazardous materials in accordance with Regional and Municipal, regulations.

- .7 Ensure emptied containers are sealed and stored safely.
- .8 Unused paint and coating materials must be disposed of at official hazardous material collections site as approved by Owner and Consultant.
- .9 Paint, stain and wood preservative finishes and related materials (thinners, and solvents) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.
- .10 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
- .11 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
- .12 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into ground follow these procedures:
 - .1 Retain cleaning water for water-based materials to allow sediments to be filtered out.
 - .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
 - .3 Return solvent and oil-soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
 - .4 Dispose of contaminants in approved legal manner in accordance with hazardous waste regulations.
 - .5 Empty paint cans are to be dry prior to disposal or recycling (where available).
- .13 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.
- .14 Set aside and protect surplus and uncontaminated finish materials: Deliver to or arrange collection by employees, individuals, or organizations for verifiable re-use or re-manufacturing.

1.9 SITE CONDITIONS

- .1 Heating, Ventilation and Lighting:
 - .1 Ventilate enclosed spaces remove odours, evaporating solvents and moisture.
 - .2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.
 - .3 Provide continuous ventilation for seven days after completion of application of paint.
 - .4 Coordinate use of existing ventilation system with Owner and ensure its operation during and after application of paint as required.

- .5 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
- .6 Provide minimum lighting level of 323 Lux on surfaces to be painted.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
 - .1 Unless pre-approved written approval by and product manufacturer, perform no painting when:
 - .1 Ambient air and substrate temperatures are below 10 degrees C.
 - .2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.
 - .3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.
 - .4 The relative humidity is under 85% or when the dew point is more than 3 degrees C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.
 - .5 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.
 - .2 Perform painting work when maximum moisture content of the substrate is below:
 - .1 12% for plaster and gypsum board.
- .3 Surface and Environmental Conditions:
 - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
 - .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.
 - .3 Apply paint when previous coat of paint is dry or adequately cured.
- .4 Additional interior application requirements:
 - .1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.
 - .2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Owner and Consultant such that painted surfaces will have dried and cured sufficiently before occupants are affected.

1.10 WASTE MANAGEMENT

- .1 Do not dispose of paints or solvents by pouring on the ground.

- .2 Empty paint cans are to be dry prior to disposal.
- .3 Solvent based paints, wood preservatives, stains, and finishes, which cannot be reused, must be treated as hazardous waste and disposed of in an appropriate manner in accordance with hazardous waste regulations.

1.11 WARRANTY

- .1 Provide a written warranty for painting specified in this section as per the Contract, including materials and application, at no cost to the Owner.
- .2 The Contractor shall warrant that the painting will be free of defects related to workmanship and/or material deficiency. The following shall be specifically covered under the warranty: scaling, crazing, cracking, crumbling, bubbling, shrinkage, running, sagging, change of colour, loss of adhesion, loss of cohesion and staining of adjoining or adjacent materials or surfaces.
- .3 Correct deficiencies immediately. Any repair(s) required under the warranty shall be carried out in accordance with the requirements of this Specification and with the recommendations of the Consultant.

PART - 2 PRODUCTS

2.1 MATERIALS

- .1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.
- .2 Provide paint materials for paint systems from single manufacturer.
- .3 Only qualified products with E2 "Environmentally Friendly" rating are acceptable for use on this project.
- .4 Conform to latest MPI requirements for interior painting work including preparation and priming.
- .5 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.
- .6 Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as required.
- .7 Provide paint products meeting MPI "Environmentally Friendly" E2 ratings based on VOC (EPA Method 24) content levels.
- .8 Use MPI listed materials having minimum E2 rating where indoor air quality (odour) requirements exist.
- .9 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids:
 - .1 Water-based.
 - .2 Non-flammable and biodegradable.

- .3 Manufactured without compounds which contribute to ozone depletion in the upper atmosphere.
- .4 Manufactured without compounds which contribute to smog in the lower atmosphere.
- .5 Do not contain methylene chloride, chlorinated hydrocarbons, and toxic metal pigments.
- .10 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium, or their compounds.
- .11 Flash point: 61.0 degrees C or greater for water-borne surface coatings and recycled water-borne surface coatings.
- .12 Ensure manufacture and process of both water-borne surface coatings and recycled water-borne surface coatings does not release:
 - .1 Matter in undiluted production plant effluent generating 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to natural watercourse or sewage treatment facility lacking secondary treatment.
 - .2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to natural watercourse or a sewage treatment facility lacking secondary treatment.
- .13 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes to meet minimum "Environmentally Friendly" E2 rating.
- .14 Recycled water-borne surface coatings to contain 50 % post-consumer material by volume.
- .15 Recycled water-borne surface coatings must not contain:
 - .1 Lead in excess of 600.0 ppm weight/weight total solids.
 - .2 Mercury in excess of 50.0 ppm weight/weight total product.
 - .3 Cadmium in excess of 1.0 ppm weight/weight total product.
 - .4 Hexavalent chromium in excess of 3.0 ppm weight/weight total product.
 - .5 Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.

2.2 COLOURS

- .1 Submit proposed Colour Schedule to Owner and Consultant for review.
- .2 Colour schedule will be based upon selection of five base colours and three accent colours. No more than eight colours will be selected for entire project and no more than three colours will be selected in each area.
- .3 Selection of colours from manufacturers' full range of colours.
- .4 Where specific products are available in restricted range of colours, selection based on limited range.

- .5 Second coat in three coat system to be tinted slightly lighter colour than topcoat to show visible difference between coats.

2.3 MIXING AND TINTING

- .1 Perform colour tinting operations prior to delivery of paint to site. Obtain written approval from Owner and Consultant for tinting of painting materials.
- .2 Mix paste, powder, or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.
- .4 Thin paint for spraying in accordance with paint manufacturer's instructions.
- .5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

- .1 Paint gloss is defined as sheen rating of applied paint, in accordance with following value:
 - .1 G3 - Eggshell: Low sheen finish with a gloss range of 10 to 35 when measured at 85 to meter and 10 to 25 when measured at 60.
- .2 Galvanized metal: Metal Door Frames.
 - .1 INT 5.3K - Waterborne light industrial semi-gloss level coating (over waterborne primer).
- .3 Dressed Lumber: Flush Wood Doors.
 - .1 INT 6.3A – High performance architectural latex semi-gloss level finish.
 - .2 INT 6.3S – Fire retardant, clear finish (ULC rated).
- .4 Plaster and gypsum board: gypsum board, drywall, sheet gypsum material.
 - .1 INT 9.2B - High performance architectural latex semi-gloss level finish.
 - .2 INT 9.2M - Institutional low odour/low VOC semi-gloss level finish.

2.5 MECHANICAL, ELECTRICAL AND FIRE PROTECTION/ALARM EQUIPMENT

- .1 Leave equipment, panels and cabinets in original finish except for touch up as required, and paint exposed conduits, exposed mounting accessories and other exposed unfinished items.

2.6 SOURCE QUALITY CONTROL

- .1 Perform following tests on each batch of consolidated post-consumer material before surface coating is reformulated and canned. Testing by laboratory or facility which has been accredited by Standards Council of Canada.

- .1 Lead, cadmium, and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.
- .2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.
- .3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

PART - 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 GENERAL

- .1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Owner and Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.
- .2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.
- .3 Maximum moisture content as follows:
 - .1 Stucco, plaster and gypsum board: 12%.
 - .2 Wood: 15%.

3.4 PREPARATION

- .1 Protection:
 - .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Owner and Consultant.
 - .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
 - .3 Protect factory finished products and equipment.

- .4 Protect building occupants and visitors in and about the building.
- .2 Surface Preparation:
 - .1 Remove electrical cover plates, light fixtures, surface hardware on doors, toilet accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
 - .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
 - .3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Owner and Consultant.
- .3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
 - .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
 - .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil, and other surface contaminants.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Allow surfaces to drain completely and allow to dry thoroughly.
 - .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
 - .6 Use trigger operated spray nozzles for water hoses.
 - .7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.
- .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil, and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
- .5 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 3'-0".
- .6 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease, and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets, and corners to be painted by brushing with clean brushes blowing with clean dry compressed air vacuum cleaning.
- .7 Touch up of shop primers with primer as specified.
- .8 Do not apply paint until prepared surfaces have been accepted by Owner and Consultant.

3.5 APPLICATION

- .1 Method of application to be as approved by Owner and Consultant. Conform to manufacturer's application instructions unless specified otherwise.
- .2 Brush and Roller Application:
 - .1 Apply paint in uniform layer using brush and/or roller type suitable for application.
 - .2 Work paint into cracks, crevices, and corners.
 - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers, or sheepskins.
 - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
 - .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Spray application:
 - .1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
 - .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
 - .3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.
 - .4 Brush out immediately all runs and sags.
 - .5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.
- .4 Use dipping, sheepskins, or daubers only when no other method is practical in places of difficult access.
- .5 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time as recommended by manufacturer.
- .7 Sand and dust between coats to remove visible defects.
- .8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.
- .9 Finish inside of cupboards and cabinets as specified for outside surfaces.
- .10 Finish top, bottom, edges, and cutouts of doors after fitting as specified for door surfaces.

3.6 MECHANICAL, ELECTRICAL AND FIRE PROTECTION/ALARM EQUIPMENT

- .1 Paint finished area exposed conduits, piping, hangers, ductwork, and other unfinished mechanical and electrical equipment and fixtures with colour and finish to match adjacent surfaces, except as indicated.
- .2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork, and other mechanical and electrical equipment with colour and finish to match adjacent surfaces.
- .3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork, and other mechanical and electrical equipment in original finish and touch up scratches and marks.
- .4 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
- .5 Do not paint over nameplates.
- .6 Keep sprinkler heads free of paint.
- .7 Paint inside of ductwork where visible behind grilles, registers, and diffusers with primer and one coat of matt black paint.
- .8 Paint fire protection piping red.
- .9 Paint natural gas piping yellow.
- .10 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
- .11 Do not paint interior transformers and substation equipment.

3.7 SITE TOLERANCES

- .1 Walls: no defects visible from a distance of 3'-0" at 90 degrees to surface.
- .2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.
- .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.8 FIELD QUALITY CONTROL

- .1 Interior painting and decorating work shall be inspected by a Paint Inspection Agency (inspector) acceptable to the specifying authority and local Painting Contractor's Association. Painting contractor shall notify Paint Inspection Agency a minimum of one week prior to commencement of work and provide a copy of project painting specification, plans and elevation drawings (including pertinent details) as well as a Finish Schedule.
- .2 Interior surfaces requiring painting shall be inspected by Paint Inspection Agency who shall notify Owner and Consultant and General Contractor in writing of defects

or problems, prior to commencing painting work, or after prime coat shows defects in substrate.

- .3 Where "special" painting, coating, or decorating system applications (i.e. elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer shall provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Owner and Consultant.
- .4 Standard of Acceptance:
 - .1 Walls: no defects visible from a distance of 3'-0" at 90 degrees to surface.
 - .2 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.
- .5 Field inspection of painting operations to be carried out by independent inspection firm as designated by Owner and Consultant.
- .6 Advise when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.
- .7 Cooperate with inspection firm and provide access to areas of work.
- .8 Retain purchase orders, invoices, and other documents to prove conformance with noted MPI requirements when requested by Owner and Consultant.

3.9 RESTORATION

- .1 Clean and re-install hardware items removed before undertaken painting operations.
- .2 Remove protective coverings and warning signs as soon as practical after operations cease.
- .3 Post wet paint signs during drying and restrict or prevent traffic where necessary.
- .4 Identify wet paint areas with signs until paint is completely dry.
- .5 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.
- .6 Protect freshly completed surfaces from paint droppings and dust to approval of Owner and Consultant. Avoid scuffing newly applied paint.
- .7 Restore areas used for storage, cleaning, mixing, and handling of paint to clean condition as approved by Owner and Consultant.
- .8 Follow paint manufacturer's recommendations for safety precautions. Ensure workers and general public are adequately protected during storage, handling, application and drying periods.
- .9 Post sign, after Consultant's inspection and acceptance of each room, reading: PAINTING COMPLETE - NO ADMITTANCE WITHOUT CONTRACTOR'S PERMISSION.

- .10 Daily as the work proceeds and upon completion, remove all surplus materials and debris resulting from work of this section.
- .11 Upon conclusion of the work, remove all materials and debris connected with the work and leave the premises neat, clean and in condition equivalent to that when work was begun.

3.10 MAINTENANCE MATERIALS

- .1 Deliver to the Owner sufficient material to produce at least 4.5 L (1 Imp. Gal.) of paint of each colour and finish used on exterior and interior surfaces after the project is completed.

END OF SECTION

PART - 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 28 31 10 – Fire Detection and Alarm

1.2 REFERENCE STANDARDS

- .1 Underwriters Laboratory of Canada (ULC)
 - .1 CAN/ULC-S1001-11 Standard for the Integrated Systems Testing of Fire Protection and Life Safety Systems.
 - .2 CAN/ULC-S524-14, Installation of Fire Alarm Systems.
 - .3 CAN/ULC-S537-13, Verification of Fire Alarm Systems.
- .2 National Fire Prevention Association (NFPA)
 - .1 NFPA 11 2024 Standard for Standard for Low-, Medium-, and High-Expansion Foam,
 - .2 NFPA 13-2013, Standard for the Installation of Sprinkler Systems.
 - .3 NFPA 14-2013, Standard for the Standpipe and Hose Systems.
 - .4 NFPA 20-2016, Standard for the Installation of Stationary Pumps for Fire Protection.
 - .5 NFPA 25-2014, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.
- .3 Government of Ontario Regulations
 - .1 O. Reg. 332/12, 2012 Ontario Building Code (OBC), as amended to date.
 - .2 O. Reg. 213/07, 2007 Ontario Fire Code (OFC), as amended to date.

1.3 ACRONYMS

- .1 CT - Construction Team
- .2 FPT - Functional Performance Testing
- .3 O&M - Operation and Maintenance
- .4 IST – Integrated Systems Testing
- .5 IST Plan – Integrated Systems Testing Plan
- .6 VI - Verification

1.4 DEFINITIONS

- .1 Integrated Systems Testing Participants: persons identified in the integrated systems testing plan, who are required to participate integrated systems tests. The persons identified shall be knowledgeable in the design, operation and installation of their relevant fire protection and life safety systems. At minimum, each installing

- contractor, subcontractor, trade or subtrade, shall be required to provide one individual to participate in the IST.
- .2 Integrated systems testing coordinator: The person, firm, or individual responsible for the development of the integrated systems testing plan and implementation of the integrated systems testing plan. For the purposes of this project, Morrison Hershfield Limited, shall be the integrated systems testing coordinator.
 - .3 IST Forms: forms used to document the results of the integrated systems test.
 - .4 Integrated Systems Testing Plan: a written project specific document, prepared by the integrated system coordinator, outlining the required tests and necessary functional results to conduct integrated fire protection and life safety systems testing.
 - .5 Integrated Systems Testing Report: a written project specific document, prepared by the integrated systems testing coordinator.
 - .6 Integrated Fire Protection and Life Safety Systems – A combination of two or more fire protection and life safety systems, which may or may not be physically connected with one another, but that are designed to operate together to achieve an overall fire protection and life safety objective.
 - .7 Interconnection – The link between two or more integrated fire protection and life safety systems which has an associated input/out correlation. The link between two or more integrated fire protection and life safety systems may or may not be a physical connection.
 - .8 Fire protection System : a system designed to detect and or react to a fire condition and,
 - .1 Aid in the warning, protection, or evacuation of building occupants.
 - .2 Suppress or control the spread of fire or its by-products, or
 - .3 Any combination thereof.
 - .9 Life safety System: A system designed to enhance or facilitate the safety of building occupants.

1.5 SUMMARY OF SCOPE

- .1 This Section specifies the Contractor's responsibilities related to the integrated systems testing of fire protection and life safety systems identified in relevant Technical Sections of Division 01 of the Contract Documents.
- .2 The Contractor may designate another firm, or individual, to the role of "Integrated Systems Testing Coordinator", whom will carry out the IST activities identified within this Section.
- .3 The IST Coordinator shall be responsible for the development and implementation of the integrated systems testing plan, in accordance with the requirements of CAN/ULC-S1001 for retro-integrated testing of fire protection and life safety systems.
- .4 The IST Coordinator shall be responsible for the coordination of the Integrated Systems Testing Participants.

- .1 Subcontractors, including but not limited to, fire suppression, fire alarm, mechanical, and electrical contractors shall participate in IST activities in coordination with site quality control requirements for Work they are providing.
- .2 Manufacturers may assist in verification or IST activities and report on installation, performance and operation of the products/systems they supplied, as specified in relevant Sections of Division 21.
- .5 The IST Coordinator is responsible to confirm all other necessary tests and verification activities specified in the relevant Sections of Divisions 21, 26, and 28 are complete prior to testing and submit to the Consultant for review.
- .6 The owner may designate a person to represent the interests of the facility during the IST process.
 - .1 O&M Representative: The owner may designate an additional representative to participate in the commissioning process and facilitate the transfer of fire suppression systems to the facility's O&M staff.
- .7 The requirements of this Section do not replace the acceptance testing requirements specified in the relevant Sections of Divisions 21, 26, 28 or reporting activities to demonstrate compliance with building code requirements to the authorities having jurisdiction.

1.6 ADMINISTRATIVE REQUIREMENTS

- .1 The IST coordinator shall obtain a copy of CAN/ULC-S1001-11 REV2, to be available on site during the IST.
- .2 The IST Coordinator may designate another qualified person, or persons from the project team, to assist during the IST.
 - .1 The representative shall be acceptable to Owner and Consultant with the following qualifications:
 - .1 Technical personnel with a minimum of five years' experience in construction, testing and commissioning of fire suppression systems and life safety systems.
 - .2 An employee of the contractor or subcontractor installing the fire suppression systems, with direct knowledge of the installation.
- .3 Coordinate and assign the roles responsibilities of the IST Participants in the IST process.
- .4 Notify the Owner and Consultant in writing two weeks in advance of the anticipated IST date.
- .5 Coordinate and schedule the participation of all contractors and subcontractors including for IST at a date agreeable to the Owner and Consultant.
- .6 Arrange meetings with the IST participants prior to the start of testing, identify the following:
 - .1 Participant responsibilities.

- .2 Means of occupant notification in the event of an actual emergency during testing.
- .3 Identify any and all safety hazards during testing.
- .4 Confirm required protective personal equipment is provided.
- .7 Perform IST comprised of Functional Performance Testing to confirm the input output correlations between Integrated Fire Protection and Life safety systems as identified in the IST plan and in accordance with CAN/ULC-S1001.
- .8 Identify any Integration failures to the respective contractors/subcontractors. Confirm corrective actions and retest interconnection.
 - .1 Repeat until all Integrations until are successfully tested and operating in accordance with the design intent.
- .9 Record testing results and prepare the final IST Report.

1.7 ACTION AND INFORMATIONAL SUBMITTALS

- .1 The IST coordinator is to prepare and submit a copy of the integrated systems testing plan to the Consultant for review and comment. In addition to the administrative and pretesting requirements of CAN/ULC-S1001, the integrated system test plan shall include the following:
 - .1 Description of the building.
 - .2 Description of each fire protection and life safety system.
 - .3 Description of system integrations, including input and out correlations.
 - .4 Testing forms which identify the following for each system integration:
 - .1 Normal Condition, including steps to confirm the conditions.
 - .2 Off Normal Condition, including procedure to initiate and confirm the condition.
 - .3 Test Outcomes:
 - .1 Tested: Yes/No
 - .2 Passed: Yes/No
 - .3 Comments if not test or failed.
 - .4 Appendices, including all documentation identified in 1.7.2.
 - .5 The requirements of this Part do not negate any additional requirements contained within CAN/ULC-S1001, and it is the responsibility of the IST Coordinator to comply fully with the standard.
- .2 Review and submit manufacturers' written certificates and reports demonstrating compliance of Work, as specified in the relevant Sections of Divisions 21, 26, 28 of the Contractor documents, including but not limited to:
 - .1 Factory test reports.
 - .2 Material and test certificates for above ground piping.
 - .3 Material and test certificates for below ground piping.
 - .4 CAN/ULCS-537 Verification reports.

- .5 Forward flow test reports.
- .6 Additional acceptance test reports or documents mandated by the standards in 1.2.2. of this Section.
- .3 Provide required information in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Submit a list of proposed testing equipment for performing the IST.

1.8 CLOSE OUT SUBMITTALS

- .1 Submit O&M data and as-built information in accordance with Section 01 78 00 - Closeout Submittals.
 - .1 Record changes to installations, system configuration and/or controls that were made during the IST process to meet the required performance of fire suppression and life safety systems design.

PART - 2 PRODUCTS

2.1 EQUIPMENT

- .1 Furnish special tools or equipment required for:
 - .1 Verifying or adjusting equipment/system components.
 - .2 Accessing equipment, enclosures or control cabinets.
 - .3 Interfacing with equipment controls or integrated system diagnostics.
- .2 Furnish instruments and equipment required to perform testing and validate the interconnection of fire protection and life safety systems installed or modified as part of the contract documents.

PART - 3 EXECUTION

3.1 INTEGRATED SYSTEMS TEST PLAN

- .1 Obtain information from fire protection and life safety system design professionals and identify all fire protection and life safety systems and their integrations as outlined in chapter 6 of CAN/ULC-S1001.
- .2 Identify the functional objectives of each system integration.
- .3 Identify sequence of operations for each integrated fire protection and life safety system.
 - .1 Describe operation under normal operating conditions.
 - .2 Describe operation under fire conditions.
- .4 Develop test protocol and procedures for each integrated fire protection and life safety system.
- .5 Submit copy of the testing plan for the Consultant and owner to review and comment.

3.2 INTEGRATED SYSTEMS TESTING PHASE

- .1 Obtain written confirmation from the installing contractors and subcontractors that they have conducted acceptance testing of their respective fire protection and life safety systems, and that the systems have been installed in accordance with the design.
- .2 Obtain and review documentation from the verifying parties that all verification and tests have been completed in accordance with the their respective design standards.
- .3 Provide written notice to the owner and consultant two weeks prior to the scheduling of the test.
- .4 Coordinate and confirm attendance with the IST Participants, Owner, Owner's Representative, and consultant.
- .5 Carry out testing in accordance with the IST Plan.
- .6 Identify any and all failed integrations with the respective installing contractors. Schedule corrective actions and retest systems. Provide equipment, materials and labor as required to correct installation and/or equipment deficiencies identified through the IST process.
- .7 Process to be repeated until all system integrations are successfully tested and operating in accordance with the design intent.

3.3 FINAL REPORT AND AHJ TESTING

- .1 Prepare final IST report and submit to owner and consultant for review.
- .2 Submit completed report for AHJ approval.
- .3 Coordinate testing with local AHJ.

END OF SECTION

PART - 1 GENERAL

1.1 SUMMARY

- .1 Provide labour, materials, products, equipment, and services to complete the work specified in this Section in accordance with the Contract requirements.
 - .1 Fire Alarm Display and Control Unit,
 - .2 Transponders,
 - .3 Fire Alarm Graphic workstation
 - .4 Addressable input and control devices,
 - .5 Conventional signal devices.
- .2 Provide a new fire alarm system for this project, including but not limited to fire alarm control panel(s) (FACP), addressable initiating field devices, conventional signaling field devices, addressable monitor and relay modules.
 - .1 Provide all new wiring, conduit, raceways, backboxes, for all new devices installed under this project.
- .3 Demolish all existing devices, wiring, conduits, raceways, backboxes, for all existing fire alarm devices.
- .4 All existing control equipment shall be turned over to the owner.
- .5 The Facility shall be provided with an addressable Very Early Warning Fire Detection (VEWFD) system as indicated on the drawings. All VEWFD's and devices shall report to the Fire Alarm Control Panel (FACP) as indicated on the drawings.
- .6 This specification is intended to provide the design and performance requirements for a Very Early Warning Fire Detection System as indicated in this specification and on the drawings. Vendors shall meet all specifications required herein.
- .7 Building permits shall be paid for by the Owner. All other inspection fees, and additional permits required for the work shall be applied for and paid for by the Contractor.

1.2 RELATED REQUIREMENTS

- .1 Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this and other Sections of Division 28.
- .2 Materials and Methods are directly related. All other sections that are indirectly related shall be reviewed by the Contractor and Manufacturer
- .3 Section 01 11 00 - Summary of Work

1.3 DEFINITIONS

- .1 ATS: Acceptance Testing Specifications.
- .2 AHJ: Authority Having Jurisdiction.

- .3 ATP: Acceptance Test Procedure.
- .4 DCC: Fire Alarm Display and Control Centre
- .5 FACP: Fire Alarm Control Panel.
- .6 ANN: Fire Alarm Annunciator Panel.
- .7 FPE: Fire Protection Engineer.
- .8 NFPA: National Fire Protection Association.
- .9 OBC: Ontario Building Code.
- .10 SLC: Signal Line Circuit.
- .11 SCP: Suppression Control Panel.
- .12 ULC: Underwriters Laboratories of Canada.
- .13 VEWFD: Very-Early-Warning-Fire-Detection.
- .14 ASSD: Air Sampling Smoke Detection.

1.4 REFERENCE STANDARDS

- .1 CAN/ULC-S139, Fire Test for Evaluation of Integrity of Electrical Cables.
- .2 CAN/ULC-S529-16, Smoke Detectors for Fire Alarm
- .3 CAN/ULC-S524-14, Installation of Fire Alarm Systems.
- .4 .7 CAN/ULC-S536-13, Inspection and Testing of Fire Alarm Systems
- .5 CAN/ULC-S537-13, Verification of Fire Alarm System.
- .6 CAN/ULC-S1001-11 Integrated Systems Testing of Fire Protection and Life Safety Systems.
- .7 NFPA 13-2013 Installation of Sprinkler Systems.
- .8 NFPA 20-2016 Installation of Stationary Pumps for Fire Protection.

1.5 SYSTEM DESCRIPTION

- .1 This specification outlines the requirements for furnishing, installation, connection, and testing of the microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete, operative, coordinated Very Early Warning Fire Detection System. The work described in this specification includes all design, engineering, labour, materials, equipment and services necessary and required, to complete and test the system.
- .2 The VEWFD system devices, components and equipment shall be new, standard products or the manufacturer's latest design, addressable, and suitable to perform the functions intended.
- .3 Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances, switches and devices necessary for a

sound, secure and complete installation in full compliance with all applicable codes and requirements of the local Authorities Having Jurisdiction (AHJ).

1.6 SCOPE OF WORK

- .1 Provide and install all new raceway, conduit, wiring, and back boxes.
- .2 Provide and install a new 2-hour rated fire alarm network in DCLC configuration.
- .3 Determine the existing input/output correlations for the building building's smoke control sequence. Documentation on the existing smoke control sequence being initiated by the building's fire alarm system is not known. The successful proponent must carry the base building fire alarm system contractor (Johnson Controls) to download and recreate the building smoke control system sequence.
 - .1 Input output matrix to be submitted to the Engineer for review and approval.
- .4 Provide and install new fire alarm transponders,
 - .1 All input and output devices serving each fire alarm area shall be on the same transponder,
- .5 Provide and install new fire alarm graphic workstation,
- .6 Interface with all auxiliary systems,
 - .1 Smoke control including fans and dampers,
 - .2 Electromagnetic locks,
 - .3 Elevators,
 - .4 Special suppression,
 - .1 FM200,
 - .2 Pre-Action
 - .5 Security gate release,
 - .6 Generators
 - .7 Fire pumps,
 - .8 Sprinklers.
- .7 Test and verify, including carry out Testing of Integrated Fire Protection and Life Safety Systems which are interfaced with the Fire alarm system in accordance with CAN/ULC- S1001.
- .8 Demolition of all existing fire alarm system components, including but not limited to the control system, remote annunciator, all existing field devices.

1.7 PERFORMANCE REQUIREMENTS

- .1 The system shall be complete in all ways. It shall include all engineering, and electrical installation, all detection and control equipment, auxiliary devices and controls, alarm interface, functional checkout and testing, owner representative

training, and all other operations necessary for a functional, ULC listed fire alarm system.

- .2 All fire alarm related wiring shall be in red raceway – no exceptions. Data Communication Links (DCL) shall use fault isolator modules installed per ULC-S524, to protect the DCL loop against wire-to-wire short circuits.
- .3 The fire alarm system will be a fully addressable, stand-alone system comprised of addressable detectors, conventional notification appliances, and addressable interface modules.
- .4 The main Fire Alarm Control Panel (FACP) and graphics workstation will be located within a new CACF that is to be constructed as part of the project. The FACP and will be the Display and Control Centre (DCC) for the fire alarm system.
- .5 The fire alarm will also provide the means of detection for various special suppression systems in the building and monitor the associated releasing panels for each.
- .6 Where ASSD solutions are used, early warning thresholds will connect to the fire alarm system for notification.
- .7 The fire alarm system will be two-stage, with one way voice-communication. The existing firefighter emergency handsets will be demolished. A distributed antenna system (DAS) used to boost communication services for first responders shall be installed in lieu. However, the DAS will not be connected to the fire alarm system, other than a supervisory circuit to monitor the status.
- .8 An ASSD solution will be provided for the elevator shaft with multiple Alarm Levels, to limit nuisance alarms:
 - .1 Alarm Level Table

Alarm Signal	Detection Level	System Response
Alarm Level 1	Sensitivity as listed in settings, or 25% above ambient level as determined during the verification test whichever is greater.	Initiate a discrete local visual indication at the detector unit only. Initiate a supervisory level 1 condition in the fire alarm system.
Alarm Level 2	Sensitivity as listed in settings, or 50% above ambient level as determined during the verification test whichever is greater.	Initiate a discrete local visual indication at the detector unit only. Initiate a supervisory level 2 condition in the fire alarm system.

Alarm Signal	Detection Level	System Response
Alarm Level 3	Sensitivity as listed in settings, or 75% above ambient level as determined during the verification test whichever is greater.	Initiate a discrete local visual indication at the detector unit only. Initiate an Alert condition in the fire alarm system.
Alarm Level 4 (Fire 2)	Sensitivity as listed in settings	Initiate a discrete local visual indication at the detector unit only. Initiate an Alarm condition in the fire alarm system.

1.8 SUBMITTALS

- .1 Submit each item specified in this section per Division 01 Specification Sections and the requirements of this section.
- .2 All documentation associated with this contract including submittals, shop drawings, O&M manuals, and test reports shall be furnished as follows.
 - .1 Submittals shall be provided in portable document format (PDF). Submit a combined PDF document that is word-searchable (not scanned) which shall include bookmarks that match the table of contents of the hard copy submittal. Alternatively, if multiple PDF files are submitted, file names shall match table of contents and sorted by sections. Submittals consisting of multiple PDF files with non-descript file names may be disqualified from submittal and/or rejected.
 - .2 Documents shall be submitted in the latest version of AutoCAD for Drawings and Microsoft Word for text format when requested.
- .3 Product Data:
 - .1 Submit manufacturer's technical product data as a minimum, but not limited to, for the following:
 - .1 Addressable Fire Alarm Control Panel.
 - .2 Graphic workstation.
 - .3 Fire Alarm Annunciator Panel(s).
 - .4 Addressable ASSD solution(s).
 - .5 Addressable VEWFD devices.
 - .6 Addressable input/output and monitoring devices.
 - .7 Any non-addressable devices such as control relays if needed, etc.
 - .8 Conventional Signal Devices,
 - .9 DCL Isolators

- .10 Panel component layout,
 - .1 Indicates all connected and spare circuits.
- .11 Wiring diagrams.
- .12 Battery calculations.
- .13 Equipment ratings.
- .14 Description of system operation for each product and that the system meets or exceeds specified requirements.
- .4 Shop Drawings:
 - .1 Shop drawings shall be prepared by persons with the following qualifications:
 - .1 Trained and certified by manufacturer in fire alarm system design.
 - .2 CFAA Registered Technician with good standing or ECAO CERTI-FIRE Fire Alarm Electricians with good standing.
 - .3 If required licensed or certified by the Authorities Having Jurisdiction.
 - .2 Indicate coordination with Division 21, Fire Suppression, Division 26, Electrical, Division 23, HVAC and Division 28 Security.
 - .3 Information shall be submitted on 1:100 scale building floor plans. Reproduction of contract drawing will not be acceptable. The following information shall be included in the shop drawings:
 - .1 Smoke control input/output matrix.
Include brief description of scope of work.
 - .2 One-line diagram showing/indicating number of devices and appliances per zone/circuit.
 - .3 Device Address List: Coordinate with final system programming and final room names.
 - .4 Provide mounting details of fire alarm control panel (s) and power supplies and other boxes to building structure, showing fastener type, sizes, material, and embedded depth where applicable.
 - .5 Plans, elevations, sections, details, and attachments to other work. Indicate dimensions, weights, loads, and required clearances, method of field assembly, components, and location and size of each field connection.
 - .6 Submit graphic zone map layout for review and approval by the Engineer and Owner's Representative prior to fabrication.
 - .7 The fire alarm contractor shall coordinate with the Owner's Representative and Engineer for final room names and numbers.
 - .4 The following Calculations and Wiring Diagrams shall also be included on the shop drawings:
 - .1 Power, signal, and control wiring.
 - .2 Wire sizes and type(s).
 - .3 Wiring diagrams showing points of connection and terminals used for all electrical connections to the system devices and panels. Indicate on the

- point-to-point wiring diagrams, interconnecting wiring within the panel between modules, and connecting wiring to the field device terminals. Show wiring color code.
- .4 Provide an internal control panel wiring diagram which shall include power supply requirements and field wiring termination points and any spare circuits.
- .5 Provide calculations for the battery stand-by power supply taking into consideration the power requirements of all alarms and auxiliary components under full load conditions including spare capacity. Include battery size calculations.
- .6 Show system components, including panels and cabinets, locations, quantities, and full schematic of system wiring showing conductor size, routings, quantities and connection details.
- .7 Coordination Drawings: Indicate all ceiling mounted fire alarm devices on the Coordination Drawings specified in Division 26 Section "Interior Lighting".
- .8 Submit for approval prior to installation of wire, a proposed legend for system conductors to allow rapid identification of circuit types.
- .9 All shall be in red conduit and all conduit routing must be submitted to, and accepted by, the Engineer and Owner's Representative.
- .5 Reflected Ceiling Plans: Show ceiling penetrations, ceiling-mounted items, and the following:
 - .1 Method of attaching hangers to building structure.
 - .2 Other ceiling mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, and access panels.
- .5 Permit Approved Drawings: Working plans, prepared according to ULC-S524 and the OBC, that have been approved by authorities having jurisdiction. Include any design calculations.
- .6 Field quality-control test reports.
- .7 Maintenance Data: For components to include in maintenance manuals.
- .8 Warranty information.

1.9 QUALITY ASSURANCE

- .1 Manufacturer's Qualifications:
 - .1 Firms regularly engaged in manufacture of fire alarm systems of types, sizes, and electrical characteristics required, and whose products have been in satisfactory use in similar service for not less than five years.
 - .2 The name of the manufacturer, part numbers and serial numbers shall appear on all major components.
- .2 Installer's Qualifications:

- .1 The installing contractor shall be an experienced firm regularly engaged in the installation of Digital, Addressable Fire Alarm Systems, or similar, in strict accordance with all applicable standards.
- .2 The installing contractor shall be trained by the supplier to design, install, test and maintain the system.
- .3 The installing contractor shall show proof of emergency service available on a twenty-four hour, seven-days-a-week basis during the construction and warranty period.
- .4 Installation shall be by personnel certified by CFAA Registered Technician in good standing or ECAO CERTI-FIRE Fire Alarm Electricians in good standing.
- .3 Materials and installation shall be in accordance with the latest revisions of the following codes, standards, and specifications, except where more stringent requirements have been specified herein:
 - .1 Ontario Building Code.
 - .2 Ontario Fire Code.
 - .3 CAN/ULC-S524: Installation of Fire Alarm Systems.
 - .4 CAN/ULC-S537: Verification of Fire Alarm System.
 - .5 CSA C22.1: Ontario Electrical Safety Code.
 - .6 ULC Listed and FM Approved devices.
 - .7 The standards listed, as well as all other applicable codes and standards shall be used as "minimum" design standards. Also, to be considered are the requirements of the "Authority Having Jurisdiction" and good engineering practices.

1.10 COORDINATION

- .1 Coordinate installation of all wall and ceiling mounted devices with other electrical device and other trades.

1.11 CLOSEOUT SUBMITTALS AND DOCUMENTATION

- .1 Submit Operation and Maintenance Manuals (O&M) for system and components as specified in the following Sections:
 - .1 Division 01
- .2 In addition to requirements included in the Sections above, include the following:
- .3 Field quality-control test reports.
- .4 Operation and Maintenance Data: For fire alarm system to include in emergency, operation, and maintenance manuals. Include abbreviated operating instructions and data sheets for all installed equipment.
- .5 Include:

- .1 Instructions for complete fire alarm system to permit effective operation and maintenance.
- .2 Technical data - illustrated parts lists with parts catalogue numbers.
- .3 Copy of approved shop drawings with corrections completed and marks removed except review stamps.
- .4 List of recommended spare parts for system.
- .6 Electronic version (pdf format) of CAN/ULC-S537 fire alarm verification report.
- .7 Software comparison reports per Chapter 7 of CAN/ULC-S537, summarized in plain language identifying specific changes to system programming at each partial verification stage. Data dumps will not be accepted.
- .8 Operation and Maintenance Manuals:
 - .1 Include the following additional information with the data:
 - .1 Comply with the CAN/ULC-S524-14, CAN/ULC-S537-13 and CAN/ULC-S1001-11.
 - .2 Provide Record of Completion Documents according to CAN/ULC-S537-13 and CAN/ULC-S1001-11.
 - .3 Record copy of site-specific software if applicable.
 - .4 Provide Maintenance, Inspection and Testing Records according to CAN/ULC-S536 and CAN/ULC-S537, Verification, Inspection, Testing and Maintenance Section to include the following:
 - .1 Frequency of testing of installed components.
 - .2 Frequency of inspection of installed components.
 - .2 Requirements and recommendations related to results of maintenance.
 - .3 Manufacturer's user training manuals.
 - .4 Provide all information required for shop drawing and product data review.
- .9 Record Drawings:
 - .1 Maintain detailed redlines of all devices, conduits, and junction boxes as they are installed on site. The fire alarm contractor shall transfer the redlines to AutoCAD and submit:
 - .1 Initial copy in pdf format for the consultant to review and comment.
 - .2 Final copy in pdf and AutoCAD format, following the incorporation of any comments from the consultant. Incomplete submissions will not be considered.
 - .3 Record drawings to be submitted no later than two-weeks following the Consultant's acceptance test.
 - .2 Submit pdf copies of test results and date to Engineer no later than seven days after the conclusion of tests described in this section.
 - .3 Include written documentation for all logic modules as programmed for system operation.

- .4 Equipment installation, operation, and programming manuals.
- .5 Manufacturer's required maintenance related to system warranty requirements.
- .6 Include name, telephone number, address, and contact information for the local fire alarm installing contractor. The local supplier shall have a 24-hour telephone response service. An answering machine shall not be considered acceptable.
- .7 Record drawings to show as-built conditions to include, but not limited to the following:
 - .1 Parts list.
 - .2 Circuit drawings, point-to-point wiring diagram, riser diagram and control diagrams.
 - .3 Sequence of Operation which includes detailed operation and control of each item of equipment and a control sequence.
 - .4 Final location of all devices related to the fire alarm system and addresses of each addressable device.
 - .5 Show size and route of all conduits related to the fire alarm system.
 - .6 Provide quantity and size of all conductors within each raceway.
 - .7 System voltage drop calculations, current and resistance readings taken during the installation and testing.
- .10 Record Electronic Documentation:
 - .1 As a minimum provide three (3) sets of Operating and Maintenance Manuals and drawings (one (1) hard copy and two (2) USB's with electronic copies in Adobe Acrobat PDF format).
 - .2 Each USB shall contain all AutoCAD record drawings including saved in an AutoCAD version 2023 or more current format along with PDF versions of all record drawings .

1.12 DELIVERY, STORAGE, AND HANDLING

- .1 It is the Contractor's responsibility to ensure on-time delivery of all materials and equipment required for the Project. All materials furnished or incorporated in the Work shall be new, unused, of best quality, and especially adapted for the service required; whenever the characteristics of any material are not particularly specified, such material shall be utilized as is customary in first class work of a nature for which the material is employed.
- .2 Contractor shall provide necessary means to properly stage and store all materials and equipment until time of use or installation on the Project. Contractor shall be solely responsible for materials and equipment stored on the Site; type and extent of security provided to be at Contractor's discretion. Coordinate all requirements with Owner.
- .3 Contractor shall be responsible for proper handling, rigging, and installing of all materials and equipment for the Project.

- .4 Owner reserves the right to reject any materials or equipment that are not properly stored in accordance with these specifications or the manufacturers' requirements.

1.13 WARRANTY

- .1 All fire alarm and fire protection system components furnished and installed under this contract, shall be guaranteed against defects in design, materials and workmanship for the full warranty period, which is standard with the manufacturer, but in no case less than two (2) year from the date of system acceptance.

PART - 2 PRODUCTS

2.1 MANUFACTURERS

- .1 In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - .1 Manufacturers: Subject to compliance with requirements, provide product by the manufacturers specified.
- .2 Manufacturers: Subject to compliance with requirements provide products by one of the following:
 - .1 Fire Alarm System Equipment:
 - .1 Edwards Systems Technology
 - .2 Honeywell/Notifier
 - .3 Mircom
 - .4 Siemens
 - .5 Simplex/Johnson Controls
 - .2 Audible and Visual Signals:
 - .1 Listed components manufactured or recommended by the FACP manufacturer.
 - .1 CPG Signals
 - .2 Gentex Corporation
 - .3 System Sensor
 - .3 Air Sampling Smoke Detection Equipment:
 - .1 Manufactured by Xtralis

2.2 SYSTEM DESCRIPTION

- .1 Non-coded, addressable system; multiplexed signal transmission dedicated to fire alarm service only.

2.3 PERFORMANCE REQUIREMENTS

- .1 Fire alarm network shall have full standalone and degraded mode functionality.
- .2 Comply with the OBC and CAN/ULC-S524.
- .3 Meet Owner's insurance company standards.

- .4 Refer to sequence of operations matrix provided in the contract drawings.
- .5 The building contains critical call centre operations on multiple floors. Audible signaling in these areas is being substituted with strobes utilizing coloured lenses to identify first and second stage fire alarm conditions, respectively. Dedicated circuits are to be provided for first and second strobes.
- .6 Fire alarm signal initiation shall be by one or more of the following devices, as indicated:
 - .1 Manual stations,
 - .2 Heat detectors,
 - .3 Linear heat detectors,
 - .4 Smoke detectors,
 - .5 Duct smoke detectors,
 - .6 Air sampling smoke detection system,
 - .7 Automatic sprinkler system water flow (water pressure switch or vane type flow switch).
- .7 Activation of a duct smoke detector shall result in the shut down of the associated air handling unit.
- .8 Fire alarm signal shall initiate the following actions:
 - .1 Transmit an alert signal to the remote alarm receiving station,
 - .2 Speakers shall sound first stage alert tone.
 - .3 Base building strobes shall activate.
 - .4 First stage strobes shall activate in call centre areas.
 - .5 Identify the device in alert at the FACP and graphic workstation,
 - .6 Release all electromagnetic locks.
 - .7 Open the ground floor lobby security gates,
 - .8 Override special suppression signaling devices,
 - .9 Release fire and smoke doors held open by magnetic door holders,
 - .10 Record events in the system history.
- .9 If the fire alarm is not acknowledged within five (5) minutes, or upon the activation of the second stage manual station, the fire alarm system shall go into second stage and initiate the following actions:
 - .1 Transmit an alarm signal to the remote alarm receiving station,
 - .2 Speakers shall sound second stage temporal 3 alarm tone.
 - .3 Base building strobes shall activate,
 - .4 Second stage strobes shall activate in call centre areas.

- .5 Identify device in alarm at the FACP and graphic workstation,
- .6 The smoke control sequence shall initiate.
- .7 Open the ground floor lobby security gates.,
- .8 Record events in the system history.
- .10 Supervisory signal initiation shall be by one or more of the following devices or actions:
 - .1 Operation of a fire-protection system valve tamper switch,
 - .2 Supervisory signal-initiating devices on air sampling smoke detection systems,
 - .3 Supervisory bypass for pre-action sprinkler zone, clean agent system, fire smoke dampers, air sampling smoke detection, and air handling equipment smoke shutdown,
 - .4 Low-air-pressure switch operation pre-action sprinkler system,
 - .5 Fire Pump running,
 - .6 Generator running.
- .11 System trouble signal initiation shall be by one or more of the following devices or actions:
 - .1 General Low Fuel
 - .2 Generator Common Trouble.
 - .3 Fire Pump Loss of Phase.
 - .4 Fire Pump Phase Reversal
 - .5 Fire Pump Loss of Primary Power
 - .6 Open circuits, shorts and grounds of wiring for initiating device, signaling line, and notification-appliance circuits,
 - .7 Opening, tampering, or removal of alarm-initiating and supervisory signal-initiating devices,
 - .8 Loss of primary power at the FACP,
 - .9 Ground or a single break in FACP internal circuits,
 - .10 Abnormal ac voltage at the FACP,
 - .11 A break in standby battery circuitry,
 - .12 Failure of battery charging,
 - .13 Abnormal position of any switch at the FACP or annunciator,
 - .14 Abnormal position of any manual bypass switch,
 - .15 Trouble condition indicated at any air-sampling smoke detector,

- .12 System Trouble and Supervisory Signal Actions: Ring trouble or supervisory event buzzer and annunciate at the FACP and remote annunciators. Record the event in system memory.

2.4 FIRE ALARM CONTROL PANEL (FACP)

- .1 Provide new FACP and transponders to serve all devices within the scope of this project.
- .2 General Description:
 - .1 Modular, power-limited design with electronic modules, ULC listed.
 - .2 Fire Alarm System network shall be set up as a peer-to-peer network with global annunciation.
 - .1 Provide DCLC performance.
 - .3 Fire Alarm panels shall be ULC listed for releasing pre-action systems.
 - .4 Addressable initiation devices that communicate device identity and status.
 - .1 Smoke sensors shall additionally communicate sensitivity setting and allow for adjustment of sensitivity at the FACP.
 - .2 Temperature sensors shall additionally test for and communicate the sensitivity range of the device.
 - .5 Addressable monitoring modules for monitoring status of conventional devices.
 - .6 Addressable control circuits for operation of mechanical equipment and other interfaces to third-party equipment.
 - .7 Primary Power:
 - .1 24V DC obtained from a dedicated 120V AC service and a power supply module.
 - .8 Secondary Power:
 - .1 24-V dc supply system with batteries per manufacturer's specifications, automatic battery charger and automatic transfer switch.
 - .2 The system shall have a minimum of 24-hours supervisory and 2-hour full alarm battery backup, additional back up time may be required.
 - .1 Refer to the local AHJ requirements that may be imposed.
 - .3 Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals and digital alarm communicator transmitters shall be powered by 24V DC source.
 - .4 Alarm current draw of entire fire alarm system shall not exceed 80 percent of the power supply module rating.
- .3 Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

- .1 Annunciator and Display: Liquid-crystal type, 2 line(s) of 40 characters, minimum.
- .2 Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.
- .4 Circuits:
 - .1 Data Communication Link: CAN/ULC-S524, Class A.
 - .1 System Layout: The maximum number of addressable devices which may be installed on each signaling line circuit shall not exceed 80% of the maximum allowed by the system manufacturer in order to allow for future reconfiguration or expansion.
 - .2 Notification-Appliance Circuits: CAN/ULC-S524, Class B.
 - .3 Actuation of alarm notification appliances, annunciation, and actuation of suppression systems shall occur within 10 seconds after the activation of an initiating device.
 - .4 Electrical monitoring for the integrity of wiring external to the FACP for mechanical equipment shutdown and magnetic door-holding circuits is not required, provided a break in the circuit will cause doors to close and connected air handling mechanical equipment to shut down.
- .5 Smoke-Alarm Verification:
 - .1 Initiate audible and visible indication of an "alarm verification" signal at the FACP.
 - .2 Activate a listed and approved "alarm verification" sequence at the FACP and the detector.
 - .3 Record events in the system memory.
 - .4 Sound general alarm if the alarm is verified.
 - .5 Cancel FACP indication and reset system if the alarm is not verified.
- .6 Notification-Appliance Circuit:
 - .1 Signal circuits shall provide 1st stage (Alert) or 2nd stage (Alarm) throughout the building.
 - .1 Alert shall provide 60 beats per minute tones,
 - .2 Alarm shall provide temporal (3-3-3) tones.
- .7 Power Supply for Supervision Equipment: Supply for audible and visual equipment for supervision of the AC power shall be from a dedicated DC power supply, and power for the DC component shall be from the AC supply.
- .8 Alarm Silencing, Trouble, and Supervisory Alarm Reset: Manual reset at the FACP/DCC, after initiating devices are restored to normal.

- .1 Silencing-switch operation halts alarm operation of notification appliances and activates an "alarm silenced" indicator. Display of identity of the alarm zone or device is retained.
- .2 Subsequent alarm signals from other devices or zones reactivate notification appliances until silencing switch is operated again.
- .3 When alarm-initiating devices return to normal and system reset switch is operated, notification appliances shall automatically operate again upon alarm condition until the alarm silence switch is reset.
- .9 Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their status and sensitivity settings, and control of changes in those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory.
- .10 Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, trouble, and supervisory signals to a remote alarm station through a digital alarm communicator transmitter or radio transmitter.
- .11 System Printer
 - .1 Provide new laser printer and connect to graphic workstation,
 - .2 Printer shall provide reports or graphic image as requested,
 - .3 The printer shall not provide continuous event printing,
 - .4 The printer shall be on demand only.
- .12 Primary Power: 24V DC obtained from 120V AC service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signal, supervisory signal, supervisory and digital alarm communicator transmitter shall be powered by the 24V DC source.
 - .1 The alarm current draw of the entire fire alarm system shall not exceed 80 percent of the power-supply module rating.
- .13 Secondary Power: 24V DC supply system with batteries and automatic battery charger and an automatic transfer switch.
 - .1 Batteries: Sealed lead acid.
 - .2 Battery and Charger Capacity: Comply with CAN/ULC-S524.
 - .3 Provide sufficient battery backup to provide 24 hours supervisory operation followed by 2 hours of full alarm.
 - .1 Batteries shall provide 25% additional power beyond the requirements above.
- .14 Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.5 MANUAL STATIONS

- .1 Description: ULC listed; finished in red with molded, raised-letter operating instructions in contrasting color. Station shall show visible indication of operation. Mounted on recessed outlet box unless specific conditions require otherwise; receive approval for surface mounting and if approved, provide manufacturer's surface back box.
 - .1 Single action mechanism to initiate an alarm. With integral addressable module, arranged to communicate manual-station status (normal, alarm, or trouble) to the FACP.
 - .2 Provide ancillary contact (normally closed) for direct connection to associated magnetic door locks.
 - .3 Station Reset: Key-or wrench-operated opening.
 - .4 Weatherproof Protective Shield (where required): ULC Listed clear plastic enclosure, hinged at the top to permit lifting for access to initiate an alarm.

2.6 SYSTEM SMOKE DETECTORS

- .1 Remote Air-Sampling Detector System:
 - .1 Control Unit: Single or multi-zone unit as indicated.
 - .2 Provides same system power supply, supervision, and alarm features as specified for the central FACP plus separate trouble indication for airflow and detector problems.
 - .3 Signals to the Central FACP: Any type of local system trouble is reported to the central FACP as a composite "trouble" signal.
 - .4 Alarms on each system zone are individually reported to the central FACP as separately identified zones.
- .2 Spot-type Smoke Detectors:
 - .1 Modular addressable photoelectric type with base. ULC Listed.
 - .2 Adjustable sensitivity offering multiple programmable levels of detection.
 - .3 Automatic drift compensation to account for changes in sensitivity over time due to ambient conditions.
 - .4 Provide with remote indication where detector is not readily visible from floor below.
- .3 Duct Smoke Detectors:
 - .1 Coordinate with Division 23 and HVAC Contractor as required on the installation of addressable duct detectors and sampling tubes in all air handling units and CRAH/CRAC Units.
 - .2 Provide addressable relays for AHU shutdown.

2.7 HEAT DETECTORS

- .1 Heat Detector, Combination Type: Actuated by either a fixed temperature of 57 deg C or rate-of-rise of temperature that exceeds 8 deg C per minute, unless otherwise indicated.
 - .1 Mounting: Adapter plate for outlet box mounting or plug-in base, interchangeable with smoke-detector bases.
 - .2 Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
- .2 Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 88 deg C.
 - .1 Mounting: Adapter plate for outlet box mounting or plug-in base, interchangeable with smoke-detector bases.
 - .2 Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
- .3 Heat Detector, Linear Heat
 - .1 Provide linear heat cable for elevator pits,
 - .2 Provide addressable monitor module to connect conventional linear heat cable,
 - .3 Provide linear heat test box and cable strips for annual testing. See drawing specification.

2.8 NOTIFICATION APPLIANCES

- .1 Description: Equipped for mounting as indicated and with screw terminals for system connections. Factory-integrated audible and/or visible devices in a single-mounting assembly.
- .2 Speakers, 70V wall or ceiling, surface or recessed as indicated on drawings.
 - .1 Speaker settings available from ¼ watt to 2 watt. Settings as indicated on drawings.
- .3 Visible Alarm Devices: Xenon strobe lights listed under UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 25-mm-high letters on the lens.
 - .1 Rated Light Output: field adjustable, up to 110 candelas.
 - .2 Strobe Leads: Factory connected to screw terminals.
- .4 Combination Speaker/Strobes: Comply with requirements above for Speakers and Visible Alarm Devices.

2.9 ADDRESSABLE INTERFACE DEVICE

- .1 Addressable monitor module listed for use in providing a system address for conventional listed alarm-initiating devices with normally open contacts. Where

multiple contacts are used for similar purpose (i.e. the same pre-action sprinkler zone or ASSD detector) multiple-input modules may be used in lieu of individual monitor modules.

2.10 WIRE AND CABLE

- .1 Wire and cable for fire alarm systems shall be ULC listed and labeled as complying with the Ontario Electrical Safety Code.
- .2 All network wiring, primary and alternate paths, shall utilize Vitalink Cable, listed to ULC 139.
- .3 Data Communication Link Circuits: Twisted, shielded pair, not less than No. 18 AWG unless otherwise recommended by system manufacturer.
- .4 Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
 - .1 Low-Voltage Circuits: No. 16 AWG, minimum.
 - .2 Line-Voltage Circuits: No. 12 AWG, minimum.
- .5 All junctions shall be made on terminal strips, no twist or crimp type connectors shall be used.
- .6 Within sprinkler and domestic water rooms use red liquid tight raceway, cable, junction, and mounting boxes.
- .7 All raceway, EMT, Rigid, or flexible raceway shall be red.
- .8 All junction boxes are to be painted red.

2.11 SPARE PARTS

- .1 Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - .1 Smoke, Fire, and Flame Detectors: Quantity not less than 5 percent of each type utilized.
 - .2 Detector Bases: Quantity equal to 5 percent of amount of each type installed, but not less than 1 unit of each type.
 - .3 Keys and Tools: Two extra sets for access to locked and tamper-proof components.
 - .4 Visual Units: Quantity equal to 5 percent of amount installed, but not less than 1 unit of each type
 - .5 Audible Units: Quantity equal to 5 percent of amount installed, but not less than 1 unit of each type.
 - .6 Audible / Visual Units: Quantity equal to 5 percent of amount installed, but not less than 1 unit of each type.

- .2 Submit a complete inventory of spare parts being furnished to the Owner, in Microsoft Excel format, including catalog numbers, descriptions, and quantities furnished.

PART - 3 EXECUTION

3.1 SEQUENCE OF WORK

- .1 This part shall be supplemented by the work sequence identified in Section 01 11 00 - Summary of Work, Paragraph 1.5.

3.2 INSTALLATION OF BASIC WIRING SYSTEM MATERIALS

- .1 Wiring:
 - .1 Wiring shall be enclosed in conduit in compliance with Division 26. Wiring is to include, but is not limited to, all wiring routed above ceilings; all wiring associated with interfaces to the Fire Alarm system, and all Clean Agent System communication wiring.
 - .2 All wiring shall be installed in red metallic conduit with a minimum size of 1". All conduits shall be concealed, except above 9 ft in network equipment rooms, crawl spaces, tunnels and mechanical or electrical rooms. Conduit shall be fastened securely at regular intervals and shall be run parallel to the building lines.
 - .3 24V DC system wiring shall not share conduit with power wiring.
 - .4 Communication wiring shall not be installed in raceway and enclosures containing Class 1 or other Class 2 wiring.
 - .5 Maximum pulling, tension, and bend radius for cable installation as specified by the cable manufacturer shall not be exceeded during installation.
 - .6 Contractor shall verify the integrity of the entire network following the cable installation including meg testing. Use appropriate test measures for each cable.
 - .7 Communication wiring shall be installed in continuous lengths. Spliced wires are not acceptable.
 - .8 Any wiring junctions shall be connected using terminal blocks only. Twist or crimp type connectors shall not be used.
 - .9 All analog signal and communications wiring between field devices and panel must be "continuous run", no splices will be permitted.
 - .10 All connections within the panels must be made with spade or ferrule connectors of appropriate size and design for terminals being applied.
 - .11 All cables must be labeled and identified on corresponding termination drawings.
 - .12 Final connections between equipment and the system wiring shall be made under the direct supervision of a factory trained representative.

3.3 EQUIPMENT INSTALLATION

- .1 Comply with CAN/ULC-S524 and in accordance with the manufacturer's written instructions for installation of fire alarm equipment.
- .2 Wall mounted panels and devices:
 - .1 Flush mounted where wall construction allows. Where flush mounted in fire rated partitions or walls, shall provide appropriate UL Listed devices for such application. Surface mount wall devices shall require coordination and approval.

3.4 FIELD QUALITY CONTROL

- .1 Perform tests and inspections.
- .2 The Digital, Addressable Fire Alarm System contractor shall draft and submit, to the Engineer and the Owner's Representative, for approval, a detailed Method of Procedure (MOP) commissioning plan, per area and clean agent protected zone, which outlines all commissioning activities and identifies each activity and test, zone specific, necessary for a complete verification of the design and operation **one (1) month** prior to start of testing.
- .3 The complete system shall be subjected to additional Functional Testing and Integrated Systems Testing as specified by the Consultant. The functional testing requirements in this section are minimum requirements.
- .4 Tests and Inspections:
 - .1 General testing:
 - .1 All test to comply with CAN/ULC-S537-13, Verification of Fire Alarm System and CAN/ULC-S1001-11 Integrated Systems Testing of Fire Protection and Life Safety Systems.
 - .2 Test intelligent analog devices for correct address and sensitivity using test equipment specifically designed for that purpose. These devices and their bases shall be tagged with adhesive tags located in an area not visible when installed, showing the system address, initials of the installing technician and date.
 - .3 All system and equipment devices shall function as required and designed.
 - .4 Each control panel circuit shall be tested for trouble by inducing a trouble condition into the system.
 - .5 Test wiring runs for continuity, short circuits, and grounds before system is energized. (MEG test) Test and record resistance, current, and voltage readings as work progresses.
 - .6 Field tests shall be performed for all devices and functions of the fire alarm system (100%) prior to the performing a final test to be witnessed and accepted by the local AHJ. All testing shall be coordinated with the Engineer and the Owner's Representative.

- .7 All tests to be documented in conform with CAN/ULC-S537 Verification and CAN/ULC-S1001-11 Integrated Systems Testing requirements.
- .2 Visual Inspection: Conduct visual inspection prior to testing.
 - .1 Inspection shall include completed Record Drawings and system documentation.
 - .2 Nomenclature for all fire zones and device naming to be field verified, documented and provided to the Engineer for review and acceptance before final submittal.
- .5 Correct malfunctioning equipment, and then retest to demonstrate compliance. Replace equipment that cannot be corrected or does not perform as specified and indicated, then retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
 - .1 Report test results promptly and in writing to Engineer, the Owner's Representative and Authorities Having Jurisdiction.
- .6 Acceptance Tests:
 - .1 Prior to final acceptance, the installing contractor shall provide complete operation and maintenance instruction manuals as indicated in this specification Part 1, Closeout Submittals and Documents.
 - .1 All aspects of system operation and maintenance shall be detailed, including piping isometrics, wiring diagrams of all circuits, a written description of the system design, sequence of operation and drawing(s) illustrating control logic and equipment used in the system.
 - .1 Raceways shall indicate quantity and size of conductors.
 - .2 Checklists and procedures for emergency situations, troubleshooting techniques, maintenance operations and procedures shall be included in the manual.
 - .2 Final Acceptance Test shall begin only when the Preliminary Test Report has been approved.
 - .3 The addressable fire alarm system contractor shall conduct the Final Acceptance Test and shall provide a complete demonstration of the operation of the system.
 - .4 As-Built Drawings and previous test results shall be available at the time of testing.
 - .5 The installation shall not be considered accepted until identified discrepancies have been corrected and test documentation is properly completed and received.
- .7 Fire Alarm system will be considered defective if it does not pass tests and inspections.
- .8 Prepare test and inspection reports.
 - .1 Upon completion of a successful test, the fire protection contractor shall so certify the system in writing to Owner's Representative.

- .2 Installation contractor shall provide confirmation letter of installation in compliance with ULC-S524.
- .3 Submit copy of test results in duplicate, after signed off by the AHJ, to the Engineer and the Owner's Representative.
- .9 Upon acceptance by the Engineer and the Owner's Representative, the completed system(s) shall be placed into service.

3.5 DEMONSTRATION AND TRAINING

- .1 Train Owner's maintenance personnel to adjust, operate, and maintain systems. .
- .2 Prior to final acceptance, the installing contractor shall provide operational training to each shift of Owner's personnel. The following training requirements are Minimum requirements and may be supplemented with additional training requirements specified elsewhere in the specifications by the Commissioning Agent. Each training session shall include system control panel operation, trouble procedures, supervisory procedures, auxiliary functions and emergency procedures.
 - .1 Furnish training for a minimum of four employees of the system user:
 - .1 Training in the receipt, handling, and acknowledgement of alarms.
 - .2 Training in the system operation including manual control of output functions from the system control panel.
 - .3 Training in the testing of the system including logging of detector sensitivity, field test of devices and response to common troubles.
 - .4 The total training requirement shall be a minimum of 6 hours, conducted on three successive days, but shall be sufficient to cover all items specified.

END OF SECTION