Hastings & Prince Edward District School Board

RFQ# 2526-001

Fire Alarm System Renewal at Eastside Secondary School

275 Farley Avenue, Belleville, Ontario

"Issued for Permit & Tender"

Project 25040

Jan 2, 2026

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End of Section

LIST OF DRAWINGS

Dwg. No.	Title	Issue No.	Rev. No.	Issue Date
ARCHITECTURAL				
A000	Cover Sheet, List of Drawings and OBC Matrix	1	-	February 02, 2026
A101	Overall Floor Plans	1	-	February 02, 2026
A201	Part Second Demo & Proposed RCP Plans	1	-	February 02, 2026
ELECTRICAL				
E1.1	Ground Floor & Basement Keyplans & Legend.	2	-	February 02, 2026
E1.2	Second Floor Key Plan	2	-	February 02, 2026
E2.1	Ground Floor Demolition Plan Part ‘A’	2	-	February 02, 2026
E2.2	Ground Floor Demolition Plans Parts ‘B’ & ‘C’	2	-	February 02, 2026
E2.3	Ground Floor & Bsmt Demolition Plans Parts ‘D’, ‘E’ & ‘F’	2	-	February 02, 2026
E2.4	Second Floor Demolition Plan Part ‘A’	2	-	February 02, 2026
E2.5	Second Floor Demolition Plans Parts ‘B’ & ‘C’	2	-	February 02, 2026
E2.6	Second Floor Demolition Plans Parts ‘D’ & ‘E’	2	-	February 02, 2026
E3.1	Ground Floor Renovation Part ‘A’	2	-	February 02, 2026
E3.2	Ground Floor Renovation Plans Parts ‘B’ & ‘C’	2	-	February 02, 2026
E3.3	Ground Floor & Bsmt Demolition Plans Parts ‘D’, ‘E’ & ‘F’	2	-	February 02, 2026
E3.4	Second Floor Renovation Plan Part ‘A’	2	-	February 02, 2026
E3.5	Second Floor Renovation Plans Parts ‘B’ & ‘C’	2	-	February 02, 2026
E3.6	Second Floor Renovation Plans Parts ‘D’ & ‘E’	2	-	February 02, 2026
E4.1	Fire Alarm Riser Diagram and Annunciator Schedule	2	-	February 02, 2026
E4.2	Fire Alarm Passive Graphic & Sequence of Operations	2	-	February 02, 2026

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Work covered by contract documents
.2 Owner
.3 Location of the site
.4 Scheduling requirements
.5 Site access .
.6 Work sequence
.7 Contractor use of premises
.8 Pre-ordered materials and equipment
.9 Work by others
.10 Engineer design
.11 Designated substances: ACM and others
.12 Building smoking environment
.13 Special conditions
.14 Integrated systems testing
.15 Site security
.16 “By Others”
.17 Protection of Drawings

1.2 Work Covered by Contract Documents

.1 Work of this Contract comprises the renovation of Eastside Secondary School as indicated on the Contract Drawings and specifications.

1.3 Owner

.1 Hastings & Prince Edward District School Board

1.4 Place of the Work

.1 The Work of this Contract is located at 275 Farley Avenue, Belleville, Ontario.

1.5 Scheduling Requirements

.1 Refer to Instructions to Bidders

1.6 Metric Project

.1 This project is to be based on The International System of Units (SI). Measurements are expressed in metric (SI) units.

.2 All dimensions are to be shown in meters and millimeters.

1.7 Site Access

.1 Access to the site to be arranged by the Owner.

.2 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work

.3 Provide secure construction fencing as specified and where indicated.

1.8 Work Sequence

.1 Construct Work continuously.

1.9 Contractors' Use of Premises

.1 Contractor has restricted use of site until Substantial Performance.

1.10 Engineer Design

.1 Where specifications require work to be designed by an engineer, engage an engineer licensed in the Province of Ontario to design such work. Refer to Section 01 78 00.

1.11 Designated Substances: ACM and Others

.1 The Owner shall provide any prospective constructor or contractor a copy of building ACM surveys and information on designated substances that are known or suspected of being present within the area or scope of work.

.2 The General Contractor shall ensure that a copy of the ACM survey is provided to each contractor and subcontractor who will be working on the Project.

.3 Any findings of undeclared ACM, or damaged ACM that could pose a risk to workers is to be brought to the attention of the Owner immediately, and work is to be stopped.

.4 All project design and construction activities must be carried out in compliance with the Regulations and the Owner's Asbestos Management Program.

.5 No asbestos-containing materials, as defined by O. Reg. 278/05, may be specified or used in any project.

1.12 Verification

.1 All dimensions shall be verified on site, and all necessary modifications and adjustments shall be made as necessary to suit.

1.13 Building Smoking Environment

.1 Smoking and vaping are prohibited in all work places within the Owner's buildings and on the Owner's property.

1.14 Special Conditions

.1 The following general and special conditions apply:
  .1 All existing surfaces and finishes are to be repaired wherever damaged during the course of the Work.
  .2 Wherever existing floor, roofs, and wall finishes are to be removed, include full removal down to the existing substrate of all tile, base, mortars, grouts, waterproofing membranes and adhesives in accordance with TTMAC recommended procedures. Patch and repair existing substrate to the quality required by the new finish material manufacturer for the installation of their products.

.3 All openings in existing fire rated assemblies or fire separations which are created by the removal of existing services, plumbing, conduit, ductwork, fittings fixtures or accessories are to be firestopped to maintain the integrity of the existing construction.
.4 All exposed interior surfaces except prefinished surfaces shall be painted whether referred to in the specifications and drawings or not.

1.15 Integrated Systems Testing

.1 Test and verification in conformance with CAN/ULC S1001, Integrated Systems Testing of Fire Protection and Life Safety Systems. Provide a satisfactory Integrated Testing Report. Procure (engage, coordinate and pay for) an Integrated Testing Coordinator, responsible to develop and implement the Integrated Testing Plan. The systems which must be included as part of the integrated systems testing to be determined by the Integrated Testing Coordinator. All costs related to the integrated systems testing must be included as part of the base bid price. Provide all requirements to all required trades during the bid period.

.2 Include the following scopes of work as part of the base bid price specific to CAN/ULC S1001, Integrated Systems Testing of Fire Protection and Life Safety Systems:
.1 Fire Alarm Technician required for operations and resetting of the fire alarm control panel for the duration.
.2 Electrician required for operations and initiating alarms, demonstrating wiring, etc., for the duration.

1.16 Site Security

.1 Daily Inspection: Provide inspection of the work areas daily while the work is in progress and take whatever measures are necessary to secure the construction zones from theft, vandalism and unauthorized entry.

1.17 “By Others”

.1 The term "by others" where it is used in the contract documents means that work shown or described in the contract documents and labeled with this designation is not included in the specific sub-trade's scope of work but will be required to be done within the General Contractor's contract.

1.18 Use of Drawings

.1 Drawings are not to be scaled.

.2 Copies of architectural and structural “issued for construction” drawings in digital format will be made available for the contractors use under the following conditions.
.1 Copyright remains with BBA.
.2 The drawings will only be used for shop drawings for this project and not be put to any other use.
.3 BBA assumes no liability for errors or omissions in the drawings. The Contractor assumes all risk and expenses associated with the use of drawings in the production of his work.
.4 References to BBA and other Consultants must be deleted from the title block.
.5 The Contractor signs a release available from BBA that addresses the above items in more detail. (Sample attached as Appendix ‘A’)

.3 Arrangements for use of Sub-Consultant drawings must be made with the Appropriate Sub-Consultant.

1.19 Protection of Drawings

.1 Copyright of electronic document belongs to the Consultant. Electronic documents may not be forwarded to others, transmitted, downloaded or reproduced in any format, whether print or electronic, without the express, written permission of the copyright owner.

.2 Drawings, specifications and other contract related documents which are posted on Contractor controlled websites for access by sub-trades and suppliers, shall be posted only on password protected platforms with access only to those parties with an expressed interest in the Project.

.3 Provide Consultant and Owner with access to such websites as noted above.

PART 2 PRODUCTS

3.1 Not Used

.1 Not used

PART 3 EXECUTION

3.2 Not Used

.1 Not used

End of Section

SAMPLE

[Date]

[CONTRACTOR'S COMPANY

ADDRESS

CITY, PROVINCE, POSTAL CODE]

Attention: [INSERT CONTACT NAME]

At your request, BBA will provide electronic files for your convenience and use in the preparation of your shop drawings for Project Name, subject to the following terms and conditions:

Our electronic files are compatible with [AutoCAD 2020 (**)]. We make no representation as to the compatibility of these files with your hardware or your software beyond the specified release of the referenced drawings.

Data contained on these electronic files are part of our instruments of service, and at all times remain the exclusive property of Barry Bryan Associates and copyright is reserved. The electronic files shall not be used by you for any purpose other than as a convenience in the preparation of shop drawings for the referenced project. You further agree not to transfer these electronic files to others without the prior written consent of Barry Bryan Associates. Any other use or reuse by you or by others will be at your sole risk and without liability or legal exposure to us. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against us, our officers, directors, employees, agents or other project consultants that may arise out of or in connection with your use of the electronic files.

Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold us harmless against all damages, liabilities or costs, including reasonable attorneys' fees and defence costs, arising out of or resulting from your use of these electronic files, or from the use by others, should they have obtained them from you.

These electronic files are not construction documents. Differences may exist between these electronic files and corresponding hard-copy construction documents. We make no representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the hard-copy construction documents prepared by us and the electronic files, the hard-copy construction documents shall govern. You are responsible for determining if any conflict exists.

Due to the nature of the design and construction process, the drawings on these electronic files may not be fully coordinated, may change, and may not incorporate revisions, change orders, or addenda. By your use of these electronic files, you are not relieved of your duty to fully comply with the contract documents, including, and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate your work with that of other contractors for the project.

Because information presented on the electronic files can be modified, unintentionally or otherwise, we require all indications of our ownership and/or involvement be removed from each electronic display.

We will furnish you electronic files upon your written request.

Under no circumstances shall delivery of the electronic files for use by you be deemed a sale by us, and we make no warranties, either express or implied, of merchantability of fitness for any particular purpose. In no event shall we be liable for any loss of profit or any consequential damages as a result of your use or reuse of these electronic files.

_____	_____
Barry Bryan Associates	[CONTRACTOR FIRM NAME]

PART 1 GENERAL

1.1 Consultants

.1 ARCHITECT:
Barry Bryan Associates
201 - 250 Water Street
Whitby, Ontario L1N 0G5
Tel: (905) 666-5252
Fax: (905) 666-5256
Attention: Ms Rhonda Sukumaran, OAA

.2 MECHANICAL ENGINEER:
DEI Consulting Engineers.
55 Northland Road
Waterloo, Ontario N2V 1Y8
Tel: (519) 725-3555
Attention: Mr Jason Legacy, P.Eng.

.3 ELECTRICAL ENGINEER:
DEI Consulting Engineers.
55 Northland Road
Waterloo, Ontario N2V 1Y8
Tel: (519) 725-3555
Attention: Mr Jason Legacy, P.Eng.

PART 2 PRODUCTS

3.1 Not Used

.1 Not used

PART 3 EXECUTION

3.2 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Cash Allowances

1.2 References

.1 Canadian Construction Documents Committee CCDC2-2020 Stipulated Price Contract including the Supplementary Conditions.

1.3 Cash Allowances

.1 Refer to General Conditions, GC4.1.

.2 Unless otherwise specified, Cash Allowances shall cover the cost of the materials and equipment delivered F.O.B. job site, and all applicable taxes, except Harmonized Sales Tax. The Contractor's handling costs on the site, labour, installation costs, overhead and profit and other expenses shall be included separately in the Stipulated Price and not in the Cash Allowance.

.3 Where it is specified that a Cash Allowances is to include both supply and installation costs, such allowances shall cover the cost of the materials and equipment delivered and unloaded at the site, all applicable taxes and the contractor’s handling costs on the site, labour and installation costs and other expenses, except overhead and profit which shall be included separately in the Stipulated Price.

.4 If the cost of the Work covered by Cash Allowances, when determined, is more or less than the allowance, the Contract Sum shall be adjusted accordingly.

.5 In the event that the cost of the work covered by Cash Allowances should exceed the cash allowance, while the Contract Sum will be adjusted in conformity therewith, there shall be no adjustment to the Contractor's fee or other expenses such as overhead or profit, it being understood and agreed that the contract sum includes the Contractor's expenses and profit for all Cash Allowances whether or not they are exceeded.

.6 Progress payments on accounts of work authorized under Cash Allowances shall be included in monthly certificate for payment.

.7 Expenditures from Cash Allowances shall be authorized by Site Instruction, Change Directive or Change Order.

.8 Cash Allowance for independent inspection and testing shall cover the cost of such services as provided by independent testing agency only. The Contractor's cost for labour, overhead and other expenses related to independent inspection and testing shall be included separately in the Stipulated Price and not in the Cash Allowance.

.9 Cause the work covered by Cash Allowances to be performed for such amounts and by such persons as the Consultant may select and direct or as required by the project drawings and specifications.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Alternatives

1.2 References

.1 Canadian Construction Documents Committee (CCDC)
  .1 CCDC 23-2018 A Guide to Calling Bids and Awarding Contracts.

1.3 Requirements

.1 Referenced specification Sections stipulate pertinent requirements for products and methods to achieve Work stipulated under each Alternative.

.2 Co-ordinate affected related Work and modify surrounding Work to integrate Work under each Alternative.

1.4 Substitution of Materials Prior to Bid Closing

.1 Where products or systems have been specified by trade name, no substitution will be allowed except where alternatives have been approved by the Consultant prior to bid closing.

.2 Where a specified product or system is not available at the time of bid, the bidder must inform the Consultant in writing so that they may advise all bidders of proposed changes. In the event that the Bidder fails to do so, the Consultant will choose a substitute product suitable for the application at the time of construction.

1.5 Request for Approval of Alternates

.1 Contractors and suppliers of products or systems that have not been specified may apply for approval of their product or system as an "alternative".

.2 Requests for approval must reach the Consultant at least five working days prior to the bid closing. The Consultant will advise applicants of the status of their request two working days prior to bid closing.

.3 Request for approval shall include sufficient information for the Consultant to satisfactorily review the alternative. This may include the following:
  .1 Project name and number.
  .2 Specification sections to which the product or system applies.
  .3 Description of proposed substitution, including manufacturer's material specifications, manufacturer's preparation and application requirements and manufacturer's warranties.
  .4 Sample of product indicating surface finish and material thickness to be applied under this Contract.
  .5 Installation history of proposed alternative including:
    .1 projects and locations
    .2 approximate value of contract
    .3 approximate size of projects
    .4 number of years in use
    .5 type of usage
    .6 name of owner and consultant involved.

.4 When submitting alternatives to specified materials or equipment, Bidders shall include in their Bid any changes in the Work required to accommodate the alternatives. A later claim for an addition to the Contract Price due to changes in the Work that are necessitated by the use of the alternatives will not be considered.

1.6 Approval of Alternates

.1 An addendum will be issued prior to bid closing if an alternative is approved. No alternative materials or equipment will be considered after bid closing.

.2 Products or systems that have been approved as alternatives may be substituted for specified products and systems as outlined in the addendum.

.3 When substitution of any proposed alternative into the work, either in whole or in part, affects other parts of the work, the Contractor shall assume full responsibility and bear the associated costs. The Contractor will also be responsible for paying for any drawing changes required as a result of the substitution.

.4 Cost savings arising from approved alternative products or systems are to be credited to the Contract and the Contract Price will be adjusted accordingly.

.5 The Consultant reserves the right to reject any or all requests for approval.

.6 No substitutions will be permitted without the approval of the Consultant in the form of an addendum.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Requests for Substitution (RFS) prior to execution of Contract.
.2 Requests for Substitution (RFS) after execution of Contract.

1.2 Definitions

.1 Products Not Available: When all listed manufacturers products in the specification section are no longer manufactured.

.2 Proprietary Specification: a specification which includes one or more proprietary names of products or manufacturers, or both, and may also include descriptive, reference standard, or performance requirements, or any combination thereof.

.3 Non-proprietary Specification: a specification which includes descriptive, reference standard or performance requirements, or any combination thereof, but does not include proprietary names of products or manufacturers.

.4 Substitution: a product or manufacturer not specified by proprietary name, which may be acceptable in place of a product or manufacturer which, is specified by proprietary name.

1.3 Procedures

.1 Product Options:
  .1 For products specified by non-proprietary specification:
    .1 Select any product by any manufacturer, which meets requirements of Contract Documents.
  .2 For products specified by proprietary specification:
    .1 Select any product or manufacturer named, or
    .2 Substitute an unnamed product or manufacturer in accordance with Substitutions – Manufacturers article of this Section.
  .3 For products specified by proprietary specification and accompanied by words indicating that substitutions will not be accepted:
    .1 Select any product or manufacturer named; substitutions are not permitted.

.2 Substitution Requests Prior to Execution of Contract: Submit substitutions requests to Consultant no later than the time stated in the Instructions to Bidders.

1.4 Substitutions – Products

.1 Substitute Products: Where substitute products are permitted, unnamed products may be accepted by the Consultant, subject to the following:
  .1 Substitute products shall be the same type as, be capable of performing the same functions as, and meet or exceed the standards of quality and performance of the specified products.
  .2 Substitutions for Cause: Changes proposed by Subcontractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  .3 Substitutions for Convenience: Changes proposed by Subcontractor or Contractor that are not required in order to meet other Project requirements but may offer advantage to Contractor or Subcontractor.

1.5 Substitutions – Manufacturers

.1 Substitute Manufacturers: Where substitute manufacturers are permitted, unnamed manufacturers will be accepted by the Consultant, subject to the following:
  .1 Substitute manufacturers shall have capabilities comparable to those of the named manufacturers.
  .2 In making a substitution Contractor and the Subcontractor represents that they have:
    .1 Investigated substitute product or manufacturer, or both, and determined it meets or exceeds the criteria of the specified product, and;
    .2 Will provide the same warranty for the Substitution as for the specified product.
    .3 Will make any changes to the Work necessitated by substitution as required for Work to be complete in all respects, and;
    .4 Waives claims for additional costs and time caused by substitution which may subsequently become apparent.
    .5 Will reimburse Consultant's services for review or redesign, additional studies, investigations, review of submittals, and associated contract administration.
    .6 Received necessary approvals of authorities having jurisdiction.
    .7 Investigated the proposed substitute to determine if license fees and royalties are pending.
    .8 If accepted, the substitution will not adversely affect the Construction Schedule.
  .3 Do not install requested Substitutions without Consultant's acceptance.
  .4 If, in the Consultant's opinion, a substitution does not meet requirements of Contract Documents, Contractor shall, at no extra cost to Owner, provide a product which, in the Consultant's opinion, does meet requirements of Contract Documents.

1.6 Proprietary Specifications

.1 Notwithstanding specified proprietary names of either or both products or manufacturers, products provided shall meet other applicable requirements of Contract Documents. Modify products if necessary, to ensure compliance with all requirements of Contract Documents.

1.7 Changes to Accepted Products and Manufacturers

.1 Products and manufacturers accepted by the Consultant for use in performance of Work of Contract shall not be changed without Consultant's written consent. .

.2 Submit requests to change accepted products and manufacturers to Consultant in writing, including product data indicated in Product Data article.

1.8 Product Data

.1 When requested by the Consultant, submit complete data substantiating compliance of a product with requirements of Contract Documents. Include the following:
  .1 Product identification, including manufacturer's name and address.
  .2 Manufacturer's literature providing product descriptions, applicable reference standards, performance and test data, in form consistent with the Contract Documents and readily comparable with product being substituted and can provide the specified and indicated requirements.
  .3 Samples, as applicable.
  .4 Name and address of projects on which product has been used and date of each installation.
  .5 Itemized comparison of substitution with named product(s). List significant variations.
  .6 Designation of availability of maintenance services and sources of replacement materials
  .7 Completed Substitutions Request Form. Incomplete forms will be rejected.

1.9 Consultant Procedure

.1 In reviewing the supporting data submitted for substitutions, Consultant will use, for purposes of comparison, all the characteristics of the specified material or equipment as they appear in the manufacturer's published data even though all the characteristics may not have been particularly mentioned in the Specifications.

.2 Consultant will review supporting data and will determine that the substitution in the Consultant's opinion is or is not able to meet or exceed the standards of quality, appearance and performance to the material specified.

.3 Consultant will sign, date and issue the RFS indicating acceptance or refusal, with applicable pre-contract or contract documentation, to affected participants.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Requests for Information.
.2 Submittal Procedures.
.3 Screening of RFI's.
.4 Response to RFI's.
.5 Response Timing.

1.2 Request for Information (RFI)

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

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

1.3 Submittal Procedures

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Number RFI's consecutively in one sequence in order submitted, in numbering system as established by the Contractor.

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

.4 RFI Form:
  .1 Submit a draft "Request for Information" form to be approved by the Owner and Consultant.
  .2 Submit RFI's to the Consultant on approved "Request for Information" form. The Consultant shall not respond to an RFI except as submitted on this form.
  .3 Where RFI form does not have sufficient space to provide complete information thereon, attach additional sheets as required.
  .4 Submit with RFI form all necessary supporting documentation.

.5 RFI Log:
  .1 Maintain log of RFI's sent to and responses received from the Consultant, complete with corresponding dates.
  .2 Submit updated log of RFI's at each construction meeting.

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

.7 Only the Contractor shall submit RFI's to the Consultant.

.8 RFI's submitted by Subcontractors or Suppliers directly to the Consultant will not be accepted.

1.4 Screening of RFI's

.1 Contractor shall satisfy itself that an RFI is warranted by undertaking a thorough review of the Contract Documents to determine that the claim, dispute, or other matters in question relating to the performance of the Work or the Interpretation of the Contract Documents cannot be resolved by direct reference to the Contract Documents. Contractor shall describe in detail this review on the RFI form as part of the RFI submission. RFI submittals that lack such detailed review

description, or where the detail provided is, in the opinion of the Consultant, insufficient, shall not be reviewed by the Consultant and shall be rejected.

1.5 Response to RFI's

.1 Consultant shall review RFI's from the Contractor submitted in accordance with this section with the following understandings:
  .1 Consultant's response shall not be considered as a Change Order or Change Directive, nor does it authorize changes in the Contract Price or Contract Time or changes in the Work.
  .2 Only the Consultant shall respond to RFI's. Responses to RFI's received from entities other than the Consultant shall not be considered.

1.6 Response Timing

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

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

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

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

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Preconstruction Conference
.2 Project Meetings
.3 On Site Documents
.4 Cost Breakdown

1.2 Preconstruction Conference

.1 The Consultant will call for and administer a Preconstruction Conference at time and place to be announced.

.2 Contractor, all major Subcontractors, and major suppliers shall attend the Preconstruction Conference.

.3 Agenda will include, but not be limited to, the following items.
.1 Lines of communication and contact information
.2 Submittal and RFI procedures
.3 Schedules
.4 Personnel and vehicle permit procedures
.5 Use of premises
.6 Location of any Contractor on-site facilities
.7 Security
.8 Housekeeping
.9 Inspection and testing procedures, on-Site and off-Site
.10 Control and reference point survey procedures
.11 Health and safety
.12 Contractor's Schedule of Values
.13 Contractor's Schedule of Submittals

.4 The Consultant will distribute copies of minutes to attendees. Attendees shall have seven days to submit comments or additions to minutes. Minutes will constitute final documentation of results of Preconstruction Conference.

1.3 Project Meetings

.1 The Contractor will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.

.2 Meetings will be held minimum bi-weekly.

1.4 On-Site Documents

.1 Maintain at job site, one copy each of the following:
.1 Contract drawings.
.2 Specifications.
.3 Addenda.
.4 Reviewed shop drawings.
.5 Requests for Information (RFI's)
.6 Change orders.
.7 Other modifications to Contract.
.8 Field test reports.

.9 Geotechnical reports
.10 DSS reports
.11 Approved Work schedule.
.12 Manufacturers' installation and application instructions.
.13 Safety Data Sheets (SDS).
.14 Health and Safety Plan and other safety related documents.
.15 Other documents as specified.

1.5 Cost Breakdown

.1 Submit a detailed cost breakdown to Consultant at least ten working days prior to the submission of the first progress claim. After approval by Consultant the cost breakdown will be used as basis for progress payment.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Submittals.
.2 Schedules.
.3 Format.
.4 Submission.
.5 Critical Path Scheduling.
.6 Submittals Schedule.

1.2 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

1.3 Schedules Required

.1 Submit schedules as follows:
  .1 Construction Progress Schedule.
  .2 Submittal Schedule for Shop Drawings and Product Data.
  .3 Submittal Schedule for Samples.
  .4 Product Delivery Schedule.
  .5 Cash Allowance Schedule for purchasing Products or Services.
  .6 Shutdown or closure activity.

1.4 Format

.1 Prepare schedule in form of a horizontal bar chart using Microsoft Project 2016 or later.

.2 Provide a separate bar for each major item of work, trade or operation.

.3 Split horizontally for projected and actual performance.

.4 Provide horizontal time scale identifying first work day of each week.

.5 Format for listings: chronological order of start of each item of work.

.6 Identification of listings: By Systems description.

1.5 Submission

.1 Submit initial format of schedules within 10 working days after award of Contract.

.2 Submit schedules in electronic format, by email as PDF files.

.3 Consultant will review schedule and return reviewed copy within 10 days after receipt.

.4 Resubmit finalized schedule within 7 days after return of reviewed copy.

.5 During progress of Work revise and resubmit schedule as directed by Consultant.

.6 Submit revised progress schedule with each application for payment.

.7 Distribute copies of revised schedule to:
.1 Job site office.
.2 Subcontractors.
.3 Other concerned parties.
.4 Instruct recipients to report to Contractor within 10 days, any problems anticipated by timetable shown in schedule.

.8 Table current and up to date schedule at each regular site meeting.

1.6 Critical Path Scheduling

.1 Include complete sequence of construction activities.

.2 Schedules shall represent a practical plan to complete the work within the Contract period, and shall convey the plan to execute the work. Schedules as developed shall show the sequence and interdependencies of activities required for complete performance of the work.

.3 The submittal of schedules shall be understood to be the Contractor's representation that the schedule meets the requirements of the Contract Documents and that the work will be executed in the sequence and duration indicated in the schedule.

.4 Failure to include any element of work required for performance of the Contract or failure to properly sequence the work shall not excuse the Contractor from completing all work within the Contract Time.

.5 All schedules shall be developed utilizing industry standard 'best practices' including, but not limited to:
.1 No open-ended activities.
.2 No use of constraints other than those defined in the Contract Documents without the prior approval of the Consultant.
.3 No negative leads or lags.
.4 No excessive leads or lags without prior justification and approval from the Consultant.
.5 For individual schedule construction activities, do not exceed 14 days in duration without prior approval of the Consultant. Subdivide activities exceeding 14 days in duration to an appropriate level.
.6 Sufficiently describe schedule activities to include what is to be accomplished in each work area. Express activity durations in whole days. Clearly define work that is to be performed by subcontract.
.7 Create the schedule in conformance with the work-hours and constraints set forth in these Contract Documents.

.6 Include dates for commencement and completion of each major element of construction.

.7 Show projected percentage of completion of each item as of first day of month.

.8 Indicate progress of each activity to date of submission schedule.

.9 Show changes occurring since previous submission of schedule:
.1 Major changes in scope.
.2 Activities modified since previous submission.
.3 Revised projections of progress and completion.
.4 Other identifiable changes.

.10 Provide a narrative report to define:
- .1 Problem areas, anticipated delays, and impact on schedule.
- .2 Corrective action recommended and its effect.
- .3 Effect of changes on schedules of other prime contractors.

1.7 Submittals Schedule

.1 Include schedule for submitting shop drawings, product data, and samples. Indicate manufacture and delivery lead times into the shop drawing submittal schedule.

.2 Indicate dates for submitting, review time, resubmission time, and last date for meeting fabrication schedule.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Construction Documentation.

1.2 Construction Documentation

.1 This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
.1 Daily construction reports.
.2 Material location reports.
.3 Field condition reports.
.4 Special reports.

1.3 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Field Condition Reports: Submit at time of discovery of differing conditions.

.3 Special Reports: Submit at time of occurrence.

1.4 Coordination

.1 Coordinate preparation and processing of reports with performance of construction activities and with reporting of separate Contractors.

1.5 Reports

.1 Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project Site:
.1 List of Subcontractors at Project Site.
.2 Approximate count of personnel at Project Site.
.3 Equipment at Project Site.
.4 Material deliveries.
.5 High and low temperatures and general weather conditions.
.6 Accidents.
.7 Meetings and significant decisions.
.8 Stoppages, delays, shortages, and losses.
.9 Meter readings and similar recordings.
.10 Emergency procedures.
.11 Orders and requests of authorities having jurisdiction.
.12 Change Orders received and implemented.
.13 Work Change Directives received and implemented.
.14 Clarifications requested, received, and implemented.
.15 Services connected and disconnected.
.16 Equipment or system tests and startups.

.2 Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project Site. List shall be cumulative, showing materials

previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project Site.

.3 Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

1.6 Special Reports

.1 Prepare Coordination Memoranda for distribution to each Contractor involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings. Provide copy to the Consultant.

.2 Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required. All such memoranda must be directed through the Consultant.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Administrative
.2 Requests for Information
.3 Shop Drawings and Product Data
.4 Interference Drawings
.5 Progress Photographs
.6 Samples
.7 Mock-Ups
.8 Certificates and Transcripts

1.2 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 Work affected by submittal shall not proceed until review is complete.

.3 Present shop drawings, product data, samples and mock-ups in metric units.

.4 Where items or information is not produced in metric units converted values are acceptable.

.5 Verify field measurements and affected adjacent work are coordinated.

.6 Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review.

.7 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant’s review.

.8 Keep one reviewed copy of each submission on site.

1.3 Requests for Information (RFI’s)

.1 Refer to Section 01 26 15 – Requests for Information

1.4 Shop Drawings and Product Data

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures, product data and other data which the Contractor provides to illustrate details of a portion of Work.

.2 Coordinate each submission with requirements of Work and Contract Documents. Individual submissions will not be reviewed until all related information is available.

.3 Submit shop drawings bearing stamp and signature of qualified professional Engineer registered or licensed in the Province of Ontario where required by the individual specification sections. Each submittal and each resubmittal must bear the stamp of the Engineer

.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 Prior to submission to Consultant, review all submitted drawings. By this review, Contractor represents to have determined and verified field measurements, site conditions, materials, catalogue number and similar data and to have checked and coordinated each drawing with the requirements of Work and of Contract Documents. Contractor's review of each drawing shall be indicated by stamp, date and signature of a responsible person.

.6 At time of submission, notify Consultant in writing of any deviations in drawings from the requirements of the Contract Documents.

.7 Allow ten days for Consultant's review of each submission.

.8 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.

.9 Make any changes in submitted drawings which Consultant may require, consistent with Contract Documents and resubmit unless otherwise directed by Consultant. When resubmitting, notify Consultant in writing of any revisions other than those requested by Consultant.

.10 Accompany submissions with transmittal letter 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.

.11 Submissions shall include:
- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, 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.

.12 After Consultant's review, distribute copies.

.13 Submit one electronic copy in PDF format of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.

.14 Submit electronic copy in PDF format 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.

.15 Delete information not applicable to project.

.16 Supplement standard information to provide details applicable to project.

.17 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.

.18 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 the 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.

1.5 Interference Drawings

.1 Prepare interference drawings to coordinate the installation of the work of all sections, within available space. Conflicts between trades which could be determined beforehand, by the careful coordination and preparation of interference drawings, shall be corrected at no expense to the Owner.

.2 Prepare interference drawings of all buried services as necessary to avoid conflicts with new or existing structures, foundations or services.

.3 Submit interference and equipment placing drawings as specified in Section 01 71 00, when requested by the Consultant.

1.6 Progress Photographs

.1 Progress photograph to be electronically formatted and labelled as to location and view.

1.7 Samples

.1 Submit for review samples as requested in respective specification Sections. Label samples with origin, manufacturer, product information, applicable specification section, and intended use.

.2 Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.3 Where colour, pattern or texture is criterion, submit full range of manufacturer’s samples.

.4 Adjustments made on samples 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.

.5 Make changes in samples which Consultant may require, consistent with Contract Documents.

.6 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.8 Mock-Ups

.1 Erect mock-ups in accordance with 01 45 00 - Quality Control.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Special Project Procedures for Occupied Buildings.
.2 Contractor Use of Premises
.3 Owner's use of Existing Building
.4 Dust Control
.5 Protection
.6 Emergency and Fire Protection
.7 Temporary Exhaust
.8 Hoisting of Materials and Equipment.

1.2 Contractor Use of Premises

.1 Limit access of construction personnel to existing building only at locations approved by the Owner, and only when necessary to perform work within the existing building. Any other access by contractors is strictly prohibited.

.2 Ensure that construction personnel perform work in existing building only as required under the Contract; and that they do not use it as access to work areas, except for work in existing building, or for other purposes.

.3 Use of washroom and services in existing building by construction personnel is strictly forbidden except as designated by the owner's representative.

.4 Construction personnel shall use areas of the existing building for their purposes only as designated by the Owner and only while Work is in progress. Prohibit lounging. Keep assigned areas clean and return them to an "as was" condition at completion of construction.

.5 Do not take meal and coffee breaks in the existing building. Provide space in site trailer for workers' breaks.

.6 Smoking is strictly prohibited on the Owner's property.

.7 Keep traffic through existing occupied areas to an absolute minimum in executing the Work.

.8 Minimize noise, dust, and odours to ensure staff in areas adjacent to the construction area are disturbed as little as possible. Implement immediate corrective action to cease or limit disagreeable annoyances to staff and public upon notification by Owner.

.9 Make good damage to building, fixtures, and fittings caused during use by construction personnel by replacement with new work. Include cost of installation and making good of other work thereby affected in replacement.

.10 Assume total responsibility for security of construction areas within the existing building upon commencement of Work, particularly where construction areas are exposed to the exterior. Secure construction areas by methods compatible with the total security established for building.

.11 Construction personnel shall use areas of the existing buildings only in a manner as determined by the Work.

.12 Arrange with the Owner for appropriate times for doing cutting and coring operations.

1.3 Owner's Use of Existing Building

.1 The existing building will remain in use throughout the partial time periods during renovation of exising building.

.2 The Owner will maintain control over operation of building systems during construction.

.3 Maintain fire department access to existing building.

.4 Maintain existing exits and always provide proper and safe means of egress from all parts of the existing building to open spaces to the approval of jurisdictional authorities. Identify, provide exit lights, and illuminate temporary means of egress.

.5 Execute work in existing building at times approved by Owner, so not to inconvenience their occupation or in any manner hinder their use of building.

.6 Give Owner minimum 14 working days of notice of intention to commence work in a room or area of existing building.

.7 Execute work as quietly as possible in and around existing building while Owner is occupying it. Schedule noisy operations with Owner to achieve least disturbance to ongoing activities and programming.

1.4 Dust Control

.1 Obtain and refer to the Designated Substances Report provided by the Owner. Take all precautions necessary to comply with legislated requirements for the control and spread of dust to occupied areas of the building. Controls shall include but not be limited to the use of HEPA filters on grinding equipment and saws, the installation of temporary filters or screens on air intake systems and the installation of dust tight screens and covers over all openings including doors, archways, windows and louvres.

.2 Prior to any work being done or removal of ceiling tiles or opening of ceiling access hatches, erect a floor to ceiling dust tight partition which completely encloses the area of work;
   .1 Maintain barriers throughout the work and repair or replace as required or instructed.
   .2 Completely remove barrier when work is finished and remove any marks left by tape or studs.

.3 Provide dust tight partitions to prevent dust and dirt migrating from the work area. Remove when no longer required.

.4 Post "Construction Zone" signage outside barrier and entrance to all work areas.

.5 Take precautions when working on existing ceilings, ducts and piping systems.

.6 Protect workers with the following minimum requirements:
   .1 Carefully remove acoustical ceiling panels keeping horizontal if possible, and vacuum and clean the panels immediately upon removal.
   .2 Clean air ducts, conduits and space above the ceiling with a HEPA filter equipped vacuum cleaner prior to start of any work.

.7 Throughout the work period, ensure that:
   .1 Plastic barrier flaps or doors to construction area remain closed.

.2 Place adhesive floor strips or walk-off mats outside the door to the construction area.
.3 Clean and vacuum construction and surrounding areas frequently with vacuum cleaners Equipped with HEPA filters.
.4 Vacuum carpeted areas daily or more often if necessary
.5 Shampoo carpets when the construction work is complete.
.6 Remove dust from body and clothing when traversing Owner occupied areas.
.7 Carts, tools and equipment entering the construction area should remain there until the work is complete. Clean thoroughly prior to removal from the construction area.

1.5 Protection

.1 Protect staff and visitors from any danger arising from work. Supply, erect, maintain and remove signs, barricades, barriers, etc. as required. Sharp tools and dangerous objects must not be left unattended.

.2 The job site shall always remain clean and tidy. Only those materials required each day are to be brought to the job site.

.3 Remove all garbage and scrap from work site daily, or more often if required. Owners recycle containers and garbage bins shall not be used.

.4 Fire routes or personnel thoroughfares must not be obstructed. Fire doors must not be wedged open or latches disengaged.

.5 Safety clearances are required before any cutting, welding, core drilling, open flame work or dust work is done. A request in writing to the Owner must be made and approved a minimum of 72 hours before this work is anticipated.

1.6 Emergency and Fire Protection

.1 Provide and maintain ready access to firefighting equipment.

.2 While work is proceeding in existing building, existing fire hoses and fire extinguishers shall be used as required. Recharge fire extinguishers if used and re-rack hoses.

.3 Provide temporary portable fire extinguishers throughout the work and at every work area.

.4 Prior to execution of any work which may possibly start a fire, provide proper and suitable precautions and fire extinguishers. Provide fire-watch during and for minimum 6 hours after all welding operations.

1.7 Hoisting of Materials and Equipment

.1 Movement of materials and equipment that requires hoisting above, or movement through, occupied grounds beyond hoarding lines shall not be performed without prior knowledge and approval from the Owner. Schedule such activity to coincide with Owner's scheduling so as not to be performed when staff are on parking lots and areas of site within close proximity to areas of work.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Administrative
.2 Fires
.3 Disposal of Wastes
.4 Drainage
.5 Site Clearing and Plant Protection
.6 Pollution Control
.7 Unanticipated Soil Contamination

1.2 References

.1 Statutes of Canada 1999 Chapter 33.
  .1 Canadian Environmental Protection Act 1999.
  .2 SOR/2003-289. Federal Halocarbon Regulations, 2003.
  .3 Transportation of Dangerous Goods Act, 1992 (1992, c. 34)
.2 OPSS 805 “Construction Specification for Temporary Erosion and Sediment Control Measures”.
.3 Province of Ontario Environmental Protection Act, R.S.O. 1990, c. E.19
.4 Ontario Regulation O Reg 406/19 On-Site and Excess Soil Management

1.3 Administrative

.1 Comply with all federal, provincial, and municipal regulatory requirements and guidelines for environmental protection and natural resource conservation, including those referenced above.

.2 Failure to comply with environmental requirements may result in a stop work order or assessment of damages commensurate with repair of damage.

.3 It is the Contractor’s responsibility to be aware of environmental requirements and the best management practices and pollution control measures necessary to meet them.

.4 It is the Contractor’s responsibility to obtain and abide by permits, licenses and compliance certificates at appropriate times and frequencies as required by the authorities having jurisdiction.

.5 All hazardous materials are to be stored with secondary containment

1.4 Fires

.1 Fires and burning of rubbish on site not permitted.

1.5 Disposal of Wastes

.1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.6 Drainage

.1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

.2 Do not pump water containing deleterious substances into waterways, sewer or drainage systems.

.3 Protect storm drains against entry by sediment, debris, oil, or chemicals.
.4 Control disposal or runoff of water containing deleterious substances or other harmful substances in accordance with local authority requirements.

1.7 Site Clearing and Plant Protection

.1 Protect trees and plants on site and adjacent properties.

1.8 Pollution Control

.1 Maintain, inspect, and repair temporary erosion and pollution control features installed under this contract on a weekly basis. Submit inspection logs to the Owner when requested.

.2 Control emissions from equipment and plant to conform to federal, provincial, and municipal requirements.

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

.4 Take all measures necessary to prevent material and mud tracking on adjacent roads and streets.

.5 Use mechanical sweepers as often as necessary to keep adjacent roads and streets clean of material and mud that is deposited from this project.

.6 On site disposal or clean out of concrete trucks is not permitted. Any spillage of concrete onto asphalt or other surfaces must be cleaned up before spillage sets.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 References
.2 Owner's Regulations
.3 Standards and Definitions
.4 Designated Substances
.5 Hazardous Materials
.6 Spills Reporting
.7 Protection of Water Quality
.8 Potable Water Systems
.9 Soils Management
.10 Access for Inspection and Testing
.11 Other Regulatory Requirements

1.2 References

.1 Perform Work in accordance with Ontario Building Code (OBC), National Fire Code of Canada (NFC), the Canadian Electrical Code CSA C22.1:21, including all Supplements and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Where a material is designated in the Contract Documents for a certain application, unless otherwise specified, that material shall conform to standards designated in the Code. Similarly, unless otherwise specified, installation methods and standards of workmanship shall also conform to standards invoked by the aforementioned Code.

.3 Meet or exceed requirements of:
.1 Contract documents.
.2 Specified standards, codes and referenced documents.
.3 Manufacturer's instructions.

.4 Where requirements of Contract Documents exceed Code requirements provide such additional requirements.

.5 Where the Building Code or the Contract Documents do not provide all information necessary for complete installation of an item, then the manufacturer's instructions for first quality workmanship shall be strictly complied with.

1.3 Owner's Regulations

.1 Conform to requirements, regulations and procedures of the Owner.

1.4 Standards and Definitions

.1 Where a reference is made to specification standards produced by various organizations and agencies, conform to latest edition of standards, as amended and revised to date of Contract.

.2 Have a copy of each specified standard which relates to your work available on the site to be produced immediately on Consultant's request.

1.5 Designated Substances

.1 Known designated substances are identified in the Designated Substance Report provided by the Owner.

.2 Stop work immediately when material resembling asbestos, mould or any other designated substance which is not identified in the Designated Substance Report is encountered during the course of the work. Notify Owner and Consultant immediately.

.3 The Owner will arrange for independent testing of suspected designated substances and removal of such substances encountered on the site during the course of the work which are not identified in the Designated Substance Report.

1.6 Hazardous Materials

.1 Definition: "Hazardous Material" is material, in any form, which by its nature, may be flammable, explosive, irritating, corrosive, poisonous, or may react violently with other materials, if used, handled or stored improperly. Included are substances prohibited, restricted, designated or otherwise controlled by law.

.2 Provide SDS for all materials brought to the Place of Work.

.3 Hazardous Materials will not be introduced for experimental or any other use prior to being evaluated for hazards.

.4 Make known to the Consultant those hazardous materials or designated substances intended to be used in the workplace and receive permission to use before introducing to the Owner’s property.

.5 Many common construction materials such as asbestos pipe and various insulations are designated substances and shall not be used under any circumstances.

1.7 Spills Reporting

.1 Spills or discharges of pollutants or contaminants under the control of the Contractor, and spills or discharges of pollutants or contaminants that are a result of the Contractor's operations that cause or are likely to cause adverse effects shall forthwith be reported to the Consultant. Such spills or discharges and their adverse effects shall be as defined in the Environmental Protection Act R.S.O. 1999.

.2 All spills or discharges of liquid, other than accumulated rain water, from luminaries, internally illuminated signs, lamps, and liquid type transformers under the control of the Contractor, and all spills or discharges from this equipment that are a result of the Contractor's operations shall, unless otherwise indicated in the Contract, be assumed to contain PCB's and shall forthwith be reported to the Consultant.

.3 This reporting will not relieve the Contractor of his legislated responsibilities regarding such spills or discharges.

1.8 Protection of Water Quality

.1 No waste or surplus organic material including topsoil is to be stored or disposed of within 30 metres of any watercourses. Run-off from excavation piles will not be permitted to drain directly into watercourses. Where this measure is not sufficient or feasible to control sediment entering the watercourses, sedimentation traps or geo-textile coverage will be required.

.2 If de-watering is required, the water shall be pumped into a sedimentation pond or diffused onto vegetated areas a minimum of 30 metres from any watercourses and not pumped directly into the

watercourses.

.3 Provide all de-watering and sedimentation control required to properly complete the work of this contract.

.4 Supply, install and maintain silt/sediment control fencing along the edge of the site to intercept construction runoff silt, to the satisfaction of the Owner.

1.9 Potable Water Systems

.1 Potable water systems in completed buildings must meet criteria and guidelines established by Provincial and Municipal authorities, prior to occupancy by the Owner.

.2 Upon completion, submit testing certificates verifying water quality and water systems meets all applicable Provincial and Legislated Standards

1.10 Soils Management

.1 Comply with the requirements of Ontario Regulation O. REG 406/19, “On-Site and Excess Soil Management”, for the importation of new soils and fill materials and the exportation, removal and disposal off-site, of excavated materials. Complete testing of imported and exported materials as required. Unless noted elsewhere, costs for such testing is the responsibility of the contractor and is not included in any allowances. Maintain and submit to authorities having jurisdiction all required test reports, certificates and documentation.

1.11 Access for Inspection and Testing

.1 Cooperate fully with and provide assistance to, all outside authorities including Building Inspectors, utilities, testing agencies and consultants, with the inspection of the Work.

1.12 Other Regulatory Requirements

.1 Conform to the requirements of the Ontario Ministry of Transportation, Regional and Local authorities regarding transportation of materials.

.2 Pay any required roadway damage deposits required by the local municipality.

.3 Conform to the requirements of the Ontario Ministry of the Environment.

.4 Conform to the requirements of the Ontario Ministry of Labour.

.5 Conform to all applicable local by-laws, regulations and ordinances.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Inspection
.2 Independent Inspection Agencies.
.3 Access to Work
.4 Procedures
.5 Rejected Work
.6 Reports
.7 Contractors Responsibilities
.8 Tests and Mix Designs
.9 Mock-Ups
.10 Equipment and Systems.

1.2 Inspection

.1 Contractor is responsible for Quality Control (QC).

.2 Allow Owner and Consultant access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.3 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Consultant instructions, or law of Place of Work.

.4 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.5 Consultant will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Owner shall pay cost of examination and replacement.

1.3 Independent Inspection Agencies

.1 Independent Inspection and Testing Agencies will be engaged by Contractor for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the Contractor and paid from the cash allowances specified in Section 01 21 13.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Consultant at no cost to Owner. Pay costs for retesting and re-inspection.

1.4 Access to Work

.1 Allow inspection and testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.5 Procedures

.1 Notify Owner and Consultant 48 hours in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples

1.6 Rejected Work

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Consultant as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other work damaged by such removals or replacements promptly.

.3 If in opinion of Consultant it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Consultant will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Consultant.

1.7 Reports

.1 Submit electronic .pdf format inspection and test reports to Consultant.

.2 Provide copies to Subcontractor of work being inspected or tested or manufacturer or fabricator of material being inspected or tested.

1.8 Contractors Responsibilities

.1 Be responsible for the execution of the Construction Quality Plan and is to pay all costs for the execution of the Construction Quality Plan. Designate an experienced site representative for carrying out the Construction Quality Plan.

.2 Provide the Owner with a completed quality product for the Work. Contractor shall be responsible for any costs associated with re-testing and reperforming the Work as a result of the Contractor's poor performance or workmanship or other failure to comply with the Contract Documents.

.3 All Work shall be done by persons qualified in their respective trades, and the workmanship shall be first-class in every respect. Contractor is responsible for ensuring employees are appropriately trained. All materials and equipment furnished shall be the best of their respective kinds for the intended use and unless otherwise specified, same shall be new and of the latest design.

.4 The Consultant will have the authority to reject Work that does not conform to the Contract Documents or may require special inspection or testing, whether or not such Work is to be then fabricated, installed or completed.

.5 Failure by a Contractor to conduct its operations, means and methods and coordinate proper sequencing of the Work may cause the Owner to withhold payment or any other means deemed necessary to correct non-conforming Work.

.6 The Owner shall engage a testing firm to perform such engineering laboratory services and on-site inspection as deemed necessary by the Owner. The testing firm will determine compliance with the requirements of the Contract Documents. This Work will not be a service to the Contractors for the performing of tests and checking of materials required of the Contractors.

.7 Copies of test and inspection reports will be furnished to the Contractor. The laboratory and its representatives will be instructed to promptly call to the attention of the Contractor, any instance of non-compliance with the requirements of the Contract Documents. Failure to so notify the Contractor shall not relieve the Contractor of any of its responsibilities for compliance or making good workmanship or materials which are not in compliance with the requirements of the Contract Documents. The agency shall notify the Consultant and the Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services

.8 Contractor's construction materials, procedures and work shall be subject to specified testing procedures and shall be in conformance with the Contract Documents as verified by Testing Agency.

.9 Cooperate with the testing firm and provide labor to assist with sample preparations where applicable.

.10 Except where specifically indicated to be provided by another entity as identified, inspections, tests, and similar quality control services including those specified to be performed by independent agency are the Contractor’s responsibility, and costs thereof are not to be included in contract sum.

.11 Cooperate with independent agencies performing required inspections, tests, and similar services. Provide auxiliary services as reasonably requested, including access to Work, the taking of samples or assistance with the taking of samples, delivery of samples to test laboratories, and security and protection for samples and test equipment at Project site.

.12 Coordination: Contractor and each engaged independent agency performing inspections, tests, and similar services for project are required to coordinate and sequence activities so as to accommodate required services with minimum delay of Work and without the need of removal/replacement of work to accommodate inspections and tests. Scheduling of times for inspections, tests, taking of samples, and similar activities is Contractor’s responsibility.

.13 Where sampling and testing is required for Sections of Work listed in the Contract Documents, the tests shall be performed by an independent testing lab and paid for by the Contractor.

.14 Test procedures to be used shall be submitted for approval of the Consultant where other than those specified are recommended by the testing agency.

.15 Testing Agency Duties: The independent Testing Agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the Owner, the Consultant and Contractors in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.

.16 Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

1.9 Tests and Mix Designs

.1 Furnish test results and mix designs as requested.

1.10 Mockups

.1 Prepare mockups for Work specifically requested in specifications.

.2 Construct in locations acceptable to Consultant.

.3 Prepare mockups for Consultant's review with reasonable promptness and in orderly sequence, to not cause delays in Work.

.4 Failure to prepare mockups 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.

.5 Mock-ups may remain as part of Work unless indicated otherwise.

1.11 Equipment and Systems

.1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Appointment and payment.
.2 Manufacturer's field review.

1.2 Related Sections

.1 Particular requirements for testing and inspection to be carried out by testing laboratory designated by the Consultant are specified under various sections of the specifications.

.2 Testing of systems under Divisions 28.

1.3 Appointment and Payment

.1 From time to time during the progress of the Work, the Owner will require that testing and inspection be performed to determine that materials provided in the Work meet the requirements of the Contract Documents.
  .1 Subcontractors shall verify with Contractor, in writing, portions of the Work that will require testing and/or inspection prior to commencing such affected work.

.2 The Owner will appoint testing and inspection companies, representing, reporting and responsible to the Owner. Cost of testing and inspection will be authorized as a disbursement of the Cash Allowances as specified in Section 01 21 13 unless otherwise indicated or specified and except for the following:
  .1 Testing and inspection required by laws, ordinances, rules, regulations or orders of public authorities.
  .2 Testing and inspection performed exclusively for Contractor's convenience.
  .3 Testing, adjusting and balancing of conveying systems, mechanical and electrical equipment and systems. Refer to mechanical specifications for in-contract air-balancing.
  .4 Mill tests and certificates of compliance.
  .5 Tests specified to be carried out by Contractor under supervision of the Consultant.
  .6 Where tests or inspections by designated testing laboratory reveal work not in accordance with the Contract requirements, Contractor shall pay costs for additional tests or inspections as Consultant may require to verify acceptability of corrected work.
  .7 Additional testing required because of changes in materials, proportions of mixes, requested by the Contractor or Subcontractors as well as any extra testing of materials occasioned by lack of identification or failure of such materials being replaced to meet requirements of the Contract Documents or testing of structure or elements including load testing, shall be ac carried out at no additional cost to the Owner.
  .8 Where evidence exists that defective workmanship has occurred or that the Work has been carried out incorporating defective materials, the Consultant reserves the right to have tests, inspections or surveys performed, analytical calculation of structural strength made and the like in order to help determine the extent of defect and whether such work must be replaced. Tests, inspections or surveys carried out under these s circumstances will be made at the Contractor's expense and will not be paid for by the Owner.
  .9 Testing and compliance letters specified in other Sections.

.3 Inspection and testing company shall submit monthly invoice original to the Contractor for review, relating invoices to tests and inspection reports. Provide original receipts for disbursements. Invoices will be forwarded by Contractor to the Consultant for inclusion in progress payment application.

.4 The Consultant will work with the Owner's representative and the Contactor's commissioning team to review the work of the Contract during closeout procedures. The Contractor shall be responsible to correct all deficiencies as reported by the Consultant and Owner's representative, and in accordance with the Contract documents. Refer to Sections 01 77 00 and 01 91 13 for additional closeout requirements.

.5 Testing and Inspection shall be performed by qualified and/or certified personnel under professional supervision or performed directly by a professional engineer qualified in conformance with applicable codes and certification programs.

.6 Requirements of regulatory agencies:
- .1 Testing shall be conducted in accordance with the requirements of the Building Code.
- .2 Obtain certification where required by the building code and standards.

.7 Cooperation with testing and inspection company.
- .1 Provide inspection company with materials and installation information as required or as requested.
- .2 Provide access to the work for representatives of the inspection and testing companies.
- .3 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
- .4 Cooperate with testing and inspection companies and give adequate notification of any changes in source of supply, additional work shifts or other proposed changes.
- .5 No Product nor part of the Work shall be installed before it is tested when a test is specified or required, nor shall work be executed where a test or inspection is required and the inspector cannot attend. Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by the Consultant.
- .6 Cooperate in permitting access to the Work for testing and inspection company wherever Work is in progress, or wherever Products, materials or equipment are stored prior to shipping.
- .7 Supply labour required to assist testing and inspection company in sampling and making tests.
- .8 Repair work damaged as a result of testing and inspection work.
- .9 Costs of above labour and material shall be borne by applicable Subcontractors.
- .10 The testing and inspection service does not relieve the Contractor of responsibility for normal shop and site inspection, and quality control of production.
- .11 Pay costs for removal and replacement of Work, or for remedial measures necessitated by faulty workmanship and materials which fail to meet requirement specified.

.8 Prepare schedule for testing and inspection in accordance with Section 01 33 00 and as follows:
- .1 Establishing Schedule:
  - .1 By advance discussion with the selected testing laboratory, determine the time required by the laboratory to perform its tests and issue each of its findings.
  - .2 Allow required time within Construction Schedule
- .2 Adherence to Schedule:
  - .1 Contractor shall advise testing and inspection laboratory in advance when testing of the Work is required.
  - .2 When testing and inspection laboratory is ready to test according to predetermined schedule, but is prevented from testing or taking specimens due to incompleteness of the parts of the Work scheduled for testing and inspection, extra costs for testing attributable to the delay may be back-charged to the Contractor at no increase in the Contract Price.
- .3 Notify Contractor and inspection company at least 3 Working Days before work required to be inspected commences, and arrange for a meeting at the Place of the Work, to be held one Working day before the work starts with the following present:
  - .1 Contractor, a principal of the Sub-contractor whose work is to be inspected or tested,

testing and inspection company, manufacturer's res presentative and Consultant.

.4 Give 2 Working Days prior notice to inspection company of the commencement of each phase of the Work requiring inspection and provide inspection company with materials and installation information.

.9 Reports and Documents:

.1 Testing and Inspection companies shall submit shop inspection and site inspection reports within 5 Working days of each inspection.

.2 Distribute reports as follows:

.1 Owner.

.2 Consultant.

.3 Contractor.

.4 Consulting engineers as applicable.

.3 Inspectors shall submit a written report on each inspection or test, including pertinent data such as conditions at the Place of the Work, dates, test references, locations of tested materials, actual product identification, procedures and descriptions, site instructions given, recommendations and/or any other information required by standard applicable reporting of tests and inspections.

.4 Clearly indicate in report failure of Product or procedures to meet applicable standards, give recommendations for retesting or correction. Contact Consultant immediately when Product or procedure fails to meet applicable standards.

.5 Upon completion of those parts of the Work subject to independent testing and inspection, submit to the Consultant duplicate certificates of acceptance of the installation issued by independent testing and inspection company.

.10 Inspection and Test Specimens:

.1 Testing and inspection will generally consist of procedures listed in the following paragraphs, but additional tests may be performed as required to verify conformance to Contract Documents.

.2 Specimens and samples for testing, unless otherwise specified in the Contract Documents, will be taken by the testing laboratory; sampling equipment and personnel will be provided by the testing laboratory; and deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.

.3 Testing and inspection company shall take samples necessary to verify quality as specified by applicable standards or as specified herein. Taking of samples shall not endanger the structure or life and shall be taken so as to best represent the Work as a whole.

.4 Samples shall be handled, packaged, stored and delivers so as to best ensure the validity of tests that will be performed on them. Sample handling where required shall duplicate conditions at the Place of the Work (such as site cured concrete cylinders).

1.4 Manufacturer's Field Review

.1 Where manufacturer's field review is specified, manufacturer's representative shall review the relevant parts of work at the Place of Work, or wherever such affected work is in progress, to end sure that work is being executed in accordance with manufacturer's written recommendations.

.2 Manufacturer's field review is to ensure that the Products specified are being used in the Work and are being applied on surfaces prepared in accordance with their recommendations and the requirements of the Contract Documents.

.3 Manufacturer's representative shall undertake such review weekly, or additionally as necessary, to determine that the work is in accordance with manufacturer's written recommendations.

.4 Manufacturer's representative shall submit a type written report on manufacturer's letterhead

within 2 Working Days after each field review. Report shall document manufacturer's representative's field observations and recommendations.

.5 Manufacturer's field review reports to be prepared and distributed following the procedures specified for pe reparation and submittal of testing and inspection reports given above.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Temporary utilities

1.2 Installation and Removal

.1 Provide temporary utilities and controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.3 Water Supply

.1 Existing sources of water can be made available to the Contractor at no charge, subject to operational requirements. Arrange for connection and pay all costs for installation, maintenance and removal. Conversions or alterations to existing sources of water to meet construction requirements are the responsibility of the Contractor.

.2 The points of delivery and limits on amount available will be determined on site by the Owner whose written permission must be obtained before any connection is made.

1.4 Temporary Heating and Ventilation

.1 Provide adequate ventilation to meet health regulations for safe working environment.

.2 Maintain temperatures of minimum 10° C in areas where construction is in progress.

.3 Ventilating:
.1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
.2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
.3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
.4 Ventilate storage spaces containing hazardous or volatile materials.
.5 Ventilate temporary sanitary facilities.
.6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.4 On completion of Work for which permanent heating system is used, replace filters.

.5 Ensure Date of Substantial Performance and warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Consultant.

.6 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
.1 Conform to applicable codes and standards.
.2 Enforce safe practices.
.3 Prevent abuse of services.
.4 Prevent damage to finishes.
.5 Vent direct fired combustion units to outside.

.7 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.5 Temporary Power and Light

.1 Existing sources of electric power can be made available to the Contractor. Conversions or alterations to existing sources of electric power to meet construction requirements are the responsibility of the Contractor.

.2 The points of delivery and limits on amount available will be determined on site by the Owner whose written permission must be obtained before any connection is made.

.3 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Consultant provided that guarantees are not affected.

.4 Provide and maintain temporary lighting throughout project. Lighting levels shall be sufficient to complete work including inspections. Provide minimum lighting levels of 400 lux at work areas. Lighting levels at floors and stairs not within work areas shall be not less than 160 lux at all times during construction activity.

.5 All equipment used shall be CSA approved.

.6 Wiring and method of installation shall conform to local power requirements and shall be reviewed by a licensed inspector prior to use.

1.6 Temporary Communication Facilities

.1 Provide and pay for temporary telephone, fax, cellular data, lines and all equipment necessary for Contractor's own use.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Construction aids.
.2 Site storage.
.3 Construction parking
.4 Offices
.5 Equipment, tool and material storage.
.6 Sanitary facilities.
.7 Signage.
.8 Shoring

1.2 References

.1 CSA Group (CSA)
  .1 CAN/CSA Z321-96 (R2006) Signs and Symbols for the Workplace
  .2 CAN/CSA Z797-18 Code of Practice for Access Scaffold

1.3 Installation and Removal

.1 Provide construction facilities in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.4 Scaffolding

.1 Scaffolding in accordance with CSA Z797.

.2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms and temporary stairs.

.3 Enclose and heat scaffolding during cold weather.

1.5 Hoisting

.1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment.

.2 Hoists and cranes shall be operated by qualified operator.

1.6 Site Storage/Loading

.1 Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

1.7 Construction Parking

.1 Parking will be permitted on site at areas designated by the Owner provided it does not disrupt performance of Work or ongoing Owners operations.

.2 Provide and maintain adequate access to project site.

.3 If authorized to use existing roads for access to project site, maintain such roads for duration of

Contract and make good damage resulting from Contractors' use of roads.

1.8 Offices

.1 General Contractor and Subcontractors may provide their own offices as necessary and subject to site constraints. Direct location of these offices.

1.9 Equipment, Tool and Material Storage

.1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
.2 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.

1.10 Construction Signage

.1 Direct requests for approval to erect a Contractor signboard to Consultant.

.2 Signs and notices for safety and instruction shall be in English. Graphic symbols shall conform to CAN/CSA Z321.

.3 Post "Construction Zone" signage outside barrier and entrance to all work areas.

.4 Maintain approved signs and notices in good condition for duration of project and dispose of off-site on completion of project.

.5 Install signage to direct site traffic and deliveries to the Construction work areas.

1.11 Shoring

.1 Examine the site to determine the conditions under which work will be performed.

.2 Contractor shall formulate his own conclusions as to the extent of the existing conditions and shoring required.

.3 The method of shoring shall be according to the Contractor's and his Engineer's directions.

.4 All existing loads must be shored prior to commencement of demolition and removal of load bearing elements.

.5 All shoring and frame braces must be supplied with a safe load rating which must not be exceeded. Install in accordance with manufacturer's recommended procedures and safety guidelines. Ensure that the safe load conditions of the shoring are not exceeded by dead, live or construction loads.

.6 All shoring shall be subject to the Consultant's review and approval prior to commencing demolition work.

.7 Completely remove all shoring after new structure is installed and all concrete is set.

.8 Submit shoring drawings and a proposed installation procedure stamped by a professional engineer registered in the Province of Ontario. Procedures shall follow the information provided on these drawings. The shoring design engineer shall be retained and paid for by the Contractor.

The shoring engineer shall review all existing conditions on site prior to completing shoring design.

.9 Removal of existing materials without proper engineered shoring is a safety hazard and will not be permitted.

.10 Make good all damage to the existing structure and adjoining structures and bear full responsibility for failure to provide adequate shoring.

.11 The failure or refusal of the Consultant to suggest the use of shoring, shall not in any way or to any extent relieve the Contractor of any responsibility concerning the condition of the work or of any of their obligations under the Contract, nor impose any liability on the Owner or their agents; nor shall any delay, whether caused by any action or want of action on the part of the Contractor, or by any act of the Owner, or their agents, or employees, relieve the Contractor from necessity of properly and adequately protecting the existing structure from collapse or damage, nor from and of his obligations under the Contract relating to injury to persons or property, nor entitle him to any claims for extra compensation or an extension in schedule.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Product quality, availability, storage, handling, protection, and transportation.
.2 Manufacturer's instructions.
.3 Quality of Work, coordination and fastenings.
.4 Dielectric Separation
.5 Tolerances for Execution of Work.
.6 Protection of Work in progress.
.7 Existing Utilities

1.2 Definition – Basis of Design

.1 Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
  .1 Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.

.2 Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
  .1 Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.

.3 Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 01 33 00 -Submittal Procedures.

1.3 Quality

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Consultant based upon requirements of Contract Documents.

.4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.4 Availability

.1 Review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.5 Storage, Handling and Protection

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

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

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

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of Consultant.

.9 Touch up damaged factory finished surfaces to Consultant's satisfaction. Use touch up materials to match original. Do not paint over name plates.

1.6 Transportation

.1 Pay costs of transportation of products required in performance of Work.

.2 Transportation cost of products supplied by Owner will be paid for by Owner. Contractor shall be responsible for the unloading, handling and storage of such products.

1.7 Manufacturer’s Instructions

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant may establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements,

authorizes Consultant to require removal and re installation at no increase in Contract Price or Contract Time.

1.8 Quality of Work

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed.

.2 Immediately notify Consultant if required Work is such as to make it impractical to produce required results.

.3 Do not employ anyone unskilled in their required duties. Consultant reserves right to require dismissal from site, workers deemed incompetent or careless.

.4 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Consultant, whose decision is final.

1.9 Coordination

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.10 Concealment

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation, inform Consultant if there is interference. Install as directed by Consultant.

1.11 Remedial Work

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.12 Location of Fixtures

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Consultant of conflicting installation. Install as directed.

1.13 Fastenings

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

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

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

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

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

1.14 Fastenings – Equipment

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

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.15 Dielectric Separation

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

1.16 Tolerances for Execution of Work

.1 Unless specifically indicated otherwise, Work shall be installed plumb, level, square and straight.

.2 Unless acceptable tolerances are otherwise specified in specification sections, or are otherwise required for proper functioning of equipment, site services and mechanical and electrical systems:
- .1 “Plumb and level” shall mean plumb or level within 1 mm in 1m.
- .2 “Square” shall mean not in excess of 10 seconds lesser or greater than 90 degrees.
- .3 “Straight” shall mean within 1 mm under a 1 m long straight edge.
- .4 “Flush” shall mean within:
  - .1 6 mm for exterior concrete, masonry and paving materials.
  - .2 1 mm for interior concrete, masonry, tile and similar surfaces.
  - .3 0.5 mm for other interior surfaces.

.3 Allowable tolerances shall not be cumulative

1.17 Protection of Work in Progress

.1 Adequately protect Work completed or in progress. Work damaged or defaced due to failure in providing such protection is to be removed and replaced, or repaired, as directed by Consultant, at no increase in Contract Price or Contract Time.

.2 Prevent overloading of any part of building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of the Consultant.

1.18 Existing Utilities

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants and pedestrian and vehicular traffic.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

1.19 Hazardous Materials

.1 Report any found or suspected hazardous materials to the Owner.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Safety Requirements
.2 Fire Protection
.3 Accident Reporting
.4 Records on Site

1.2 References

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
.2 Fire Commissioners of Canada, FC 301, Standard for Construction Operations.
.3 National Fire Protection Agency (NFPA)
  .1 NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations
.4 Occupational Health and Safety Act.
  .1 R.R.O. 1990, Reg. 860: Workplace Hazardous Materials Information System (WHMIS)
  .2 O. Reg. 632/05: Confined Spaces
.5 Ontario Building Code.

1.3 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit to Owner and Consultant copies of the following documents, including updates issued:
  .1 Notice of Project filed with Provincial Ministry of Labour or equivalent for Place of Work
  .2 Site-specific Health and Safety Plan prior to commencement of work on the work site. Plan shall include but not be limited to the following:
    .1 Name and contact info of Contractor's Health and Safety Representative for Work Site; including twenty-four (24) hour emergency contact phone numbers.
    .2 Phone numbers of local fire, police, and ambulance outside of 911 services.
    .3 Location of nearest medical facility and level of injury that each can service.
  .3 Submit to the Owner, Consultant and Municipal Fire Department, for review, a “Fire Safety Plan” conforming to Section 2.14 of the National Fire Code of Canada. Maintain a copy of the “Fire Safety Plan” on site.
  .4 Copies of certification for all employees on site of applicable safety training including, but not limited to:
    .1 WHMIS.
    .2 Fall arrest and protection.
    .3 Suspended Access Equipment.
    .4 Erection of Scaffolding.
    .5 License for powder actuated devices.
  .5 On-site Contingency and Emergency Response Plan addressing:
    .1 Standard procedures to be implemented during emergency situations.
    .2 Preventative planning and protocols to address possible emergency situations.

.3 Guidelines for handling, storing, and disposing of hazardous materials that maybe encountered on site, including measures to prevent damage or injury in case of an accidental spill.

.4 Incident and accident reports, promptly if and upon occurrence
  .1 Reports or directions issued by authorities having jurisdiction, immediately upon issuance from that authority.
  .2 Accident or Incident Reports, within 24 hours of occurrence.

.5 Submit other data, information and documentation upon request by the Consultant as stipulated elsewhere in this section.

1.4 Compliance Requirements

.1 Comply with the latest edition of the Ontario Occupational Health and Safety Act, and the Regulations made pursuant to the Act.

1.5 Constructor

.1 Notify all regulatory bodies required for construction activities, (i.e., Notice of Project, employer notification, etc.). Notifications shall include, but not be limited to, the notification requirements laid out in OHSA Sec 51-53 and the requirements of Ontario Regulation 213/91 for Construction Projects, Sections 5, 6 and 7. For the purpose of this contract the Contractor shall be the "Constructor".

.2 The “Constructor” will be solely responsible for the safety of all persons on the Site.

1.6 Safety Requirements

.1 Observe and enforce all construction safety measures and comply with the latest edition and amending regulations of the following documents and in the event of any differences among those provisions, the most stringent shall apply:
.1 Occupational Health and Safety Act and Regulations for Construction Projects, August 1997, Ontario Regulation 213/91 including amendments.
.2 Hazardous Products Act and Canada Labour Code.
.3 The Workplace Safety and Insurance Board, O. Reg 454.
.4 Ontario Building Code Act, Ontario Regulation 332/12 including amendments.
.5 National Building Code of Canada, Part 8: Safety Measures on Construction and Demolition Sites.
.6 National Fire Code of Canada.
.7 NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations, 2013 Edition
.8 Environmental Protection Act.
.9 The Power Commission Act.
.10 The Boiler and Pressure Vessels Act.
.11 The Elevators and Lifts Act.
.12 The Operating Engineer's Act.
.13 Municipal statutes.

.2 Obey all Federal, Provincial and Municipal Laws, Acts, Statutes, Regulations, Ordinances and By-laws which could in any way, pertain to the work outlined in the Contract, or to any employees of the Contractor. Satisfy all statutory requirements imposed by the Occupational Health and Safety Act and Regulations made thereunder, on a Contractor, and Constructor and/or Employer with respect to or arising out of the performance of the Contractors obligations under this Contract.

.3 Working at Heights: The supervisor of the project, will be responsible to ensure that his employees and subcontractors/suppliers have current Working at Heights and Fall Protection certification.

.4 The supervisor of the project will be responsible for his employees and subcontractors/suppliers maintaining standard safety practices, as well as the specific safety rules listed below, while working on the Owner’s property.

.5 The Owner reserves the right to order individuals to leave the site if the individual is in violation of any safety requirement or any Act. Any expense incurred will be the responsibility of the Contractor.
.6 Notify the Owner should any hazardous condition become apparent.

.7 Enforce the use of CSA approved hard hats, reflective vests and safety boots for all persons entering or working at the construction site. Refuse admission to those refusing to conform to this requirement.

.8 Provide safeguard and protection against accident, injury or damage to any person on the site, adjacent work areas and adjacent property.

1.7 Confined Space

.1 Confined Space: Where applicable, provide the Consultant and all Regulatory Authorities with a copy of the Contractors' Confined Space Entry Procedure. In the event that defined procedures are not available, abide by the applicable requirements of the Occupational Health and Safety Act and all regulations made thereunder.

.2 Persons intended to work in confined spaces, as defined by the Owner, must have formal training in performing work in confined spaces.

.3 Provide proof of valid certificates of such training for all workers prior to entry of such workers into confined spaces.

.4 Provide all necessary safety equipment for entry into confined spaces.

.5 Where workers are required to enter a confined space, as defined by the OHSA, O. Reg. 632/05 Section 221.2, ensure that workers of the Contractor and all Subcontractors follow the requirements of the above legislation, including but not limited to:
.1 Having a method for recognizing each confined space to which the program applies
.2 Having a method for assessing the hazards to which workers may be exposed
.3 Having a method for the development of confined space entry plans (which include on-site rescue procedures)
.4 Having a method for training workers
.5 Having an entry-permit system.
.6 Supply the necessary tools and equipment to perform the confined space entry. These items include, but are not limited to, required documentation, gas detectors, breathing equipment, fall protection and rescue equipment.

1.8 Safety Meetings

.1 Site toolbox safety meetings will be held weekly for all Contractor employees and all sub trade contractors.

.2 Where a Joint Health and Safety Committee is required on a project, workers and supervisors, selected, as members of the committee must attend.

1.9 Workplace Hazardous Materials Information System (WHMIS)

.1 Be familiar with WHIMIS regulations and be responsible for compliance.

.2 Provide to the Consultant a list of Designated Substances that will be brought to the site prior to

commencing work. Safety Data Sheets (SDS) and the hazardous material inventory for each substance listed must be kept on the Project.

.3 Be responsible for all other requirements of regulations as applicable to Employers.

.4 All controlled products to be properly labelled and stored.

.5 Immediately inform Owner and Consultant if any unforeseen or peculiar safety-related factor, hazard, or condition becomes evident during performance of Work.

1.10 Fire Protection

.1 Provide and maintain safeguard and protection against fire in accordance with current fire codes and regulations.

.2 Provide temporary fire protection throughout the course of construction. Particular attention shall be paid to the elimination of fire hazards.

.3 Comply with the requirements of FCC No. 301 Standards for Construction Operations issued by the Fire Commissioner of Canada and the National Building Code.

.4 Provide and maintain portable fire extinguishers during construction, in accordance with Part 6 of the National Fire Code of Canada 2015 and NFPA 241.

.5 Maintain unobstructed access for firefighting at all areas in accordance with the National Building Code of Canada.

1.11 First Aid

.1 Provide such equipment and medical facility as required by WSI Act to supply first aid services to anyone who may be injured at the place of Work. Report all accidents or injuries to the proper authorities and to the Owner and Consultant.

1.12 Accident Reporting

.1 Investigate and report incidents and accidents as required by Occupational Safety and Health Act, and the Regulations made pursuant to the Act.

1.13 Records on Site

.1 Maintain on site a copy of the safety documentation as specified in this Section and any other safety related reports and documents issued to or received from the authorities having jurisdiction.

.2 Upon request, make copies available to the Consultant.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Examination of Existing Conditions.
.2 Recording of existing conditions found.

1.2 References

.1 Owner's identification of existing survey control points and property limits.

1.3 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

1.4 Examination of Work and Site

.1 Examine the site and existing building to be fully informed of their particulars as related to the Work.

.2 Verify dimensions of completed Work in place before fabrication of Work to be incorporated with it. Ensure that all necessary job dimensions are taken for the proper execution of the work. Assume complete responsibility for the accuracy and completeness of such dimensions.

.3 No claims for extra payment will be paid for extra work made necessary or for difficulties encountered due to conditions of the site which were visible or reasonably inferable from an examination of the site at the time prior to tender closing date and furthermore, failure of the Contractor to visit and examine the site shall be deemed a waiver of all claims for extra payment due to any condition of the site existing prior to tender closing date.

.4 As-found damage: Record by photography and submit evidence to Consultant before commencing work, any found damaged surfaces or materials adjacent to new work, and not included under scope of this new work. Remedial work to any damage, not so recorded, shall be the responsibility of the Contractor.

1.5 Existing Services

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Consultant of findings. The Contractor is responsible for coordination of all utility locates.

.2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut off points as directed by Consultant.

.3 Where Work involves breaking into or connecting to existing services, carry out work at times directed by authorities having jurisdiction, with minimum of disturbance to building occupants, pedestrian and vehicular traffic.

.4 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.

.5 Install temporary drain plugs to prevent construction debris from blocking pipes downstream of the work.

.6 All existing concrete floor slabs shall be scanned prior to any cutting or breaking of concrete.

Employ a qualified concrete scanning company or inspection and testing agency to scan and map floor slabs for reinforcing, plastic and metal conduit, piping, grounding cables, embedment and the like. Map all slabs and provide copies to the Owner and Consultant.

1.6 Location of Services, Equipment and Fixtures

.1 Location of services, equipment, fixtures and outlets indicated on drawings or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance. Include existing equipment which affects or will be affected by the work.

.3 Inform Consultant of impending installation and obtain approval for actual location.

.4 Location of site services where required, is approximate and is based on information provided by the Owner. Undertake all locates to determine exact locations of existing services and lay out new services to avoid any conflicts with new building elements, including site improvements, building foundations and other new or existing services.

.5 Submit field drawings and interference drawings to indicate relative position of various services and equipment. Refer to requirements for interference drawings specified elsewhere.

.6 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the spaces provided.

.7 Prepare drawings to indicate coordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus and connections are coordinated.

.8 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance and access are indicated and maintained.

.9 Submit interference drawings to Owner and Consultant in accordance with Section 01 33 00.

.10 Unless specifically indicated by the Consultant, interference drawings will be received for information only and will not be reviewed.

1.7 Records

.1 Maintain a complete, accurate log of control and survey work as it progresses.

.2 Record locations of maintained, re-routed and abandoned service lines.

1.8 Subsurface Conditions

.1 Promptly notify Consultant in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.

.2 After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in Work.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Requirements and limitations for cutting and patching the Work.

1.2 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit written request and obtain Consultant's approval in advance of cutting or alteration which affects:
.1 Structural integrity of any element of Project.
.2 Integrity of weather exposed or moisture resistant elements.
.3 Efficiency, maintenance, or safety of any operational element.
.4 Visual qualities of sight exposed elements

.3 Include in request:
.1 Identification of project.
.2 Location and description of affected Work.
.3 Statement on necessity for cutting or alteration.
.4 .Description of proposed Work, and products to be used.
.5 Alternatives to cutting and patching.
.6 Effect on Work of Owner or separate contractor.
.7 Date and time work will be executed.

1.3 Materials

.1 As specified and required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 25 00 - Substitution Procedures.

.3 Requests for change in materials shall include documentation indicating conformance to project requirements and intent.

1.4 Definitions

.1 Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

.2 Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

PART 2 PRODUCTS

2.1 Materials

.1 General: Comply with requirements specified in other Sections.

.2 In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

.3 If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Consultant for the visual and functional performance of in-place materials.

PART 3 EXECUTION

3.1 Preparation

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which may be exposed by uncovering work; maintain excavations free of water.

3.2 General

.1 Carry out all cutting, fitting and patching required for the work of the Contract.

.2 Repair all wall and floor surfaces where items have been removed.

.3 Make good all finishes as required.

.4 Repaint damaged wall surfaces.

.5 Fit several parts together, to integrate with other Work.

.6 Uncover Work to install ill-timed Work.

.7 Remove and replace defective and non-conforming Work.

.8 Provide cutting and patching of all openings in non-structural elements of Work as necessary to complete installation of mechanical and electrical Work. Include complete removal and replacement of such elements as necessary to provide construction access.

.9 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.10 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.11 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools are not allowed on masonry work without prior approval.

.12 Restore work with new products in accordance with requirements of Contract Documents.

.13 Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.14 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with “ULC approved firestopping material, full thickness of the construction element. Include any openings in existing building elements created by removal of existing services or equipment.

.15 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

3.3 Cutting and Patching

.1 General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

.2 Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

.3 Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

.4 Temporary Support: Provide temporary support of work to be cut.

.5 Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

.6 Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00 - Summary of Work.

.7 Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

.8 Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   .1 In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   .2 Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   .3 Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   .4 Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
   .5 Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
   .6 Proceed with patching after construction operations requiring cutting are complete.

.9 Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

.1 Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
.2 Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
  .1 Clean piping, conduit, and similar features before applying paint or other finishing materials.
  .2 Restore damaged pipe covering to its original condition.
.3 Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, colour, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform colour and appearance.
  .1 Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
.4 Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
.5 Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

.10 Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.4 Subfloor Levelling

.1 Where existing flooring is to be removed from floor slabs to remain, including ceramic tile flooring, carefully remove all flooring, grout, adhesives, waterproofing membranes and the like down to the base slab. Clean, patch and repair slab where damaged with concrete or acceptable leveling compound in accordance with new flooring manufacturer’s instructions and ASTM F710. Refer to original building drawings and remove and replace existing concrete floor toppings as necessary and where required.

.2 Where new flooring is to be installed on new concrete slab or on framed floors, subfloor shall be levelled in accordance with flooring manufacturer’s specifications and tolerances and with ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

3.5 Fire Barrier Seals

.1 Ensure fire separations are maintained as indicated on the drawings. patch and firestop all penetrations accordingly.

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Progressive Cleaning
.2 Final Cleaning

1.2 References

.1 National Fire Protection Association (NFPA)
  .1 NFPA 241-22 Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.3 Project Cleanliness

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by the Owner. Do not burn waste materials on site.

.3 Clear snow and ice from access to building, bank/pile snow in designated areas only.

.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.5 Provide on-site containers for collection of waste materials and debris.

.6 Provide and use clearly marked separate bins for recycling.

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

.8 Store volatile waste in covered metal containers and remove from premises at end of each working day.

.9 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

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

PART 2 PRODUCTS

2.1 Products

.1 All cleaning materials and products shall be low VOC type. Submit list of cleaning products including SDS for approval prior to commencement of cleaning operations.

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

PART 3 EXECUTION

3.1 Final Cleaning

.1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others and leave Work clean and suitable for occupancy.

.3 Prior to final review remove surplus products, tools, construction machinery and equipment.

.4 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

.5 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, floors and ceilings.

.6 Clean lighting reflectors, lenses, and other lighting surfaces. Clean and/or replace lamps, light fixtures, grilles and lenses.

.7 HEPA vacuum clean and dust building interiors, behind grilles, louvres and screens.

.8 Thoroughly vacuum clean interior of electrical equipment.

.9 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.

.10 Clean and seal concrete floor surfaces with non-skid matte sealer.

.11 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.12 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.

.13 Broom clean and wash exterior paved areas, walks, steps and surfaces; rake clean other surfaces of grounds.

.14 Remove dirt and other disfiguration from exterior surfaces.

.15 Clean and sweep roofs. Clear all drains, scuppers, gutters and downspouts.

.16 Remove debris and surplus materials from crawl spaces and other accessible concealed spaces.

.17 Under direction of Consultant, aim adjustable luminaires.

3.2 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Construction Waste Management and Disposal.

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 References.
.2 Submittals.
.3 Definitions.
.4 Waste Management Goals for the Project.
.5 Documents.
.6 Waste Management Plan.
.7 Materials Source Separation Program.
.8 Disposal of Wastes.
.9 Scheduling.
.10 Storage, Handling and Protection.
.11 Application.
.12 Diversion of Materials.

1.2 References

.1 O. Reg. 102/94 Waste Audits and Waste Reduction Work Plans.
.2 O. Reg. 278/05 Occupational Health and Safety Act

1.3 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit a completed Waste Management Plan (WMP) prior to project start-up.

1.4 Definitions

.1 Waste Management Plan (WMP): Contractor's approved overall strategy for waste management including waste reduction workplan and materials source separation program.

.2 Materials Source Separation Program (MSSP): Consists of a series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.

.3 Separate Condition: Refers to waste sorted into individual types.

1.5 Waste Management Goals for the Project

.1 The Owner has established that this Project shall generate the least amount of waste possible and that processes shall be employed that ensure the generation of as little waste as possible including prevention of damage due to mishandling, improper storage, contamination, inadequate protection or other factors as well as minimizing over packaging and poor quantity estimating.

.2 Of the waste that is generated, the waste materials designated in this specification shall be salvaged for reuse and or recycling. Waste disposal in landfills or incinerators shall be minimized.

1.6 Waste Management Plan

.1 Waste Management Plan: Submit a Waste Management Plan within 10 calendar days after receipt of Notice of Award of Contract, or prior to any waste removal, whichever occurs sooner. The Plan shall contain the following:
  .1 Analysis of the proposed job site waste to be generated, including the types of recyclable and waste materials generated (by volume or weight). In the case of demolition, a list of each item proposed to be salvaged during the course of the project should also be prepared
  .2 Alternatives to Land Filling: Contractor shall designate responsibility for preparing a list of each material proposed to be salvaged, reused, or recycled during the course of the Project.

.2 Post WMP or summary where workers at site are able to review its content.

1.7 Materials Source Separation Program

.1 The Waste Management Plan shall include a Source Separation Program for recyclable waste and shall be in accordance with the established policies currently in place at the local Municipality, and the requirements of O. Reg. 102/94.

.2 Prepare MSSP and have ready for use prior to project start-up.

.3 Implement MSSP for waste generated on project in compliance with approved methods and as approved by Consultant.

.4 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and/or recyclable materials.

.5 Provide containers to deposit reusable and/or recyclable materials.

.6 Locate containers to facilitate deposit of materials without hindering daily operations.

.7 Locate separated materials in areas which minimize material damage.

.8 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.

1.8 Disposal of Wastes

.1 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.2 Provide appropriate on-site containers for collection of waste materials and debris. Containers for volatile wastes shall be closed containers and shall be removed from site daily.

.3 Provide and use clearly marked separate bins for recycling.

.4 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site.

.5 Remove waste material and debris from site and deposit in waste container at end of each working day.

.6 Do not permit waste to accumulate onsite.

.7 Burying of rubbish and waste materials is prohibited.

.8 Disposal of waste into waterways, storm or sanitary sewers is prohibited.

1.9 Scheduling

.1 Coordinate work with other activities at site to ensure timely and orderly progress of the Work.

1.10 Storage, Handling and Protection

.1 Store, materials to be reused, recycled and salvaged in locations as directed by Owner.

.2 Materials from building demolition to be salvaged or re-used are to be removed and salvaged.

.3 Unless specified otherwise, materials for removal become Contractor's property.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Application

.1 Do work in compliance with Waste Management Plan.

.2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

.3 Source separate materials to be reused/recycled into specified sort areas.

3.2 Designated Substances

.1 All designated substances abatement, removal and disposal shall be completed in accordance with O. Reg 278/05 and all other applicable legislation.

3.3 Diversion of Materials

.1 Separate materials from general waste stream and stockpile in separate piles or containers, to approval of Owner, and consistent with applicable fire regulations. Mark containers or stockpile areas.

.2 On-site sale of materials is not permitted.

End of Section

.

PART 1 GENERAL

1.1 Section Includes

.1 Administrative procedures preceding preliminary and final inspections of Work.

1.2 References

.1 Canadian Construction Documents Committee
  .1 CCDC 2-2020 Stipulated Price Contract including Supplementary Conditions.
.2 OAA/OGCA Document 100 - Recommended Procedures Regarding Substantial Performance of Construction Contracts and Completion Takeover of Projects.
.3 The Construction Act.

1.3 Inspection and Declaration

.1 Contractor's Inspection: The Contractor shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents. Submit duplicate copies of the deficiency list to the Owner and Consultant.
  .1 Notify Consultant in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
  .2 Request Consultant's review.

.2 Consultant's Review: Consultant and Contractor will perform review of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:
  .1 Work has been completed and inspected for compliance with Contract Documents.
  .2 Defects have been corrected and deficiencies have been completed.
  .3 Equipment and systems have been tested, adjusted and balanced and are fully operational.
  .4 Certificates required by Boiler Inspection Branch, Fire Commissioner, Utility companies, TSSA, ESA and other regulatory agencies have been submitted.
  .5 Operation of systems have been demonstrated to Owner's personnel.
  .6 Work is complete and ready for Final Review by the Consultant.

.4 Final Inspection: when items noted above are completed, request final review of Work by Consultant, and Contractor. If Work is deemed incomplete by the Consultant, complete outstanding items and request re-review.

.5 Declaration of Substantial Performance: when Consultant consider deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance. Refer to CCDC 2, General Conditions Article GC 5.4 - Substantial Performance of Work and Payment of Holdback for specifics to application.

.6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment: When Consultant considers final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. Refer to CCDC 2, General Conditions Article GC 5.5 – Final Payment for specifics to application.

.8 Payment of Holdback: After issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback amount in accordance with CCDC 2, General Conditions Article 5.4 - Substantial Performance of Work and Payment of Holdback.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

.

PART 1 GENERAL

1.1 Section Includes

.1 As built, samples, and specifications.
.2 Equipment and systems.
.3 Product data, materials and finishes, and related information.
.4 Operation and maintenance data.
.5 Spare parts, special tools and maintenance materials.
.6 Warranties and bonds.
.7 Final site survey.

1.2 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

1.3 Submission

.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.2 At least 2 weeks prior to commencement of scheduled commissioning activities, submit 2 copies of the draft Operating and Maintenance Manuals, for Consultants review and use during the commissioning activities. After the completion of the commissioning activities, the Consultant will return to the Contractor 1 draft copy, with review comments, for revision. Submit 1 copy of the revised Operating and Maintenance for approval prior to the production of final copies. Prior to the Issuance of the Final Certificate of Completion, and within 10 working days after Substantial Performance, submit 2 copies of the final Operating and Maintenance Manuals.

.3 Building will not be deemed ready for use unless the draft copies of the Operating and Maintenance Manuals and the "As-built" Record Documents have been submitted and reviewed by the Consultant.

.4 Building will not be deemed ready for use unless the completed and submitted Operating and Maintenance Manuals and "As-built" Record Documents have been accepted by the Consultant.

.5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.6 If requested, furnish evidence as to type, source and quality of products provided.

.7 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

1.4 Format

.1 Organize data in the form as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

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

.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by Section numbers and sequence of Table of Contents.

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

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

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

.9 Provide 1:1 scaled CAD files in .dwg format. Provide duplicate copies on memory stick.

1.5 Contents Each Volume

.1 Table of Contents: provide title of project;
- .1 Date of submission; names.
- .2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
- .3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:
- .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

1.6 As-Builts and Samples

.1 In addition to requirements in General Conditions, maintain at the site for Consultant one record copy of:
- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Change Orders and other modifications to Contract.
- .5 Reviewed shop drawings, product data, and samples.
- .6 Field test records.
- .7 Inspection certificates.
- .8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Consultant.

1.7 Recording Actual Site Conditions

.1 Record information on set of drawings, provided by Consultant.

.2 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.3 Contract Drawings and shop drawings: mark each item to record actual construction, including:
.1 Measured depths of elements of foundation in relation to finish first floor datum.
.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
.4 Field changes of dimension and detail.
.5 Changes made by Change Orders.
.6 Details not on original Contract Drawings.
.7 References to related shop drawings and modifications.

.4 Submit following drawings:
.1 Record changes in red. Mark on one set of prints and at completion of project prior to final inspection, produce electronic “as-built” records on disk using latest version of AutoCad. Annotate “AS-BUILT RECORD” in each drawing title block.
.2 All changes shall be shown on a separate drawing layer named "as-built".
.3 At least 2 weeks prior to commencement of scheduled commissioning activities, submit one copy of the draft “As-built” Project Record Documents for Consultants review and use during the commissioning activities. After the completion of the commissioning activities, the Consultant will return to the Contractor the draft copy, with review comments, for revision. Prior to the Issuance of the Final Certificate of Completion, and within 10 working days after Substantial Performance, submit 2 copies of the final “As-built” Project Record Documents and disk of “as-built” record drawings.

.5 Specifications: legibly mark each item to record actual construction, including:
.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.8 Final Survey

.1 Submit final site survey certificate in accordance with Section 01 71 00 - Examination and Preparation, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.9 Equipment and Systems

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

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

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

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

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

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

.8 Include sequence of operation by controls manufacturer.

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

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor’s co-ordination drawings, with installed colour coded piping diagrams.

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

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

.14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control.

.15 Additional requirements: as specified in individual specification sections.

1.10 Materials and Finishes

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

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

.3 Moisture-Protection and Weather-Exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional Requirements: as specified in individual specifications sections.

1.11 Spare Parts

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Spare parts as identified in individual sections are to be delivered to the Owner prior to the Contractor's application for Substantial Performance.

.4 Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.12 Maintenance Materials

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Maintenance materials are to be delivered to the Owner prior to the Contractor's application for Substantial Performance.

.4 Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.13 Special Tools

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Special tools are to be delivered to the Owner prior to the application for Substantial Performance.

.4 Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.

1.14 Storage, Handling and Protection

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.
.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and to satisfaction of Consultant.

1.15 Warranties and Guarantees

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

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and guarantees, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.

.4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

.7 Retain warranties and guarantees until time specified for submittal.

1.16 Independent Specialty Engineers Sign-Off

.1 Prior to Substantial Performance, provide copies of signed and stamped engineers review and sign-off letters stating that the work has been built in accordance with their drawings and designs. Conditional or vague letters of sign-off will not be accepted. All specialty design engineers for all sub-contractors and suppliers will be required to review the work in progress at appropriate intervals to ensure compliance with their designs and drawings and shall provide final sign-off letters. Provide copies of all field reports issued by specialty engineers. Carry all costs associated with full compliance with this requirement.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 References

.1 The National Building Code of Canada 2020, Part 8-Safety Measures on Construction and Demolition Sites.
.2 CSA Group (CSA)
  .1 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures
.3 ASTM International (ASTM)
  .1 ASTM F710-22 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
.4 Ontario Provincial Regulations
  .1 Ontario Regulation 102/94 Waste Audits and Waste Reduction Work Plans.
  .2 Ontario Regulation 103/94 Environmental Protection Act.
  .3 Ontario Regulation 213/07 The Fire Code.
  .4 Ontario Regulation 232/98 Landfilling Sites.
  .5 Ontario Regulation 278/05 Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations.
  .6 Ontario Regulation 347 Environmental Protection Act, General — Waste Management.
  .7 Ontario Regulation 332/12 The Building Code.
.5 The Workplace Health and Safety Act, and Regulations for Construction Projects.
.6 The Contractors Health and Safety Policy.
.7 Laws, rules and regulations of other authorities having jurisdiction.

1.3 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit detailed written schedule, methodology and proposed procedures for demolition, including a Safe Work Plan for review prior to commencement of demolition.

.3 Where required by authorities having jurisdiction, submit for approval drawings, diagrams or details clearly showing sequence of disassembly work or supporting structures and underpinning.

.4 Drawings for structural elements of the demolition process including shoring, underpinning and installation of new lintels or beams in existing load bearing walls, shall bear signature and stamp of qualified professional engineer registered in the Province of Ontario.

.5 Submit proposed dust-control measures.

.6 Submit proposed noise-control measures.

.7 Submit schedule of demolition activities indicating the following:
  .1 Detailed sequence of demolition and removal work, including start and end dates for each activity.
  .2 Dates for shutoff, capping, and continuation of utility services.
.8 If hazardous materials are encountered and disposed of, landfill records indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

.9 At Project Closeout: Submit record drawings in accordance with Section 01 78 00. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions

1.4 Permits

.1 Obtain and pay for all permits and comply with all laws, rules, ordinances, and regulations relating to Demolition of Building and preservation of Public Health and Safety.

.2 The Consultant will complete General Review during demolition in accordance with the Ontario Building Code. All other engineering required for shoring design and for other structural elements of the demolition work will be completed by the Contractor's own engineer and paid for by the Contractor.

1.5 Waste Management Plan

.1 All work of this section shall be completed in accordance with the contractors approved Waste Management Plan specified in Section 01 74 19.

1.6 Definitions

.1 Chemical Waste: Includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals and inorganic wastes.

.2 Demolition Waste: Building materials and solid waste resulting from construction, remodeling, repair, cleanup, or demolition operations that are not hazardous. This term includes, but is not limited to, asphalt concrete, Portland cement concrete, brick, lumber, gypsum wallboard, cardboard and other associated packaging, roofing material, ceramic tile, carpeting, plastic pipe, and steel. The materials may include rock, soil, tree stumps, and other vegetative matter resulting from land clearing and landscaping for construction or land development projects.

.3 Environmental Pollution and Damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human or animal life; affect other species of importance to humanity; or degrade the utility of the environment for aesthetic, cultural or historical purposes.

.4 Inert Fill: A permitted facility that accepts inert waste such as asphalt and concrete exclusively for the purpose of disposal.

.5 Inert Solids/Inert Waste: Non-liquid solid waste including, but not limited to, soil and concrete that does not contain hazardous substances or soluble pollutants at concentrations in excess of water-quality standards established by a regional water board and does not contain significant quantities of decomposable solid waste.

.6 Landfill: A landfill that accepts non-hazardous materials such as household, commercial, and industrial waste, resulting from construction, remodeling, repair, and demolition operations. A landfill must have a solid waste facilities permit from the Ministry of the Environment and be in conformance to O. Reg 232/98.

.7 Recycling: The process of sorting, cleansing, treating and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.

.8 Remove: Remove and legally dispose of items, except those identified for use in recycling, re-use, and salvage programs.

.9 Reuse: The use, in the same or similar form as it was produced, of a material which might otherwise be discarded.

.10 Solid Waste: All putrescible and non-putrescible solid, semisolid, and liquid wastes, including garbage, trash, refuse, paper, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, dewatered, treated, or chemically fixed sewage sludge which is not hazardous waste, manure, vegetable or animal solid and semisolid wastes, and other discarded solid and semisolid wastes. "Solid waste" does not include hazardous waste, radioactive waste, or medical waste as defined or regulated by law.

1.7 Quality Assurance

.1 Demolition Firm Qualifications: Demolition contractor shall be an experienced firm that has successfully completed demolition Work similar to that indicated for this Project.

.2 Regulatory Requirements: Comply with governing regulations before starting demolition. Comply with hauling and disposal regulations of authorities having jurisdiction. Obtain and pay for all permits required.

.3 Pre-demolition Conference: Conduct a conference at Project site.
.1 Review the environmental goals of this Project and make a proactive effort to increase awareness of these goals among all labor forces on site.
.2 Review schedule and scheduling procedures.
.3 Review health and safety procedures.
.4 Review of Project conditions including review of record photographs.

1.8 Project Conditions

.1 Construct safety barriers, barricades, fencing and hoarding to separate public from work areas as described in Section 01 56 00.

.2 The Owner assumes no responsibility for the actual condition of the structures to be demolished.

.3 Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner insofar as practicable. Variations within the structures may occur by the Owner's salvage operations prior to start of demolition.

1.9 Designated Substances

.1 Refer to Owner supplied hazardous material report.

.2 Should any other material not identified in the above referenced reports resembling asbestos or other hazardous substances be encountered in course of demolition work, immediately stop work and notify the Owner’s Representative. Refer to Section 01 41 00.

.3 All designated substances abatement, removal and disposal shall conform to the abatement plan prepared by Owner’s consultant.. All work shall be completed in accordance with O. Reg 278/05 and all other applicable legislation. Refer to Specifications included in the Designated Substance Survey for abatement requirements.

PART 2 PRODUCTS

2.1 Materials

.1 Provide all materials necessary for temporary shoring. On completion, remove temporary materials from site.

.2 All building materials removed from the building shall become the property of the Contractor unless specified otherwise and shall be reused in new construction or removed from the Site.

.3 All concrete, masonry, asphalt and similar materials shall be crushed prior to disposal.

2.2 Salvage

.1 All items of salvageable value must be salvaged.

.2 Provide a schedule of items to be salvaged and clearly indicate which items are to be retained by Owner. Clearly identify and tag each salvageable item.

.3 Transport salvaged items from the site as they are removed.

.4 Items of salvageable value to the Contractor may be removed from the structure as the work progresses, if such items are not claimed by the Owner.

2.3 Reuse

.1 Salvage and reuse materials as indicated on the drawings.

2.4 Recycle

.1 All materials from demolition and land clearing which can be recycled through local municipal programs and which is not scheduled for salvage shall be sorted and separated in accordance with Regional, Provincial and Municipal standards and regulations.

.2 Provide recycling receptacles for the duration of construction activities at the building site.

PART 3 EXECUTION

3.1 Examination

.1 Survey existing conditions and correlate with requirements indicated to determine extent of demolition, salvage and recycling required.

.2 Verify that utilities have been disconnected and capped.

.3 Survey condition of the building to determine whether removing any element might result in a structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during demolition.

.4 Retain a licensed and qualified civil or structural engineer to provide analysis, including calculations, necessary to ensure the safe execution of the demolition work.

.5 Perform surveys and tests as the Work progresses to detect hazards resulting from demolition activities.

.6 Preliminary Survey:
.1 The Demolition Plans indicate the general extent of existing conditions based upon drawings provided by the Owner and existing site conditions. Review all areas of work to determine full extent of areas to be demolished, altered or renovated and become familiar with actual conditions and extent of work required.
.2 Before commencing demolition operations, examine Site and provide engineering survey to determine type of construction, condition of structure, and Site conditions. Assess strength and stability of damaged or deteriorated structures.
.3 Assess potential effect of removal of any part or parts on the remainder of structure before such part(s) are removed.
.4 Assess effects of demolition at adjacent structures and consider need for underpinning, shoring and/or bracing.
.5 Investigate for following conditions:
.1 load bearing walls and floors
.2 structure suspended from another
.3 effects of soils, water, lateral pressures on retaining or foundations walls
.4 presence of tanks and other piping systems
.5 presence of designated substances and hazardous materials.

.7 After determining demolition methods, determine area of possible vibration. Carefully inspect beyond those adjacent areas. List potential damage areas and photograph each for record purposes before starting work.

3.2 Preparation

.1 Erect and maintain dustproof and weatherproof partitions as required to prevent spread of dust, fumes and smoke to other parts of building. Maintain fire exits. On completion, remove partitions and make good surfaces to match adjacent surfaces of building.

.2 Provide all shoring and bracing required for the execution of the work.

.3 Ensure all sedimentation controls as required are in place prior to commencement of demolition activities.

.4 Before commencing demolition, verify that existing water, gas, electrical and other services in areas being demolished are cut off, capped diverted or removed as required. Post warning signs on electrical lines and equipment which must remain energized to serve adjacent areas during period of demolition.

.5 Conduct demolition operations and remove materials from demolition to ensure minimum interference with roads, streets, walks, and other adjacent occupied and utilized facilities.

.6 Do not close or obstruct streets, walks, or other adjacent occupied or utilized facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

3.3 Utilities

.1 Contact authorities or utility companies for assistance in locating and marking services passing under, through, overhead or adjacent to structure to be demolished. Such services include:
.1 Electrical power lines

.2 Gas mains
.3 Communication cables
.4 Fibre optic cables
.5 Water lines.
.6 Drainage piping (storm and sanitary).

.2 Before disconnecting, removing, plugging or abandoning any existing utilities serving the building:
.1 Notify the Owner, applicable utility companies, and local authorities having jurisdiction.
.2 Cut off and cap utilities at the mains on the property or in the street as required by the Owner and responsible utility company. Maintain fire protection to the existing buildings at all times.
.3 Remove, cut off and plug, or cap all utilities within the existing building areas to be demolished, except those designated to remain

3.4 Protection

.1 Erect and maintain temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction. Maintain such areas free of snow, ice, water and debris. Lighting levels shall be equal to that prior to erection.

.2 Provide safe access and egress from working areas using entrances, hallways, stairways or ladder runs, protected to safeguard personnel using them from falling debris.

.3 Do not interfere with use and activities of adjacent buildings and site. Maintain free and safe passage to and from buildings.

.4 Where demolition operations prevent normal access to adjacent properties, provide and maintain suitable alternative access.

.5 Provide flagmen where necessary or appropriate, to provide effective and safe access to site to vehicular traffic and protection to Owner’s personnel. Refer to Division 1 for safety requirements.

.6 Protect existing site improvements, appurtenances, and landscaping that are designated to remain in place.

.7 Ensure that all necessary controls are in place at the beginning of each work period which will prevent the spread of contaminated material beyond the work area limits. Stop work immediately if there exists any possibility of the spread of contaminated materials.

.8 Keep dust from entering existing facilities and areas of building not affected by the Work. Comply with Ministry of Health requirements regarding debris control.

.9 Ensure scaffolds, ladders, equipment and other such equipment are not accessible to public. Protect with adequate fencing or remove and dismantle at end of each day or when no longer required.

.10 Take precautions to guard against movement, settlement or collapse of adjacent structures, services or driveways. Be liable for such movement, settlement or collapse caused by failure to take necessary precautions. Repair promptly such damage when ordered.

.11 If Owner considers additional bracing and shoring necessary to safeguard and prevent such movement or settlement, install bracing or shoring upon Owner's orders.

.12 Particular attention shall be paid to prevention of fire and elimination of fire hazards which would endanger new work or existing premises.

.13 Protect existing adjacent work against damages which might occur from falling debris or other causes due to work of this Section.

.14 At all times protect the structure from overloading.

.15 Provide protection around floor and/or roof openings.

.16 Protect from weather, parts of adjoining structures not previously exposed.

.17 Protect interiors of building parts not to be demolished from exterior elements at all times.

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

3.5 Temporary Ventilation

.1 Provide all required temporary ventilation for demolition work.

3.6 Environmental Controls

.1 Comply with provincial and municipal regulations pertaining to water, air, solid waste, recycling, chemical waste, sanitary waste, sediment and noise pollution.

.2 Protection of Natural Resources:
- .1 Preserve the natural resources.
- .2 Confine demolition activities to areas defined by public roads, easements, and work area limits indicated on the drawings.
- .3 Water Resources: Comply with applicable regulations concerning the direct or indirect discharge of pollutants to underground and natural surface waters. Provide sedimentation control where necessary.
- .4 Store and service construction equipment at areas designated for collection of oil wastes.
- .5 Oily Substances: Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water in such quantities as to affect normal use, aesthetics, or produce a measurable ecological impact on the area.

.3 Dust Control, Air Pollution, and Odour Control: Prevent creation of dust, air pollution and odors.
- .1 Use temporary enclosures and other appropriate methods to limit dust and dirt rising and scattering in air to lowest practical level.
- .2 Store volatile liquids, including fuels and solvents, in closed containers.
- .3 Properly maintain equipment to reduce gaseous pollutant emissions.

.4 Noise Control: Perform demolition operations to minimize noise.
- .1 Provide equipment, sound deadening devices, and take noise abatement measures that are necessary to comply with municipal regulations.

.5 Salvage, Re-Use, and Recycling Procedures:
- .1 Identify re-use, salvage, and recycling facilities.
- .2 Develop and implement procedures to re-use, salvage, and recycle demolition materials.
- .3 Identify materials that are feasible for salvage, determine requirements for site storage, and transportation of materials to a salvage facility.

.4 Source-separate clean and uncontaminated demolition materials including, but not limited to the following types:
.1 Concrete, Concrete Block, Concrete Masonry Units (CMU), Brick.
.2 Metal (ferrous and non-ferrous).
.3 Wood.
.4 Glass.
.5 Plastics and Insulation.
.6 Gypsum Board.
.7 Porcelain Plumbing Fixtures.
.8 Fluorescent Light Tubes.
.9 Paper: Bond, Newsprint, Cardboard, Paper, Packaging Materials.
.10 Other materials as appropriate.

3.7 Performance

.1 Ensure demolition work is supervised by competent foreman at all times.

.2 Demolition shall proceed safely in systematic manner. Work on each floor level shall be complete before commencing work on supporting structure and safety of its supports are impaired. Parts of building which would otherwise collapse prematurely shall be securely shored. Walls and piers shall not be undermined.

.3 Until acceptance, maintain and preserve active utilities traversing premises.

.4 Provide enclosed chutes for disposal of debris from heights more than 1 storey in accordance with CSA S350.

.5 Maintain safety of site by shoring below-grade-structures and excavations resulting from demolition against collapse.

3.8 Demolition

.1 Review demolition procedures to ensure no personnel or equipment are located or working without additional safe working platforms or working surface adequate to support the operations.

.2 Any damage caused to the adjacent buildings or properties by the neglect of the Contractor or any of his forces shall be made good at the expense of the Contractor including all costs and charges which may be claimed by the Owner for damages suffered.

.3 Demolish in a manner to minimize dusting. Keep dusty materials wetted at all times.

.4 Demolition: Use methods required to complete Work within limitations of governing regulations and as follows:
.1 Locate demolition equipment throughout the building and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
.2 Demolish concrete and masonry in sizes that will be suitable for acceptance at recycling or disposal facilities.
.3 Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
.4 Break up and remove concrete slabs on grade in small sizes, suitable for acceptance at recycling or disposal facilities, unless otherwise shown to remain.
.5 Remove all disconnected, abandoned utilities.
.6 Remove all finishes, fixtures, fitments and services as indicated

.7 Damages: Promptly repair damages to adjacent facilities caused by demolition operations.
.8 Prevent access to excavations by means of fences or hoardings.

3.9 Selective Demolition

.1 Carefully dismantle and remove all items in as shown and as necessary to complete the work.

.2 Salvage items scheduled for reuse or to be handed over to the Owner.

.3 Particular attention shall be paid to prevention of fire and elimination of fire hazards which would endanger the existing buildings.

.4 Where existing flooring is to be removed from floor slabs to remain, including ceramic tile flooring, carefully remove flooring, grout, adhesives, waterproofing membranes and the like down to the base slab. Patch and repair slab where damaged with concrete or acceptable leveling compound in accordance with new flooring manufacturer's instructions and ASTM F710. Refer to original building drawings and remove and replace existing concrete floor toppings as necessary and where required.

.5 Return areas to condition existing prior to the start of the work unless indicated otherwise.

.6 At exterior and interior bearing walls to be removed, include breaking out and removal of existing concrete foundations to a minimum of 200 mm below new finished floor level.

3.10 Handling of Demolished Materials

.1 Conform to the approved Waste Management Plan.

.2 Do not allow demolished materials to accumulate or be stored on-site for more than 5 days.

.3 Do not burn, bury or otherwise dispose of rubbish and waste materials on project site.

.4 Pallet and shrink-wrap materials scheduled for re-use and stockpile where directed on site.

.5 Disposal: Transport demolished materials off Owner's property and legally reuse, salvage, recycle, or dispose of materials. Legally transport and dispose of materials that cannot be delivered to a source separated or mixed recycling facility to a transfer station or disposal facility that can legally accept the materials for the purpose of disposal.

.6 Deliver to facilities that can legally accept new construction, excavation and demolition materials for purpose of re-use, recycling, composting, or disposal.

3.11 Cleaning

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

.2 Clean adjacent streets and driveways of dust, dirt and materials caused by demolition operations.

.3 Reinstate areas and existing works outside areas of demolition to conditions that existed prior to commencement of work.

.4 Upon completion of demolition work, remove debris, trim surfaces and leave work site clean.

.5 Video storm and sanitary sewers and jet clean where debris may have accumulated

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 References

.1 ASTM International (ASTM)
  .1 ASTM A123/A123M-17 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  .2 ASTM A653/A653M-23 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealled) by the Hot-Dip Process.
  .3 ASTM D2559 - 12a(2018) Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions
  .4 ASTM F1667-21a Standard Specification for Driven Fasteners: Nails, Spikes, and Staples
.2 CSA Group (CSA)
  .1 CSA A247- M86 (R1996) Insulating Fiberboard.
  .2 CSA B111-1974(R2003) Wire Nails, Spikes and Staples.
  .3 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.
  .4 CSA O80 SERIES-15 Wood Preservation
  .5 CSA O86-14 Engineering Design in Wood
  .6 CSA O121-17 Douglas Fir Plywood.
  .7 CSA O141:23 Canadian Standard Lumber.
  .8 CSA O151-17 Canadian Softwood Plywood
  .9 CSA O437 Series-93 (R2011) Standards on OSB and Waferboard
  .10 CSA Z809-08 Sustainable Forest Management
.3 Underwriters Laboratories Canada (ULC)
  .1 ULC 102-2018 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
.4 National Lumber Grading Authority (NGLA)
  .1 Standard Grading Rules for Canadian Lumber, Latest Edition.
.5 Forest Stewardship Council (FSC)
  .1 FSC-STD-01-001-2004 FSC Principle and Criteria for Forest Stewardship.
  .2 FSC-STD-20-002-2004 Structure and Content of Forest Stewardship Standards V2-1
  .3 FSC Accredited Certified Bodies.

1.3 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 When required by authorities having jurisdiction, submit sequential erection drawings indicating all necessary false work, temporary construction bracing and hoisting.

.3 Submit shop drawings for wood trusses stamped and signed by a Professional Engineer registered in the Province of Ontario. Include statement that manufactured wood trusses and beams are designed in accordance with the referenced standards.

.4 Certified Wood: Submit listing of wood products and materials used, produced from wood obtained from forests certified by FSC Accredited Certification Body in accordance with FSC-STD-01-001.

1.4 Quality Assurance

.1 Sawn lumber shall be identified by the grade stamp of an association or independent grading agency certified by the Canadian Lumber Standards Accreditation Board.

1.5 Shipping, Handling and Storage

.1 Protect materials, under cover, both in transit and on the site.

.2 Store materials to prevent deterioration or the loss or impairment of their structural and other essential properties. Do not store materials in areas subject to high humidity and areas where masonry and concrete work are not completely dried out.

.3 Store sheathing materials level and flat, in a dry location. Protect panel edges from moisture at all times.

1.6 Waste Management and Disposal

.1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

.1 Timber Material shall be 'Grade Stamped'.

.2 CSA Z809 or FSC Certified.

.3 Construction Lumber: To CSA O141 Softwood Lumber graded to NLGA Standard Grading Rules for Canadian Lumber, published by the National Lumber Grades Authority. All lumber shall bear grade stamps. Moisture content of softwood lumber not to exceed 19% at time of installation.
.1 Framing lumber, plates, furring, blocking, No. 1 SPF.
.2 Nailing strips, furring and strapping: No. 4 S-P-F.
.3 Fitment framing: No. 1 S-P-F.

.4 Canadian Softwood Plywood: to CSA O151-M, standard construction, good one or both sides as required, thickness as shown or specified.
.1 Douglas Fir Plywood: To CSA O121-M, standard construction, good one side, thickness as shown on the drawings.
.2 Plywood used for exposed interior work shall have select grade veneer, one or both faces where exposed, with fire retardant finish. Fire retardant shall be in accordance with CAN/CSA-080.1, and all treated materials shall bear a ULC approval stamp.
.3 Poplar Plywood: to CSA 0153, standard construction.
.4 Mat formed structural panel board (oriented strand board): to CSA O437, square edge, 12.7 mm thickness.

.5 Nails, Spikes and Staples: To ASTM F1667.

.6 Bolts: 12.5 mm diameter, galvanized, complete with nuts and washers.

.7 Proprietary Fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.

.8 Wood Preservative to CSA O80 SERIES.

.9 Adhesive: Contractors gun grade cartridge loaded wood adhesive, general purpose, to ASTM D2559.

.10 Building Paper: to CAN2-51.32-M, 15# asphalt impregnated paper.

.11 Vapour Retardant: 0.152 mm polyethylene film to CGSB 51.34 Type 1.

.12 Fibreglass Insulation: to CSA A101, loose batt type, minimum density of 24 kg/m^3.

.13 Galvanizing: to CSA-G164. Use galvanized fasteners, and hardware for exterior work, preservative treated lumber, and materials in contact with concrete or masonry.

.14 Fire Retardant Treatment
- .1 Arch Wood Protection, Inc., "Dricon FRT" or equal by Chemical Specialties, Inc., D-Blaze", Hoover Treated Wood Products "Pyro-Guard" or Osmose Wood Preserving Co., Inc. "FirePRO" interior Type A fire-retardant wood treatment.
- .2 Pressure impregnate lumber and plywood with fire-retardant chemicals to comply with AWPA C20 (lumber) and C27 (Plywood), respectively, for treatment type indicated; identify "fire-retardant-treated wood" with appropriate classification marking of Underwriters Laboratories, Inc., or other testing and inspecting agency acceptable to authorities having jurisdiction.
  - .1 Treated materials shall meet FR-S ratings of not more than 25 for flame spread, smoke developed and fuel contributed when tested in accordance with UL 723 or ASTM E84, with no increase in flame spread and evidence of significant progressive combustion upon continuation of test for additional 30 minutes.
  - .2 No increase in above ratings when subjected to standard ASTM D2898 rain test.
  - .3 For interior locations use fire-retardant chemical formulation that produces "Interior Type A" treated lumber and plywood with the following properties under conditions present after installation:
    - .1 No reduction takes place in bending strength, stiffness and fastener holding capacities below values published by manufacturer of chemical formulation that are based on tests by a qualified independent testing laboratory of treated wood products identical to those indicated for this Project under elevated temperature and humidity conditions simulating installed conditions.
    - .2 No other form of degradation occurs due to acid hydrolysis or other causes related to manufacture and treatment.
    - .3 No corrosion of metal fasteners results from their contact with treated wood.
  - .4 Inspect each piece of treated lumber or plywood after drying and discard damaged or defective pieces.
  - .5 Kiln-dry all lumber and plywood materials after treatment to maximum 15% moisture content.

PART 3 EXECUTION

3.1 Installation

.1 Workmanship
- .1 Execute work using skilled mechanics according to best practice, as specified here.
- .2 Lay out work carefully and to accommodate work of other trades. Accurately cut and fit; erect in proper position true to dimensions; align, level, square, plumb, adequately brace, and secure permanently in place. Join work only over solid backing.

.2 Rough Hardware: Include rough hardware such as nails, bolts, nuts, washers, screws, clips, hangers, connectors, strap iron, and operating hardware for temporary enclosures.

.3 Erection of Framing Members
.1 Install members true to line, levels and elevations. Space framing members and frame all openings as detailed on the drawings.
.2 Construct continuous members from pieces of longest practical length.
.3 Install spanning members with crown edge up.
.4 Anchor wood framing to supporting walls with galvanized metal strap ties.

.4 Provide treated wood nailers, blocking, cants, grounds, furring and similar members where shown and where required for screeding or attachment of other work and surface applied items. Attach to substrate as required to support applied loading.

.5 Electrical Equipment Backboard: provide backboards for mounting electrical equipment as indicated. Use 19 mm thick fir face veneer fire retardant softwood plywood on 19 x 38 mm furring around perimeter and at maximum of 305 mm intermediate spacing.
.1 Install plywood backboards with countersunk screws.

.6 Blocking: Provide solid wood backing to support millwork, cabinetwork, equipment, fixtures, railings and accessories and the like, as required. Coordinate with work of other Sections and install all required backing. Any such equipment mounted on gypsum wallboard assemblies or similar assemblies shall be adequately supported.
.1 Provide solid wood blocking in all partitions where wall stops are specified in the hardware schedule.

3.1 Cleaning

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

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 07 92 00 Joint Sealants
.2 Section 09 21 16 Gypsum Board

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM E84-24 Standard Test Method for Surface Burning Characteristics of Building Materials
  .2 ASTM E119-20 Standard Test Methods for Fire Tests of Building Construction and Materials
  .3 ASTM E136-19a Standard Test Method for Behavior of Material in a Vertical Tube Furnace at 750° C
  .4 ASTM E814-13a (2017) Standard Test Method for Fire Tests of Penetration Firestop Systems
  .5 ASTM E1966-15(2019) Standard Test Method for Fire-Resistive Joint Systems
  .6 ASTM E2307-20 Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus
.2 Underwriter's Laboratories of Canada (ULC)
  .1 ULC 101-2014 Standard Methods of Fire Endurance Tests of Building Construction and Materials
  .2 ULC 102.2-2018 Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies
  .3 ULC 115-2018 Standard Method of Fire Tests of Firestop Systems
.3 National Fire Protection Association (NFPA)
  .1 NFPA 252 Standard Methods of Fire Test and Door Assemblies
.4 South Coast Air Quality Management District (SCAQMD) California State
  .1 SCAQMD Rule 1168-03: Adhesives and Sealants.
.5 Ontario Building Code

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data: Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings: Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.

.4 Samples: Submit duplicate 300 x 300 mm samples showing actual fire stop material proposed for project.

.5 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.
  .1 Test reports: in accordance with ULC 101 for fire endurance and ULC 102 for surface burning characteristics.
  .2 Submit certified test reports from approved independent testing laboratories, indicating

compliance of applied fire stopping with specifications for specified performance characteristics and physical properties

.3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.4 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

1.5 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.

1.6 Quality Assurance

.1 One installer shall install all firestopping on the project. Each trade shall not firestop their own service penetrations. Installer shall be certified by fire stopping manufacturer.

.2 Qualifications:
.1 Qualified Installer: specializing in fire stopping installations with 5 years documented experience approved and trained by manufacturer.

.3 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and Consultant 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:
.1 As part of Manufacturer's Services described in 3.5- Field Quality Control, schedule site visits, to review Work, at stages listed.
.2 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
.3 Twice during progress of Work at 25% and 60% complete.
.4 Upon completion of Work, after cleaning is carried out.
.5 Single Source Responsibility: Obtain through-penetration fire-stop systems for each kind of penetration and construction condition indicated from a single manufacturer.

.5 Field-Constructed Mockup: Prior to installing fire-stopping, erect mockups for each different through-penetration fire-stop system indicated to verify selections made and to demonstrate qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final installations.
.1 Locate mockups on site in locations indicated or, if not indicated, as directed by Consultant.
.2 Notify Consultant one week in advance of the dates and times when mockups will be erected.
.3 Obtain Consultant’s acceptance of mockups before start of final unit of Work.

.4 Retain and maintain mockups during construction in an undisturbed condition as a standard for judging completed unit of Work.
.5 Accepted mockups in an undisturbed condition at time of Substantial Performance may become part of completed unit of Work.

1.7 Sustainable Requirements

.1 Materials shall be Low VOC type conforming to SCAQMD Rule 1168-03. Maximum VOC level of firestopping materials shall be 250 g/l.

1.8 Project Conditions

.1 Environmental Conditions: Do not install fire-stopping when ambient or substrate temperatures are outside limits permitted by fire-stopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

.2 Ventilation: Ventilate fire-stopping per fire-stopping manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.

1.9 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

.3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.

.4 Storage and Protection:
.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.

1.10 Waste Management and Disposal

.1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

.1 All fire stopping shall consist of ULC listed firestop system.

.2 Applications: Provide fire-stopping systems composed of materials specified in this Section that comply with system performance and other requirements.

.3 General: Provide fire-stopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases.

.4 All firestopping material shall be:
.1 From one manufacturer;
.2 Intumescent where an appropriate system exists.

.5 Fire stopping and smoke seal systems: ULC listed in accordance with ULC 115.

.1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of ULC 115 and not to exceed opening sizes for which they are intended.

.6 Service penetration assemblies: ULC listed systems tested to ULC 115.

.7 Service penetration fire stop components: ULC listed and certified by test laboratory to ULC 115.

.8 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.

.9 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric 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.

.11 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.12 Water: potable, clean and free from injurious amounts of deleterious substances.

.13 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.

.14 F-Rated Through-Penetration Fire-stop Systems: Provide through-penetration fire-stop systems with F ratings indicated, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.

.15 T-Rated Through-Penetration Fire-stop Systems: Provide through-penetration fire-stop systems with T ratings, in addition to F ratings, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupy-able floor areas. T-rated assemblies are required where the following conditions exist:
.1 Where fire-stop systems protect penetrations located outside of wall cavities.
.2 Where fire-stop systems protect penetrations located outside fire-resistive shaft enclosures.
.3 Where fire-stop systems protect penetrations located in construction containing doors required to have a temperature-rise rating.
.4 Where fire-stop systems protect penetrating items larger than a 100 mm diameter nominal pipe or 10,000 mm² in overall cross-sectional area.

.16 Fire-Resistive Joint Sealants: Provide joint sealants with fire-resistance ratings indicated, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs. Sealants for vertical joints: non-sagging.

.17 For fire-stopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
.1 For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration fire-stop systems.
.2 For floor penetrations with annular spaces exceeding 100 mm or more in width and exposed to possible loading and traffic, provide fire-stop systems capable of supporting the floor loads involved either by installing floor plates or by other means.
.3 For penetrations involving insulated piping, provide through-penetration fire-stop systems not requiring removal of insulation.

.18 For firestopping exposed to view, provide products with flame-spread values of less than 25 and

smoke-developed values of less than 450.

.19 Compatibility: Provide fire-stopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by fire-stopping manufacturer based on testing and field experience.

.20 Accessories: Provide components for each fire-stopping system that are needed to install fill materials and to comply with "System Performance Requirements". Use only components specified by the fire-stopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire resistance-rated systems. Accessories include but are not limited to the following items:
- .1 Permanent forming/damming/backing materials including the following:
  - .1 Semi-refractory fibre (mineral wool) insulation.
  - .2 Ceramic fibre.
  - .3 Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
  - .4 Fire-rated formboard.
  - .5 Joint fillers for joint sealants.
- .2 Temporary forming materials.
- .3 Substrate primers.
- .4 Collars.
- .5 Steel sleeves.

PART 3 EXECUTION

3.1 Manufacturer’s Instructions

.1 Compliance: comply with manufacturer's written recommendations or specifications.

3.2 Preparation

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.

.2 Ensure that substrates and surfaces are clean, dry and frost free.

.3 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.4 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour retarder.

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

3.3 Installation

.1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing and as necessary to maintain fire resistance ratings of floor and wall assemblies.

.2 Provide fire stopping for all disciplines.

.3 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.

.4 Fill spaces between openings, ducts, pipes and unused sleeves passing through fire separations with firestop material and install firestopping systems in accordance with the appropriate ULC system number for the products and type of penetration.

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

.6 Tool or trowel exposed surfaces to neat finish.

.7 Remove excess compound promptly as work progresses and upon completion.

3.4 Sequences of Operation

.1 Proceed only when submittals have been reviewed by Consultant.

.2 Mechanical pipe insulation: certified fire stop system component.
.1 Ensure pipe insulation installation precedes fire stopping.

3.5 Field Quality Control

.1 Inspections: notify Consultant when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

.2 Employ a ULC accredited Designated Responsible Individual (DRI) to inspect and label all fire stop applications on site.

.3 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 Article 1.4 - 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 Article 1.6 - Quality Assurance.

3.6 Commissioning

.1 Employ a ULC accredited Designated Responsible Individual (DRI) to inspect and label all fire stop applications on site. Submit DRI's written reports within 3 days of review, verifying compliance of Work.

.2 Perform a thorough examination of the fire stopping system to determine if the assembly is installed as per its ULC listing.

.3 Allow for destructive testing of installed firestopping. Repair all tested assemblies.

.4 The examination shall take place prior to close-up to confirm assembly components and installation configuration.

.5 Any and all deviations from the ULC listed system shall be considered grounds for rejection and

replacement.

3.7 Schedule

.1 Fire stop and smoke seal at:
- .1 Penetrations through fire-resistance rated partitions and walls.
- .2 Perimeter of fire-resistance rated partitions.
- .3 Intersection of fire-resistance rated partitions.
- .4 Control and sway joints in fire-resistance rated partitions and walls.
- .5 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
- .6 Around mechanical and electrical assemblies penetrating fire separations.
- .7 Rigid ducts: greater than 129 cm^2: 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.
- .8 All electrical boxes installed in fire rated gypsum board assemblies.
- .9 All locations required by the Ontario Building Code.
- .10 Any other locations indicated.

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.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 06 10 00 Rough Carpentry
.2 Section 07 84 00 Firestopping

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C510-16(2022) Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants
  .2 ASTM C661-15(2022) Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer
  .3 ASTM C679-15(2022) Standard Test Method for Tack-Free Time of Elastomeric Sealants
  .4 ASTM C719-22 Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)
  .5 ASTM C793-05(2017) Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants
  .6 ASTM C794-18(2022) Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
  .7 ASTM C834-17 Standard Specification for Latex Sealants
  .8 ASTM C919-22 Standard Practice for Use of Sealants in Acoustical Applications
  .9 ASTM C920-18 Standard Specification for Elastomeric Joint Sealants
  .10 ASTM C1087-23 Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems
  .11 ASTM C1183/C1183M-13(2018) Standard Test Method for Extrusion Rate of Elastomeric Sealants
  .12 ASTM C1193-16 Standard Guide for Use of Joint Sealants
  .13 ASTM C1246-17(2022) Standard Test Method for Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants After Cure
  .14 ASTM C1247-20 Standard Test Method for Durability of Sealants Exposed to Continuous Immersion in Liquids
  .15 ASTM C1248-22 Standard Test Method for Staining of Porous Substrate by Joint Sealants
  .16 ASTM C1311-22 Standard Specification for Solvent Release Sealants
  .17 ASTM C1330-23 Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.
  .18 ASTM D412-16(2021) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
  .19 ASTM D2203-01(2023) Standard Test Method for Staining from Sealants
  .20 ASTM E84-24 Standard Test Method for Surface Burning Characteristics of Building Materials
  .21 ASTM E90-09(2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
.2 Department of Justice Canada (Jus)
  .1 Canadian Environmental Protection Act, 1999 (CEPA).
.3 U. S. Environmental Protection Agency (EPA)
  .1 EPA 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings.

.4 U.S. Food and Drug Administration (FDA)
.1 FDA 21 CFR 177.2600 - Title 21 Part 177 Indirect Food Additives: Polymers.
.5 South Coast Air Quality Management District (SCAQMD) California State
.1 SCAQMD Rule 1168-03: Adhesives and Sealants.

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit product data for all sealant materials and accessories including:
.1 Preparation instructions and recommendations.
.2 Standard drawings illustrating manufacturer's recommended sealant joint profiles and dimensions applicable to Project.

.3 Joint Sealant Schedule: Indicate joint sealant location, joint sealant type, manufacturer and product name, and colour, for each application. Utilize joint sealant designations included in this Section.

.4 Samples:
.1 Samples for Colour Selection: For each joint sealant type.
.2 Samples for Verification: For each joint sealant product, for each colour selected.

.5 Greenguard Certificates: For each sealant and accessory product specified to meet volatile organic emissions standards of the Greenguard Children and Schools Certification.

1.5 Quality Assurance

.1 Installer Qualifications: Company with minimum of three years of experience specializing in work of this section, employing applicators trained for application of joint sealants required for this project, with record of successful completion of projects of similar scope, and approved by manufacturer.

.2 Single Source Responsibility: Provide joint sealants by a single manufacturer responsible for testing of Project substrates to verify compatibility and adhesion of joint sealants.

.3 Caulking work shall be carried out in strict accordance with manufacturer's printed directions.

.4 Preconstruction Manufacturer Laboratory Compatibility, Staining, and Adhesion Testing: Submit samples of each substrate or adjacent material that will be in contact with or affect joint sealants. Current manufacturer test data of products on matching substrates will be acceptable
.

.5 Adhesion: Use ASTM C719 and ASTM C794 to determine requirements for joint preparation, including cleaning and priming.

.6 Compatibility: Use ASTM C1087 to determine materials forming joints and adjacent materials do not adversely affect sealant materials and do not affect sealant colour

.7 Stain Testing: Use ASTM C510, ASTM C1248, or ASTM D2203 to verify non-staining characteristics of proposed sealants on specified substrates.

.8 Pre-construction manufacturer laboratory testing is not required when sealant manufacturer can furnish data acceptable to Consultant based on previous testing for materials matching those of the Work.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.7 Project Conditions

.1 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.2 Ventilate area of work by use of approved portable supply and exhaust fans

1.8 Scheduling

.1 Schedule work so waterproofing, water repellents and preservative finishes are installed after sealants, unless sealant manufacturer approves otherwise in writing.

.2 Ensure sealants are cured before covering with other materials.

1.9 Waste Management and Disposal

.1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Manufacturer

.1 Basis-of-Design Products: Provide joint sealant products manufactured by Tremco, Inc., Commercial Sealants and Waterproofing, 220 Wicksteed Avenue, Toronto, www.tremcosealants.com, or comparable products of other manufacturer approved by Consultant.

2.2 Materials – General

.1 VOC Content for Interior Applications: Provide sealants and sealant primers complying with the following VOC content limits per 40 CFR 59, Subpart D (EPA Method 24):
  .1 Architectural Sealants: 250 g/L.
  .2 Sealant Primers for Nonporous Substrates: 250 g/L.
  .3 Sealant Primers for Porous Substrates: 775 g/L.

.2 Low-Emitting Sealants for Interior Applications: Provide sealants and sealant primers complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

.3 Compatibility: Provide joint sealants and accessory materials that are compatible with one another, and with adjacent materials, as demonstrated by sealant manufacturer using ASTM C1087 testing and related experience.

.4 Joint Sealant Standard: Comply with ASTM C920 and other specified requirements for each joint sealant.

.5 Stain Test Characteristics: Where sealants are required to be non-staining, provide sealants tested per ASTM C1248 as non-staining on porous joint substrates specified.

.6 Food Contact Suitability: Where sealants are required to be suitable for contact with food provide sealants complying with 21 CFR 177.2600.

2.3 Silicone Joint Sealants

.1 SJS#1: Single-Component, Nonsag, Non-Staining, Moisture-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 100/50, Use NT; SWRI validated.
- .1 Basis of Design Product: Tremco Spectrem 1.
- .2 Volatile Organic Compound (VOC) Content: 1 g/L maximum.
- .3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
- .4 Staining, ASTM C1248: None on concrete, marble, granite, limestone, and brick.
- .5 Colour: As selected by Consultant from manufacturer's standard line.

.2 SJS#2: Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 50, Use NT; SWRI validated.
- .1 Basis of Design Product: Tremco Spectrem 2.
- .2 Volatile Organic Compound (VOC) Content: 50 g/L maximum.
- .3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
- .4 Staining, ASTM C1248: None on concrete, marble, granite, limestone, and brick.
- .5 Colour: As selected by Consultant from manufacturer's standard line.

.3 SJS#3: Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 50, Use NT.
- .1 Basis of Design Product: Tremco Spectrem 3.
- .2 Volatile Organic Compound (VOC) Content: 20 g/L maximum.
- .3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
- .4 Staining, ASTM C1248: None on concrete, marble, granite, limestone, and brick.
- .5 Colour: As selected by Consultant from manufacturer's standard line.

.4 SJS#4: Multi-Component, Nonsag, Non-Staining, Field-Tintable Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 50, Use NT.
- .1 Basis of Design Product: Tremco Spectrem 4-TS.
- .2 Volatile Organic Compound (VOC) Content: 20 g/L maximum.
- .3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
- .4 Staining, ASTM C1248: None on concrete, marble, granite, limestone, and brick.
- .5 Colour: As selected by Consultant from manufacturer's standard line.

.5 SJS#5: Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT.
- .1 Basis of Design Product: Tremco Tremsil 200 Sanitary.
- .2 Volatile Organic Compound (VOC) Content: 1 g/L maximum.

.3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
.4 Colour: White and Clear.

2.4 Urethane Joint Sealants

.1 UJS#1: Single-Component, Nonsag, Moisture-Cure, Polyurethane Joint Sealant: ASTM C920, Type S, Grade NS, Class 50, Use NT; Greenguard certified.
.1 Basis of Design Product: Tremco Dymonic 100.
.2 Volatile Organic Compound (VOC) Content: 40 g/L maximum.
.3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
.4 Tensile Strength ASTM D412: 350 to 450 psi
.5 Percent Elongation ASTM D412: 800 to 900%
.6 Modulus at 100% ASTM D412: 75 to 85 psi
.7 Tear Strength ASTM D412: 65 to 75 psi
.8 Smoke Development ASTM E84: 5
.9 Colour: As selected by Consultant from manufacturer's standard line.

.2 UJS#2: Single-Component, Nonsag, Moisture-Cure, Polyurethane Hybrid Joint Sealant: ASTM C920, Type S, Grade NS, Class 35, Use NT; Greenguard certified.
.1 Basis of Design Product: Tremco Dymonic FC.
.2 Extrusion Rate ASTM C1183: 93.1 mL/min
.3 Weight Loss ASTM C1246: Pass
.4 Tack Free Time ASTM C679: 3 to 4 hours.
.5 Volatile Organic Compound (VOC) Content: 10 g/L maximum.
.6 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
.7 Colour: As selected by Consultant from manufacturer's standard line.

.3 UJS#3: Single-Component, Nonsag, Polyurethane Joint Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT.
.1 Basis of Design Product: Tremco Vulkem 116.
.2 Volatile Organic Compound (VOC) Content: 60 g/L maximum.
.3 Colour: As selected by Consultant from manufacturer's standard line.

.4 UJS#4: Immersible, Single-Component, Pourable, Traffic Grade Polyurethane Joint Sealant: ASTM C920, Type S, Grade P, Class 50, Use T and I.
.1 Basis of Design Product: Tremco Vulkem 45 SSL.
.2 Volatile Organic Compound (VOC) Content: 110 g/L maximum.
.3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
.4 Colour: As selected by Consultant from manufacturer's standard line.

.5 UJS#5: Immersible, Multi-Component, Pourable, Traffic-Grade Polyurethane Joint Sealant: ASTM C920, Type M, Grade P, Class 35, Use T, O, and I.
.1 Basis of Design Product: Tremco Vulkem 445SSL.
.2 Tensile Strength, ASTM D412: 1.7 MPa, at 100 percent elongation.
.3 Tear Strength, ASTM D412: 6.1 kN/m.
.4 Adhesion to Concrete, After Water, ASTM C794: 4.4 kN/m
.5 Hardness, ASTM C661: 40 durometer Shore A, minimum.
.6 Accelerated Weathering, ASTM C793: Pass.
.7 Volatile Organic Compound (VOC) Content: 106 g/L maximum.

.8 Colour: As selected by Consultant from manufacturer's standard line.

.6 UJS#6: Multi-Component, Non-sag, Polyurethane Joint Sealant: ASTM C920, Type M, Grade NS, Class 50, Use I.
.1 Basis of Design Product: Tremco Dymeric 240 FC.
.2 Volatile Organic Compound (VOC) Content: 0 g/L maximum.
.3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
.4 Colour: As selected by Consultant from manufacturer's standard line.

2.5 Latex Joint Sealants

.1 LJS#1: Latex Joint Sealant: Siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
.1 Basis of Design Product: Tremco Tremflex 834.
.2 Volatile Organic Compound (VOC) Content: 35 g/L maximum.
.3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
.4 Colour: White, paintable.

2.6 Solvent Release-Curing Sealants

.1 BJS#1: Butyl-Rubber-Based Joint Sealant: ASTM C1311.
.1 Basis of Design Product: Tremco Tremco Butyl Sealant.
.2 Volatile Organic Compound (VOC) Content: 250 g/L maximum.
.3 Colour: As selected by Consultant from manufacturer's standard colours.

2.7 Acoustical Sealants

.1 AJS#1: Acoustical/Curtainwall Sealant: Single-component, non-hardening, non-sag, paintable synthetic rubber-tested to reduce airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing of similar assemblies according to ASTM E90.
.1 Basis of Design Product: Tremco Acoustical/Curtainwall Sealant.
.2 Volatile Organic Compound (VOC) Content: 160 g/L maximum.
.3 Colour: White, paintable.

2.8 Joint Sealant Accessories

.1 Cylindrical Sealant Backing: ASTM C1330, Type B non-absorbent, bi-cellular material with surface skin, or Type O open-cell polyurethane, as recommended by sealant manufacturer for application.

.2 Bond Breaker Tape: Polymer tape compatible with joint sealant and adjacent materials and recommended by sealant manufacturer.

.3 Joint Substrate Primers: Substrate primer recommended by sealant manufacturer for application.

.4 Cleaners: Chemical cleaners acceptable to joint sealant manufacturer.

.5 Masking tape: Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

PART 3 EXECUTION

3.1 Examination

.1 Examine joint profiles and surfaces to determine if work is ready to receive joint sealants. Verify joint dimensions are adequate for development of sealant movement capability. Verify joint surfaces are clean, dry, and adequately cured. Proceed with joint sealant work once conditions meet sealant manufacturer's written recommendations.

3.2 Preparation

.1 Joint Surface Cleaning: Clean joints prior to installing joint sealants using materials and methods recommended by sealant manufacturer. Comply with ASTM C1193.
  .1 Remove curing compounds, laitance, form-release agents, dust, and other contaminants.
  .2 Clean nonporous and porous surfaces utilizing chemical cleaners acceptable to sealant manufacturer.
  .3 Protect elements surrounding the Work of this section from damage or disfiguration. Apply masking tape to adjacent surfaces when required to prevent damage to finishes from sealant installation.

3.3 Application

.1 Sealant and Primer Installation Standard: Comply with ASTM C1193 and manufacturer's written instructions.

.2 Joint Backing: Select joint backing materials recommended by sealant manufacturer as compatible with sealant and adjacent materials. Install backing material at depth required to produce profile of joint sealant allowing optimal sealant movement.
  .1 Install joint backing to maintain the following joint ratios:
    .1 Joints up to 13 mm wide: 1:1 width to depth ratio.
    .2 Joints greater than 13 mm wide: 2:1 width to depth ratio; maximum 13 mm joint depth.
  .2 Install bond breaker tape over substrates when sealant backings are not used.

.3 Masking: Mask adjacent surfaces to prevent staining or damage by contact with sealant or primer.

.4 Joint Priming: Prime joint substrates when recommended by sealant manufacturer or when indicated by preconstruction testing or experience. Apply recommended primer using sealant manufacturer's recommended application techniques.

.5 Liquid Sealant Application: Install sealants using methods recommended by sealant manufacturer, in depths recommended for application. Apply in continuous operation from bottom to top of joint vertically and horizontally in a single direction. Apply using adequate pressure to fill and seal joint width.
  .1 Tool sealants immediately with appropriately shaped tool to force sealants against joint backing and joint substrates, eliminating voids and ensuring full contact.
  .2 Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
  .3 Tool exposed joint surface concave using tooling agents approved by sealant manufacturer for application.

.6 Installation of Acoustical Sealant: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations on both sides of assemblies with a continuous bead of acoustical sealant. Comply with ASTM C919 and with manufacturer's written recommendations.

3.4 Field Quality Control

.1 Field-Adhesion Testing: Perform adhesion tests in accordance with manufacturer's instructions and with ASTM C1193, Method A. .1 Perform 5 tests for the first 300 m of joint length for each kind of sealant and joint substrate, and one test for each 300 m of joint length thereafter or 1 test per each floor per building elevation, minimum.
.1 For sealant applied between dissimilar materials, test both sides of joint.

.2 Remove sealants failing adhesion test, clean substrates, reapply sealants, and re-test. Test adjacent sealants to failed sealants.

.3 Submit report of field adhesion testing to Consultant indicating tests, locations, dates, results, and remedial actions taken.

3.5 Interior Joint Sealant Schedule

.1 Interior vertical movement joints in interior concrete and unit masonry.
.1 UJS#1, UJS#2: Single-component non-sag urethane sealant.

.2 Interior movement joints in interior unit masonry.
.1 UJS#1, UJS#2: Single-component non-sag urethane sealant.

.3 Interior perimeter joints of exterior aluminum frames.
.1 UJS#1: Single-component non-sag urethane sealant.

.4 Interior perimeter joints of interior frames.
.1 UJS#2: Single-component non-sag urethane sealant.
.2 LJS#1: Siliconized acrylic latex

.5 Interior sanitary joints between plumbing fixtures, food preparation fixtures and casework and adjacent walls, floors, and counters.
.1 SJS#5: Mildew-Resistant, Single-Component, nonsag, acid-curing silicone joint sealant.

.6 Interior traffic joints in floor and between floor and wall construction.
.1 UJS# 4, UJS#5: Single-component pourable urethane sealant.

.7 Interior non-moving joints between interior painted surfaces and adjacent materials.
.1 LJS#1: Siliconized acrylic latex
.2 Joint-Sealant Colour: Paintable.

.8 Interior concealed sealants at thresholds and sills.
.1 BJS#1: Butyl-rubber-based joint sealant.

.9 Interior exposed and non-exposed acoustical applications.
.1 AJS#1: Acoustical joint sealant.

3.6 Cleaning

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

.2 Cleaning: Remove excess sealant using materials and methods approved by sealant manufacturer that will not damage joint substrate materials.

.1 Remove masking tape immediately after tooling joint without disturbing seal.
.2 Remove excess sealant from surfaces while still uncured.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 06 10 00 Rough Carpentry
.2 Section 07 84 00 Firestopping
.3 Section 07 92 00 Joint Sealants
.4 Section 09 22 16 Non-Structural Metal Framing
.5 Section 09 91 23 Interior Painting

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C514-04(2020) Standard Specification for Nails for the Application of Gypsum Board
  .2 ASTM C840-20 Standard Specification for Application and Finishing of Gypsum Board
  .3 ASTM C954-22 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
  .4 ASTM C1002-22 Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
  .5 ASTM C1047-19 Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
  .6 ASTM C1178/C1178M-18 Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel
  .7 ASTM C1278/C1278M-17 Standard Specification for Fiber-Reinforced Gypsum Panel
  .8 ASTM C1288-17 Standard Specification for Fiber-Cement Interior Substrate Sheets
  .9 ASTM C1325-22 Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units
  .10 ASTM C1396/C1396M - 17 Standard Specification for Gypsum Board
  .11 ASTM C1629/C1629M-19 Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels
  .12 ASTM E90-09(2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
  .13 ASTM E814-13a(2017) Standard Test Method for Fire Tests of Penetration Firestop Systems
  .14 ASTM E1966-15(2019) Standard Test Method for Fire-Resistive Joint Systems
.2 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-51.34 Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
  .2 CAN/CGSB 19-GP-21M Sealing and Bedding Compound for Acoustical Purposes
.3 Underwriters Laboratories of Canada (ULC)
  .1 ULC 102-2018 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
  .2 ULC 114-2018 Standard Method of Test for Determination of Non-Combustibility in Building Materials
  .3 ULC 129- 2015 Standard Method of Test for Smoulder Resistance of Insulation (Basket Method)
  .4 ULC List of Equipment and Material, Volume III, Fire Resistance Ratings.
.4 Gypsum Association (GA)
  .1 GA-214-2022 Recommended Levels of Gypsum Board Finish.
  .2 GA-216-2021 Application and Finishing of Gypsum Board.
  .3 GA-253-2021 Application of Gypsum Sheathing

.5 Wall and Ceiling Bureau (WCB)
.1 Technical Bulletin Control Joint Placement in Gypsum Board Assemblies

1.4 Submittals

.1 Make submittals 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.

1.5 Quality Assurance

.1 Dry wall installers: minimum 5 years proven experience.

.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.

.4 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

.5 Mock-Ups
.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
.2 Construct mock-up gypsum board wall installation including one inside corner and one outside corner. Mock-up may be part of finished work.
.3 Allow two working days for inspection of mock-up by Consultant before proceeding with rest of the work.
.4 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.

1.6 Design Requirements

.1 Where indicated provide minimum sound transmission rating of installed partitions of STC 50 tested to ASTM E90.

.2 Provide fire resistance rating of installed partitions as indicated and according to referenced ULC design.

1.7 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

.3 Protect gypsum board materials before, during and after installation and to protect the installed work and materials of other trades affected by this work. Store materials in a dry area inside the

building. Do not remove wrapping until ready for use. Prevent damage to all edges and surfaces.

1.8 Project Conditions

.1 Maintain temperature minimum 10 ° C, maximum 21 ° C for 48 hours prior to and during application of gypsum boards and joint treatment, and for at least 48 hours 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.

1.9 Waste Management and Disposal

.1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Gypsum Board

.1 To ASTM C1396/C1396M. Standard for non-rated applications, Type X for rated applications, 1220 mm wide x maximum practical length, ends square cut, edges tapered with round edge, 12.7 mm thick or to thickness indicated on drawings. All fire rated board shall be minimum 16 mm thickness.

.2 Water and Moisture Resistant Board: to ASTM C1396, 12.7 mm thick, 1220 mm wide with tapered edges.

.3 Abuse Resistant Gypsum Board: CGC Fibrerock abuse resistant fibre/gypsum panels, 16 mm thickness.

2.2 Fastening and Adhesives

.1 Drywall Screws: To ASTM C954 or ASTM C1002 self-drilling, self-tapping, case hardened, length to suit board thickness and provide minimum 12 mm penetration into support.

.2 Joint Tape: To ASTM C475, 50 mm perforated with preformed seam, mould and mildew resistant.
.1 Joint tape for abuse resistant gypsum board: CGC Mould Resistant Fiberglass Drywall Tape.

.3 Joint Filler and Topping: To ASTM C475 vinyl or latex base, slow setting.

.4 Laminating Compound: as recommended by manufacturer, asbestos-free.

2.3 Accessories

.1 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, zinc-coated by hot-dip process 0.5 mm base thickness, perforated flanges, one piece length per location.

.2 Insulating Strip: Rubberized, moisture resistant, 3.0 mm thick, 12 mm wide closed cell neoprene strip, with self-sticking permanent adhesive on one face; lengths as required.

.3 Control Joints: Bailey D-ZNCJ 7/16 x 10' Drywall or Veneer Plaster Control Joint.

.4 Sealants: as specified in Section 07 92 00 - Joint Sealants.

PART 3 EXECUTION

3.1 General

.1 Prior to installation of gypsum wallboard, ensure that all required vapour barriers, air seals, gaskets and the like installed under another Section have been inspected and accepted by Municipal authorities and the Consultant. Failure to do so will result in removal of all gypsum board installed prior to approval and replacement, at no additional cost to the Owner.

.2 Unless otherwise indicated on the drawings, all gypsum board partitions shall extend from floor level to the underside of floor or roof structures above.

3.2 Gypsum Board Application

.1 Do application and finishing of gypsum board in accordance with ASTM C840 and/or GA-216 except where specified otherwise.

.2 Do not apply gypsum board until bucks, anchors, blocking, electrical, and mechanical work are approved.

.3 Apply gypsum board at right angles to framing members or furring using screw fasteners. Maximum spacing of screws 300 mm o.c.

.4 Apply water or moisture resistant gypsum wallboard where indicated. Apply water resistant sealant to edges, ends and cut outs which expose gypsum core.

.5 Carry gypsum board from floor to underside of floor or roof structure above. Furr out and carry gypsum board around any structural members as may be required. Neatly cope gypsum board to fill deck flutes where gypsum board abuts floor or roof deck.

3.3 Accessories

.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.

.2 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated.

.3 Install insulating strips continuously at edges of gypsum board or casing beads abutting exterior door or window frames, to provide thermal break.

.4 Install continuous bead of acoustic sealant at all penetrations through sound control partitions.

.5 Provide control joints in gypsum board facing. Construct control joints in accordance with ASTM C840 and as described in Wall and Ceiling Bureau Technical Bulletin “Control Joint Placement in Gypsum Board Assemblies”. Place control joints consistent with lines of building spaces as indicated. Where not indicated install as directed at maximum 6.0 m spacing. Control joints shall be supported with metal studs or furring channels on both sides of the joint Construct joints using back-to-back casing beads filled with a low modulus sealant capable of flexible joint movement. Maintain fire-resistance rating of wall assemblies. Control joints shall be provided:
.1 At abutting structural elements, steel columns.

.2 At expansion or control joints in the substrate.
.3 At each door jamb.

3.4 Access Doors

.1 Install access doors to electrical and mechanical fixtures specified in respective Sections.

.2 Rigidly secure frames to furring or framing systems, to satisfy fire rating requirements.

3.5 Taping and Filling

.1 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. Finish to GA-214 Level 5.

.2 Finish corner beads, control joints and trims as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.3 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after painting is completed.

.4 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.5 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for painting.

3.6 Cleaning

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

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 09 21 16 Gypsum Board

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM A653/A653M-23 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  .2 ASTM C645-18 Standard Specification for Nonstructural Steel Framing Members
  .3 ASTM C754-20 Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
  .4 ASTM C841-03(2018) Standard Specification for Installation of Interior Lathing and Furring.
  .5 ASTM C1002-22 Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
  .6 ASTM E90-09(2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
  .7 ASTM E814-13a(2017) Standard Test Method for Fire Tests of Penetration Firestop Systems
  .8 ASTM E1966-15(2019) Standard Test Method for Fire-Resistive Joint Systems
.2 Canadian General Services Board (CGSB)
  .1 CAN/CGSB-1.40-97 Primer, Structural Steel, Oil Alkyd Type.
.3 Underwriters Laboratories of Canada (ULC)
  .1 ULC List of Equipment and Material, Volume III, Fire Resistance Ratings.
.4 CSSBI Lightweight Steel Framing Manual

1.4 Submittals

.1 Make submittals 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.

1.5 Quality Assurance

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.7 Waste Management and Disposal

.1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Metal Stud Framing Systems

.1 Non-load bearing channel stud framing: to ASTM C645, stud size as indicated, roll formed from 0.53 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board. Knock-out service holes at 460 mm centres.
  .1 Thickness of materials to conform to referenced standards unless noted otherwise.
  .2 Thickness of materials shall be selected from manufacturer's standard span tables to suit total height requirements.

.2 Floor and ceiling tracks: to ASTM C645, in widths to suit stud sizes, 32 mm flange height.

.3 Metal channel stiffener: 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.

.4 Tie Wire: 0.90 mm, galvanized, soft annealed, steel wire or clip as recommended by the manufacturer of furring channels.

.5 Wind bearing light weight steel stud framing for exterior wall applications is specified in Section 05 41 00.

2.2 Metal Furring and Suspension Systems

.1 Channel framing: to ASTM C645, stud size as indicated, roll formed from 0.53 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board.
  .1 Thickness of materials to conform to referenced standards unless noted otherwise.

.1 Metal Furring Runners, Hangers, Tie Wires, Inserts, Anchors: to ASTM C645 , electro-zinc coated steel.

.2 Runner Channels: 38 x 19 x 0.59 mm and 38 x 9.5 x 0.45 mm, hot dip or electro-galvanized sheet steel. Use of various sizes governed by applied loads and applicable spans.

.3 Drywall Furring Channel: Channel shaped furring member for screw attachment of drywall with knurled face. For interior use. Furring masonry or concrete surfaces. Cross furring under steel joist or suspended metal channels in suspended ceiling systems: 70 x 22 x 0.9 mm with knurled face, hot dip or electro-galvanized sheet steel. Bailey D-1001.

.4 Deflection Track: Bailey Multi-Slot Track MST 250, size to suit studs, and top deflection clips TDC 350 and TDC 587.

.5 Horizontal Flange attachment: Bailey Horizontal Flange Attachment Clip (HFA Clip)

.6 Hangers: minimum 4.1 mm diameter (or as required by ULC fire rating design requirements) mild steel rods.

2.2 Fasteners

.1 Powder activated fasteners: to suit structural conditions and fastening requirements and in accordance with manufacturer's recommendations: Ramset; Hilti; or approved equivalent.

.2 Sheet Metal Screws: To ASTM C1002, self-drilling, self-tapping, case hardened, length to suit board thickness and provide minimum 12 mm penetration into support.

2.3 Accessories

.1 Acoustic sealant: As specified in Section 07 92 00.

.2 Insulating strip: rubberized, moisture resistant 3 mm thick foam strip, 12 mm wide, with self-sticking adhesive on one face, lengths as required.

.3 Zinc Rich Paint: to CGSB 1-GP-181M. Low VOC type.

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 Consultant.
  .2 Inform Consultant of unacceptable conditions immediately upon discovery.
  .3 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Consultant.

3.2 Erection

.1 Comply with ASTM C754.

.2 All gypsum board shall be supported with steel framing whether indicated or not.

.3 Unless otherwise indicated on the drawings, all gypsum board partitions shall extend from floor level to the underside of floor or roof structures above.

.4 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum. Provide top deflection tracks where indicated or as required to permit structural deflection. Install top deflection clips as necessary to increase load capacity.

.5 Install damp proof course under stud shoe tracks of partitions on slabs on grade.

.6 Place studs vertically at 400 mm on centre unless noted otherwise and not more than 50 mm from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.

.7 Erect metal studding to tolerance of 1:1000.

.8 Attach studs to bottom and ceiling track using screws.

.9 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.10 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.

.11 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.

.12 Install heavy thickness single jamb studs at openings.

.13 Erect track at head of door/window openings and sills of window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.

.14 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

.15 Provide 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.

.16 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.17 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use 50 mm leg ceiling tracks.

.18 Install continuous insulating strips to isolate studs from un-insulated surfaces.

.19 Install two continuous beads of acoustical sealant under studs and tracks around perimeter of sound control partitions.

3.3 Wall Furring

.1 Install wall furring for gypsum board wall finishes in accordance ASTM C754 and ASTM C841 except where specified otherwise and indicated on drawings.

.2 Frame openings and around built-in equipment, cabinets, access panels, etc., on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.3 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

3.4 Suspended and Furred Ceilings and Bulkheads

.1 Erect hanger and runner channels for suspended gypsum board ceilings and bulkheads in accordance with ASTM C754 and ASTM C841 except where specified otherwise and indicated on drawings.

.2 Securely anchor hanger to structural supports 1220 mm o.c. maximum along runner channels and not more than 150 mm from ends. Under no circumstances shall hanger wires be secured to or supported from mechanical or electrical materials or equipment or penetrate mechanical ductwork.

.3 Space runner or furring channels as shown on drawings and not more than 610 mm o.c. maximum nor 150 mm from walls. Run channels in long direction of board. Bend hanger sharply

under bottom flange of runner and securely wire in place with a saddle tie. Provide channels below mechanical or electrical equipment and mechanical ductwork to maintain maximum spacing.

.4 Install furring channels transversely across runner channels in short direction of wallboard at 610 mm o.c. maximum or 150 mm from walls and interruptions in ceiling continuity. Secure channels to support with furring clips or wire. Where splicing is necessary lap minimum 200 mm and wire tie each end with double loops of 0.90 mm galvanized tie wire, 25 mm from each end of overlap.

.5 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 610 mm around perimeter of fixture. Coordinate with Electrical.

.6 Install work level to tolerance of 1:1200.

.7 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles, etc.

.8 Install furring channels parallel to, and at exact locations of steel stud partition header track.

.9 Furr for gypsum board faced vertical bulkheads within or at termination of ceilings.

3.5 Gypsum Board

.1 Installation of gypsum board is specified in Section 09 21 16

3.6 Cleaning

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

.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 09 21 16 Gypsum Board
.2 Section 09 53 00 Acoustical Suspension

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C423-23 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
  .2 ASTM E84-24 Standard Test Method for Surface Burning Characteristics of Building Materials
  .3 ASTM E1264-22 Standard Classification for Acoustical Ceiling Products
  .4 ASTM E1414/E1414M-21a Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
  .5 ASTM E1477-98a(2022) Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers
.2 Underwriters Laboratories of Canada (ULC)
  .1 ULC 102-2018 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.
  .1 Acoustical Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

.3 Submit duplicate 300 x 300 mm samples of each type of acoustical units.

.4 Provide maintenance data for acoustic panel ceilings for incorporation into Operation and Maintenance Manual specified in Section 01 78 00 – Closeout Submittals.

1.5 Quality Assurance

.1 Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

.2 Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

.3 Mock-up:
  .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.

.2 Construct mock-up 10 m² minimum of acoustical panel tile ceiling including one inside corner and one outside corner.
.3 Construct mock-up where directed.
.4 Allow 48 hours for inspection of mock-up by 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.

1.6 Project Conditions

.1 Permit wet work to dry before beginning to install.

.2 Maintain uniform minimum temperature of 15° C and humidity of 20-40% before and during installation.

.3 Store materials in work area 48 hours prior to installation.

.4 Building areas to receive ceilings shall be free of construction dust and debris.

1.7 Performance Requirements

.1 Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
.1 Surface Burning Characteristics: As follows, tested per ASTM E84 and complying with ASTM E1264 Classification.
.2 Fire Resistance: As follows tested per ASTM E119 and listed in the appropriate floor or roof design in the Underwriters Laboratories Fire Resistance Directory

.2 Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to applicable code.

1.8 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

.3 Protect on site stored or installed absorptive material from moisture damage.

1.9 Waste Management and Disposal

.1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.10 Extra Materials

.1 Provide extra materials of acoustic units in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide acoustical units amounting to 5% of gross ceiling area for each pattern and type required for project.

.3 Ensure extra materials are from same production run as installed materials.

PART 2 PRODUCTS

2.1 Materials

.1 Acoustic units for suspended ceiling system: to ASTM E1264

.2 Panel Type 1: CGC Fissured.
.1 Class A.
.2 Composition: Water Felted Mineral Fiber
.3 Pattern regular fissured.
.4 Texture: medium.
.5 Flame spread: ASTM E1264, Class A (U.L.C.), 25 or less.
.6 Smoke developed 50 or less in accordance with ULC 102.
.7 Noise Reduction Coefficient (NRC): ASTM C423; Classified with UL label, 0.55
.8 Ceiling Attenuation Class (CAC): ASTM C1414; Classified with UL label, 35
.9 Light Reflectance (LR) range of 0.81 to ASTM E1477.
.10 Dimensional Stability: Standard
.11 Edge Profile: Square Lay-In
.12 Colour: White.
.13 Size 610 x 1219 x 16 mm thick.
.14 Shape flat.
.15 Surface coverings: Ecolabel certified paint.

.3 Alternate manufacturer: Products as manufactured by the following are acceptable, subject to Consultants approval of style, finish, performance characteristics and texture:
.1 Armstrong Industries
.2 Certainteed
.3 OWA Acoustic Ceiling Systems

.4 Ceiling Suspension System: as specified in Section 09 53 00.

PART 3 EXECUTION

3.1 Examination

.1 Do not install acoustical panels until work above ceiling has been inspected by Consultant.

3.2 Installation

.1 Co-ordinate with Section 09 53 00 - Acoustical Suspension.
.2 Coordinate layout and installation of ceilings with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, and fire-suppression system.

.3 Install acoustical panels and tiles in ceiling suspension system.

.4 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.

.5 Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding.

3.3 Cleaning

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

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1	Section 09 21 16	Gypsum Board
.2	Section 09 51 13	Acoustic Panel Ceilings
.3	Division 23	Refer to Mechanical Drawings
.4	Division 26	Refer to Electrical Drawings

1.3 References

.1 ASTM International (ASTM)
- .1 ASTM A307-21 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
- .2 ASTM A641/A641M-19 Standard Specification for Zinc–Coated (Galvanized) Carbon Steel Wire.
- .3 ASTM A653 / A653M – 23 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- .4 ASTM A1011/A1011M-23 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
- .5 ASTM C635/C635M-22 Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay in Panel Ceilings.
- .6 ASTM C636/C636M-19 Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- .7 ASTM E84-24 Standard Test Method for Surface Burning Characteristics of Building Materials
- .8 ASTM E119-22 Standard Test Methods for Fire Tests of Building Construction and Materials
- .9 ASTM E1264-22 Standard Classification for Acoustical Ceiling Products

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

.3 Acoustical Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

.4 Submit one representative model of each type of ceiling suspension system.
- .1 Ceiling system to show basic construction and assembly, treatment at walls, recessed fixtures, splicing, interlocking, finishes, acoustical unit installation.

1.5 Design Requirements

.1 Determine the superimposed loads that will be applied to suspension systems by components of the building other than the ceiling and ensure that adequate hangers are installed to support the additional loads in conjunction with the normal loads of the system.

.2 Design supplemental suspension members and hangers where width of ducts and other construction within ceiling plenum produces hanger spacing that interferes with location of hangers at required spacing to support standard suspension system members:
.1 Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
.3 Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of L/360 to ASTM C635 deflection test.

1.6 Performance Requirements

.1 Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
.1 Surface Burning Characteristics: Tested per ASTM E84 and complying with ASTM E1264 Classification.

.2 Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to applicable code.

1.7 Quality Assurance

.1 Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

.2 Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

.3 Where required, provide fire-resistance rated suspension system: certified by a Canadian Certification Organization accredited by Standards Council of Canada.

.4 Construct mock-ups in accordance with Section 01 45 00 - Quality Control and as described in Section 09 51 13.

1.8 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

1.9 Waste Management and Disposal

.1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

.1 Components: All main beams and cross tees, base metal and end detail shall be commercial quality hot-dipped galvanized steel as per ASTM C635. Main beams and cross tees shall be double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.

.2 Face width: 22 mm

.3 Edge Moldings and Trim: Hemmed angle moulding to match main beams and cross tees.

.4 Structural Classification: Intermediate Duty System, ASTM C635.

.5 Colour: White and match the actual colour of the specified ceiling tile.

.6 Standard of Acceptance:
- .1 Armstrong Prelude XL
- .2 Donn DXT
- .3 Certainteed Classic Environmental Stab.
- .4 OWA Acoustic Ceiling Systems

.7 Attachment Devices: Size for five times design load indicated in ASTM C635, Table 1, Direct Hung unless otherwise indicated or required.

.8 Threaded Rod: to ASTM A397. Galvanized or zinc plated.

.9 Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft annealed, with a yield stress load of at least time three design load, but not less than 2.06 mm thick.

.10 Channel Framing and Fittings: Strut type metal framing and components to ASTM A1011 or ASTM A653. Unistrut P1000SL or equivalent. Galvanized.

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 Do not proceed with installation until all wet work such as concrete, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

3.3 Preparation

.1 Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

.2 Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
- .1 Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.4 Installation

.1 Install suspension system and panels in compliance with ASTM C636; CISCA Seismic Guidelines and in accordance with the manufacturer's installation instructions.

.2 Install wall moldings at intersection of suspended ceiling and vertical surfaces.

.3 Do not erect ceiling suspension system until work above ceiling has been inspected by Consultant.

.4 Secure hangers to overhead structure using attachment methods as indicated by manufacturer. Do not suspend ceiling systems from building services including plumbing lines, conduit, cable trays or duct work.

.5 Hanger and bracing wires shall not attach to or bend around obstructions including but not limited to: piping, ductwork, conduit and equipment. Provide trapeze or other supplementary support members at obstructions to allow typical hanger spacing. Brace assemblies must be configured and/or located in order to avoid obstructions in addition to maintaining the required brace assembly spacing.

.6 Install hangers spaced at maximum 1219 mm centres and within 152 mm from ends of main tees. Install hanger wires plumb and straight.

.7 Lay out centre line of ceiling both ways, to provide balanced borders at room perimeter with border units not less than 50% of standard unit width.

.8 Ensure suspension system is coordinated with location of related components.

.9 Completed suspension system to support super-imposed loads, such as lighting fixtures, diffusers, grilles, and speakers.

.10 Support at light fixtures and diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 610 mm around perimeter of fixture.

.11 Interlock cross member to main runner to provide rigid assembly.

.12 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.

.13 Install access splines to provide ceiling access.

.14 Finished ceiling system to be square with adjoining walls and level within 1:1000

3.5 Cleaning

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

.2 Touch up scratches, abrasions, voids and other defects in painted surfaces.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 09 21 16 Gypsum Board

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM A780/A780M-20 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
.2 Environmental Protection Agency (EPA)
  .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).
.3 Master Painters Institute (MPI)
  .1 MPI Architectural Painting Specifications Manual, 2018
  .2 MPI Standard GPS-1-12 and GPS-2-12 MPI Green Performance Standard for Painting and Coatings.
.4 Society for Protective Coatings (SSPC)
  .1 Systems and Specifications, SSPC Painting Manual 2009
.5 Underwriters Laboratories of Canada (ULC)
  .1 ULC 102-18 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
.6 South Coast Air Quality Management District, California State (SCAQMD)
  .1 SCAQMD Rule 1113-96, Architectural Coatings.
.7 Green Seal GS-11 Green Seal Environmental Standard for Paints and Coatings, January 1997.
.8 National Fire Code of Canada

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
  .1 Submit full range colour sample chips.
  .2 Submit duplicate 200 x 300 mm sample panels of each paint, stain, clear coating and special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards.
  .3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties and SCAQMD Rule 1113-96.

.5 Provide maintenance data for paint products for incorporation into Operating and Maintenance Manuals specified in Section 01 78 00- Closeout Submittals. Include following:
  .1 Product name, number, type and use.
  .2 Colour numbers.

.3 MPI Environmentally Friendly classification system rating.

1.5 Quality Assurance

.1 Qualifications:
.1 Contractor: to have a minimum of five years proven satisfactory experience.
.2 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work.
.3 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.

.2 Conform to latest MPI requirements for painting work including preparation and priming.

.3 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.

.4 Paint materials to be highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and to be compatible with other coating materials as required.

.5 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Consultant.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver and store materials in original containers, sealed, with labels intact. Labels to indicate:
.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 Provide and maintain dry, temperature controlled, secure storage. Store materials and equipment in well-ventilated area with temperature range 7 ° C to 30 ° C. Store materials and supplies away from heat generating devices.

.4 Observe manufacturer's recommendations for storage and handling.

.5 Keep areas used for storage, cleaning and preparation, clean and orderly. After completion of operations, return areas to clean condition.

.6 Remove paint materials from storage only in quantities required for same day use.

.7 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

.8 Remove damaged, opened and rejected materials from site.

1.7 Fire Safety Requirements

.1 Provide one 9 kg Type ABC dry chemical 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.

1.8 Waste Management and Disposal

.1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

.2 Place materials defined as hazardous or toxic in designated containers. Handle and dispose of hazardous materials in accordance with Municipal regulations.

.3 Unused materials must be disposed of at official hazardous material collections site.

.4 Paint and related materials are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from the Ministry of the Environment.

.5 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.

.6 Place materials defined as hazardous or toxic waste in containers or areas designated for hazardous waste.

1.9 Maintenance

.1 Extra Materials:
- .1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Quantity: provide one four litre can of each type and colour of finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
- .3 Deliver to Owner and store where directed.

1.10 Ambient Conditions

.1 Heating, Ventilation and Lighting:
- .1 Ventilate enclosed spaces in accordance with Section 01 51 00 – Temporary Utilities.
- .2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 ° 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 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.
- .5 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:
- .1 Unless pre-approved in writing by Consultant and product manufacturer, perform no painting when:
  - .1 Ambient air and substrate temperatures are below 10 ° C.
  - .2 Substrate temperature is above 32 ° 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 ° C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 ° C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.
- .2 Ensure that conditions are within specified limits during drying or curing process, until newly

applied coating can itself withstand 'normal' adverse environmental factors.

.3 Perform painting work when maximum moisture content of the substrate is below:
  .1 Allow new concrete to cure minimum of 28 days.
  .2 15% for wood.
  .3 12% for plaster and gypsum board.

.4 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".

.5 Test concrete and plaster surfaces for alkalinity as required.

.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.

PART 2 PRODUCTS

2.1 Materials

.1 Provide paint materials for paint systems from single manufacturer.

.2 Products to meet requirements of GS-11 or SCAQMD Rule 1113-96

.3 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

.4 Only qualified products with E2 or E3 "Environmentally Friendly" rating are acceptable for use.

.5 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.

.6 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids:
  .1 Non-flammable, biodegradable.
  .2 Manufactured without compounds which contribute to ozone depletion in the upper atmosphere.
  .3 Manufactured without compounds which contribute to smog in the lower atmosphere.
  .4 Do not contain methylene chloride, chlorinated hydrocarbons or toxic metal pigments.
  .5 Recycled content of 15% post-consumer and ½ post-industrial waste.

.7 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.

.8 Flash point: 61 °C or greater for water-borne surface coatings and recycled water-borne surface coatings.

2.2 Colours

.1 Consultant will provide Colour Schedule. Colours will match existing colours and finishes as per the owners standard colour schedules.

.2 Colour schedule will be based upon selection of 1 base colours and three deep tint accent

colours.

.3 Selection of colours will be from manufacturer's full range of colours.

.4 Where specific products are available in restricted range of colours, selection will be based on limited range.

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

2.3 Mixing and Tinting

.1 Perform colour tinting operations prior to delivery of paint to site.

.2 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.

.3 Thin paint for spraying in accordance with paint manufacturer's instructions.

.4 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: defined as sheen rating of applied paint, in accordance with following values:

Gloss Level Category/	Units @ 60 Degrees	Units @ 85 Degrees
G1 – matte finish	0 to 5	Max. 10
G2 – velvet finish	0 to 10	10 to 35
G3 – eggshell finish	10 to 25	10 to 35
G4 – satin finish	20 to 35	Min. 35
G5 – semi-gloss finish	35 to 70	
G6 – gloss finish	70 to 85	
G7 – high gloss finish	> 85	

.2 Gloss level ratings of painted surfaces as specified and as noted on Finish Schedule.

2.5 Interior Painting Systems

.1 Structural Steel:
  .1 INT 5.1X Latex G5 semi-gloss finish (over quick dry shop primer).

.2 Metal Fabrications:
  .1 INT 5.3A Latex G5 semi-gloss finish

.3 Galvanized Metal: interior doors, frames, railings, misc. steel, pipes, and ducts.
  .1 INT 5.3A Latex G5 semi-gloss finish

.4 Concrete Masonry:
  .1 INT 4.2D High performance architectural latex G5 semi-gloss finish.

.5 Concrete masonry units at wet areas and change rooms:
  .1 INT 4.2G Epoxy (tile-like) finish.

.6 Wood Clear Polyurethane Finish:
.1 INT 6.3K Polyurethane varnish G6 gloss finish.

.7 Electrical Equipment Backboards:
.1 INT 6.4P Fire retardant, pigmented coating. Low odour/low VOC. Semi-gloss (UL/ULC rated).

.8 Gypsum Board: Walls and Bulkheads.
.1 INT 9.2A Latex G3 eggshell finish over latex sealer.

.9 Gypsum Board: Ceilings and Bulkheads:
.1 INT 9.2A Latex G2 velvet finish over latex sealer.

.10 All other surfaces not noted above: high performance finish suitable for commercial and institutional environment and in accordance with MPI painting manual.

.11 Concrete Vertical Surfaces (including horizontal soffits)
.1 INT 3.1A Latex G4 (over w.b. alkali-resistant primer)

PART 3 EXECUTION

3.1 General

.1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.

.2 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and application instructions, and data sheets.

3.2 Examination

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report damages, defects, unsatisfactory or unfavourable conditions to Consultant before proceeding with work.

3.3 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 and in accordance with paint manufacturers and MPI recommendations. If damaged, clean and restore surfaces as directed by Consultant.
.2 Protect items that are permanently attached such as Fire Labels on doors and frames.
.3 Protect factory finished products and equipment.

.2 Surface Preparation:
.1 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
.2 Place "WET PAINT" signs in occupied areas as painting operations progress.

.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 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
.1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
.2 Apply wood filler to nail holes and cracks.
.3 Tint filler to match stains for stained woodwork.

.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 and SSPC-SP 6. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes blowing with clean dry compressed air or vacuum cleaning.

.7 Touch up of shop primers with primer as specified.

.8 Do not apply paint until prepared surfaces have been accepted by Consultant.

3.4 Application

.1 Apply paint materials in accordance with paint manufacturer's written application instructions.

.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, 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 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.5 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.6 Sand and dust between coats to remove visible defects.

.7 Finish surfaces both above and below sight lines as specified for surrounding surfaces.

.8 Finish alcoves as specified for adjoining rooms.

.9 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.5 Mechanical/Electrical Equipment

.1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces.

.2 Mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.

.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.

3.6 Field Quality Control

.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.

.2 Standard of Acceptance:
.1 Walls: no defects visible from a distance of 1000 mm 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.

3.7 Cleaning and Restoration

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

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Consultant. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Consultant.

End of Section

Division 26 Common Requirements for Electrical

26 00 11 Electrical Specification Index

Common Contract Requirements for Electrical

26 01 16 Electrical Contract General Requirements
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Common Work Results for Electrical

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Lighting

26 51 13 Lighting Equipment

Division 28 Electronic Safety and Security

Fire Detection and Alarm

28 31 25 Fire Alarm System (Addressable)

END OF SECTION

Part 1 General

1.1 GENERAL

.1 This Section covers items common to Electrical Division 26 and Division 28.

.2 This section supplements requirements of Division 1.

.3 Furnish labour, materials, and equipment necessary for completion of work as described in contract documents.

1.2 INTENT

.1 Mention herein or indication on Drawings of articles, materials, operations, or methods requires: supply of each item mentioned or indicated, of quality, or subject to qualifications noted; installation according to conditions stated: and, performance of each operation prescribed with furnishing of necessary labour, equipment, and incidentals for electrical work.

.2 Where used, words “Section” and “Division” shall also include other Subcontractors engaged on site to perform work to make building and site complete in all respects.

.3 Where used, word “supply” shall mean furnishing to site in location required or directed complete with accessory parts.

.4 Where used, word “install” shall mean secured in place and connected up for operation as noted or directed.

.5 Where used, word “provide” shall mean supply and install as each is described above.

1.3 TENDERS & BONDING

.1 Submit Supplemental Tender Form as noted.

.2 Submit tender based on specified described equipment or Alternates listed.

.3 State in Tender, names of all Subcontractors proposed for work under this Division.

1.4 LIABILITY INSURANCE

.1 This contractor must maintain and produce at the request of the consultant proof of proper insurance to fully protect the owner, the consultant and the contractor from any and all claims due to accidents, misfortunes, acts of God, etc.

1.5 ELECTRICAL SAFETY AUTHORITY

.1 The contractor is to determine general inspection fees with Electrical Safety Authority and include as part of tender.

1.6 DRAWINGS

.1 Electrical Drawings do not show structural and related details. Take information involving accurate measurement of building from building drawings, or at building. Make, without additional charge, any necessary changes or additions to runs of conduits and ducts to accommodate structural conditions. Location of conduits and other equipment may be altered by the consultant without extra charge provided change is made before installation and does not necessitate major additional material.

.2 As work progresses and before installing fixtures and other fittings and equipment which may interfere with interior treatment and use of building, provide detail drawings or obtain directions for exact location of such equipment and fitments.

.3 Electrical drawings are diagrammatic. Where required work is not shown or only shown diagrammatically, install same at maximum height in space to conserve head room (minimum 2200 mm (88") clear) and interfere as little as possible with free use of space through which they can pass. Conceal wiring, conduits and ducts in furred spaces, ceilings and walls unless specifically shown otherwise. Install work close to structure so furring will be small as practical.

.4 Before commencing work, check and verify all sizes, locations, grades, elevations, levels and dimensions to ensure proper and correct installation. Verify existing/municipal services.

.5 Locate all electrical equipment in such a manner as to facilitate easy and safe access to and maintenance and replacement of any part.

.6 In every place where there is indicated space reserved for future or other equipment, leave such space clear, and install services so that necessary installation and connections can be made for any such apparatus. Obtain instructions whenever necessary for this purpose.

.7 Relocate equipment and/or material installed but not co-ordinated with work of other Sections as directed, without extra charge.

.8 Where drawings are done in metric and product not available in metric, the corresponding imperial trade size shall be utilized.

1.7 INTERFERENCE AND CO-ORDINATION DRAWINGS

.1 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the constructed spaces provided.

.2 Prepare drawings to indicate co-ordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus, and connections are co-ordinated.

.3 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance are indicated on drawings.

.4 Upon consultant’s request submit copies of interference drawings to the consultant.

.5 Due to the nature of the building and the complexity of the building systems provide the following:

.1 Interference drawings, showing coordination of architectural, structural, mechanical, and electrical systems for the consultant's review prior to fabrication.

.2 Detailed equipment room drawings clearly showing all distribution equipment.

.3 Detailed layout drawings clearly showing conduit/feeder runs 78mm diameter or larger, including hangers or tray.

.6 Provide CAD drawings (minimum file version AutoCAD 2013) in addition to hard copies.

1.8 QUALITY ASSURANCE

.1 The installations of the division must conform to the latest edition of the Electrical Safety Code as well as its supplemental bulletins and instructions. Provide materials and labour necessary to comply with rules, regulations, and ordinances.

.2 Complete underground systems in accordance with CSA C22.3 No. 7-94 except where specified otherwise.

.3 Abbreviations for electrical terms: to CSA Z85-1983.

.4 In case of differences between building codes, provincial laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify consultant in writing of such differences.

1.9 ALTERNATES AND SUBSTITUTIONS

.1 Throughout these sections are lists of "Alternate Equipment" manufacturers acceptable to consultant if their product meets characteristics of specified described equipment.

.2 Each bidder may elect to use "Alternate Equipment" from lists of Alternates where listed. Include for any additional costs to suit Alternated used. Prices are not required in Tender for Alternates listed except where specifically noted as "Separate Price". Complete the Supplementary Tender Form.

.3 When two or more suppliers/manufacturers are named in the Bid Documents, only one supplier/manufacturer of the products named will be acceptable; however, it is the responsibility of this Division to ensure "Alternate Equipment" fits space allocated and gives performance specified. If an "Alternate Equipment" unit is proposed and does not fit space allotted nor equal specified product in consultant's opinion, supply of specified described equipment will be required without change in Contract amount. Only manufacturers listed will be accepted for their product listing. All other manufacturers shall be quoted as substitution stating conditions and credit amount.

.4 If item of material specified is unobtainable, state in Tender proposed substitute and amount added or deducted for its use. Extra monies will not be paid for substitutions after Contract has been awarded.

1.10 EXAMINATION

.1 Site Reviews

.1 Examine premises to understand conditions, which may affect performance of work of this Division before submitting proposals for this work.

.2 No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

.2 Drawings

.1 Electrical Drawings show general arrangement of fixtures, power devices, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.

.2 Consider Architectural, Mechanical, and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Electrical Drawings.

.3 Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories, which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings and accessories required to meet conditions.

.3 Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.

1.11 SEQUENCING AND SCHEDULING

.1 It is understood that while Drawings are to be followed as closely as circumstances permit, this Division will be held responsible for installation of systems according to the true intent and meaning of Contract Documents. Anything not clear or in conflict will be explained by making application to consultant. Should conditions arise where certain changes would be advisable, secure consultant's approval of these changes before proceeding with work.

.2 Coordinate work of various trades in installing interrelated work. Before installation of electrical items, make proper provision to avoid interferences in a manner approved by consultant. Changes required in work specified in these sections caused by neglect to do so shall be made at no cost to owner.

.3 Arrange fixtures, conduit, ducts, and equipment to permit ready access to junction boxes, starters, motors, control components, and to clear openings of doors and access panels.

.4 Furnish and install inserts and supports required by these sections unless otherwise noted. Furnish sleeves, inserts, supports, and equipment that are an integral part of other Divisions of the Work to Sections involved in sufficient time to be built into construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from improper location or installation of items above shall be borne by the electrical trade.

.5 Adjust locations of ducts, conduits, equipment, fixtures, etc., to accommodate work from interferences anticipated and encountered. Determine exact route and location of each conduit and duct prior to installation.

.1 Make offsets, transitions, and changes in direction of ducts, and electrical raceways as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.

.2 Supply and install pull boxes, etc., as required to affect these offsets, transitions, and changes in direction.

1.12 REQUEST FOR INFORMATION (RFI) PROCEDURES

.1 RFIs shall be submitted to the consultant minimum two (2) weeks prior to answer being required. Failure to submit and RFI in a timely manner will forfeit delay claims and schedule extension requests by the contractor.

.2 All RFIs will be submitted with the following information:

.1 RFI number
.2 Name of project
.3 Date of initiation
.4 Date response required by (minimum two (2) weeks)
.5 Subject
.6 Submitter's name
.7 Drawing/specification reference
.8 Photograph of the issue (if applicable)
.9 Description of the issue
.10 Contractor's proposed resolution

1.13 DRAW BREAKDOWN

.1 This contractor MUST submit a breakdown of the tender price into classifications to the satisfaction of the consultant, with the aggregate of the breakdown totaling the total contract amount. **Each item must be broken out into material and labour costs.** Progress claims, when submitted are to be itemized against each item of the draw breakdown. This shall be done in table form showing contract amount, amount this draw, total to date, % complete and balance.

.2 Breakdown shall be as follows:

.1 Permits and fees
.2 Mobilization (maximum 1%)
.3 Demolition
.4 Branch conduits
.5 Branch wiring
.6 Lighting fixtures (interior)
.7 Emergency lighting
.8 Fire alarm system

.9 Integrated Life Safety System Testing

.10 Commissioning (minimum 3%)

.11 Electrical contractor closeout requirements (minimum of 3% but not less than $5,000.00)

.3 The breakdown must be approved by the consultant prior to submission of the first draw.

.4 Breakdowns not complying to the above will not be approved.

.5 Breakdown must indicate total contract amount.

.6 Mobilization amount may only be drawn when all required shop drawings have been reviewed by the consultant.

1.14 SHOP DRAWINGS AND PRODUCT DATA

.1 General

.1 Furnish complete catalog data for manufactured items of equipment to be used in the work to consultant for review within 14 days after award of Contract.

.2 Upon receipt of reviewed shop drawing, product is to be ordered immediately.

.3 Provide a complete list of shop drawings to be submitted prior to first submission.

.4 Before submitting to the consultant, review all shop drawings to verify that the products illustrated therein conform to the Contract Documents. By this review, the contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers, and similar data and that it has checked and coordinated each shop drawing with the requirements of the work and of the Contract Documents. The contractor's review of each shop drawings shall be indicated by stamp, date and signature of a qualified and responsible person possessing by the appropriate authorization.

.5 If material or equipment is not as specified or submittal is not complete, it will be rejected by consultant.

.6 Additional shop drawings required by the contractor for maintenance manuals, site copies etc., shall be photocopies of the "reviewed" shop drawings. All costs to provide additional copies of shop drawings shall be borne by the contractor.

.7 **Submit all shop drawings for the project as a package. Partial submittals will not be accepted**.

.8 Catalog data or shop drawings for equipment, which are noted as being reviewed by consultant or his engineer shall not supersede Contract Documents.

.9 Review comments of consultant shall not relieve this Division from responsibility for deviations from Contract Documents unless consultant's attention has been called to such deviations in writing at time of submission, nor shall they relieve this Division from responsibility for errors in items submitted.

.10 Check work described by catalog data with Contract Documents for deviations and errors.

.11 Shop drawings and product data shall show:

.1 Mounting arrangements.

.2 Operating and maintenance clearances. e.g. access door swing spaces.

.12 Shop drawings and product data shall be accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Manufacturer test data where requested.

.3 Manufacturer to certify as to current model production.

.4 Certification of compliance to applicable codes.

.13 State sizes, capacities, brand names, motor HP, accessories, materials, gauges, dimensions, and other pertinent information. List on catalog covers page numbers of submitted items. Underline applicable data.

.14 If a shop drawing is returned "reviewed as noted" this contractor must provide written indication that the comments have been complied with.

.15 A partial list of shop drawings includes:

.1 Fire alarm system

.2 Luminaires and drivers

.3 Emergency battery units, exit signs, and fixtures

.4 Firestopping materials

.5 Integrated Life Safety System Testing Plan (ITP)

.2 Submissions shall be submitted electronically as per the following directions:

.1 Electronic Submissions:

.1 Electronically submitted shop drawings shall be prepared as follows:

.1 Use latest software to generate PDF files of submission sheets.

.2 Scanned legible PDF sheets are acceptable. Image files are not acceptable.

.3 PDF format shall be of sufficient resolution to clearly show the finest detail.

.4 PDF page size shall be standardized for printing to letter size (8.5"x11"), portrait with no additional formatting required by the consultant. Submissions requiring larger detail sheets shall not exceed 11"x17".

.5 Submissions shall contain multiple files according to section names as they appear in Specification.

.6 File names shall include consultant project number and description of shop drawing section submitted.

.7 Each submission shall contain an index sheet listing the products submitted, indexed in the same order as they appear in the Specification. Include associated PDF file name for each section.

.8 On the shop drawing use an "electronic mark" to indicate what is being provided.

.9 **Each file shall bear an electronic representation of the "company stamp" of the contractor. If not stamped the file submission will not be reviewed.**

.2 Email submissions shall include subject line to clearly identify the consultants' project number and the description of the shop drawings submitted.

.3 Electronic attachments via email shall not exceed 10MB. For submissions larger than 10MB, multiple email messages shall be used. Denote related email messages by indicating "1 of 2" and "2 of 2" in email subject line for the case of two messages.

.4 Electronic attachments via web links (URL) shall directly reference PDF files. Provide necessary access credentials within link or as username/password clearly identified within body of email message.

.5 On site, provide one (1) copy of the "reviewed" shop drawings in a binder as noted above.

.6 Contractor to print copies of "reviewed" shop drawings and compile into maintenance manuals in accordance with requirements detailed in this section.

1.15 CARE, OPERATION AND START-UP

.1 Instruct consultant and operating personnel in the operation, care and maintenance of equipment.

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation and ensure that operating personnel are conversant with all aspects of its care and operation.

1.16 VOLTAGE RATINGS

.1 Operating voltages: to CAN3-C235-83.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.17 PERMITS, FEES, AND INSPECTION

.1 The contractor is required to include in his tender all required inspection costs by the Electrical Safety Authority. Permit application is the responsibility of the contractor.

.2 Reproduce drawings and specifications required by Electrical Safety Authority at no cost.

.3 Notify consultant of changes required by Electrical Safety Authority prior to making changes.

.4 Furnish Certificates of Acceptance to consultant from Electrical Safety Authority and other authorities having jurisdiction upon completion of work.

.5 This contractor must furnish any certificates required to indicate that the work completed conforms with laws and regulations of authorities having jurisdiction.

1.18 ADDITIONAL INSTALLED EQUIPMENT

.1 The electrical contractor is to review all specification sections forming part of the electrical bid documents and include additional equipment or components, as well as all associated installation costs and testing costs as noted, in the electrical bid price.

1.19 MATERIALS AND EQUIPMENT

.1 Equipment and material to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Electrical Safety Authority.

.2 Factory assemble control panels and component assemblies.

1.20 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates as follows:

.2 Nameplates:

.1 Lamacoid 3 mm (1/8") thick plastic engraving sheet, black face, white core, mechanically attached with self tapping screws.

NAMEPLATE SIZES

Size 1	9 mm x 50 mm (3/8" x 2")	1 line	3 mm (1/8") high letters
Size 2	12 mm x 70 mm (1/2" x 2 1/2")	1 line	5 mm (3/16") high letters
Size 3	12 mm x 70 mm (1/2" x 2 1/2")	2 lines	3 mm (1/8") high letters
Size 4	20 mm x 90 mm (3/4" x 3 1/2")	1 line	9 mm (3/8") high letters
Size 5	20 mm x 90 mm (3/4" x 3 1/2")	2 lines	5 mm (3/16") high letters

.3 Wording on nameplates labels to be approved by consultant prior to manufacture.

.4 Allow for average of five (25) letters per nameplate.

.5 Identification to be English.

.6 Nameplates for equipment connected to emergency services are to be red in colour.

1.21 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour code: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

1.22 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m (45') intervals.

.3 Colour bands must be 25 mm (1") wide.

	Prime
up to 208 V	yellow
Fire alarm	red
Emergency lighting	pink

.4 This contractor must paint all system junction boxes and covers in conformance with the above schedule.

1.23 PROTECTION OF OPENINGS

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.24 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.25 MANUFACTURERS AND CSA LABELS

.1 All labels must be visible and legible after equipment is installed.

1.26 WARNING SIGNS

.1 To meet requirements of Electrical Safety Authority and consultant.

.2 Provide porcelain enamel signs, with a minimum size of 175 mm x 250 mm (7" x 10").

1.27 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise. Coordinate with block coursing (if applicable).

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise.

.1 Fire alarm stations: 1200 mm (3'-11").

.2 Fire alarm visual and signal devices: 2250 mm (88 ½").

1.28 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete shall be schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm (2") beyond either side.

.2 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

1.29 FIELD QUALITY CONTROL

.1 Conduct and pay for following tests:

.1 Power distribution system including phasing, voltage, grounding, and load balancing.

.2 Circuits originating from branch distribution panels.

.3 Lighting and its control.

.4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

.5 Systems: fire alarm system, communications, security.

.2 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.

.3 Insulation resistance testing.

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Check resistance to ground before energizing.

.4 Carry out tests in presence of consultant.

.5 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.6 Submit test results for consultant's review.

1.30 EQUIPMENT NAMEPLATE DATA

.1 Refer to the Equipment Wiring Schedule, Distribution Diagram(s) and Panel Schedules for information regarding the designed electrical connections for all equipment to be connected to the electrical distribution system.

.2 Refer to the shop drawing submissions of all project divisions and coordinate with all trades and equipment manufacturers throughout the construction period for equipment connection requirements.

.3 This electrical trade shall be responsible to coordinate any discrepancies on equipment minimum circuit ampacity, maximum overcurrent protection, voltage and phase, between the equipment manufacturer published literature, the equipment shop drawing submission, the project design drawings equipment wiring schedule, and the nameplate data on the equipment. The contractors installing and connecting all equipment shall be responsible for the coordination of this data through the construction period.

.4 Equipment shall not be connected where the specified maximum overcurrent protection and minimum circuit ampacity values do not meet the requirements of the equipment nameplate data on site.

.5 Electrical distribution equipment shop drawings shall not be submitted prior to approval of equipment to be connected including, but not limited to, mechanical units, pumps, elevators, etc. Electrical distribution equipment shall not be released into production until all connected equipment requirements are confirmed and included in approved shop drawings.

.6 Where nameplate data of equipment on site varies from that data listed in the approved equipment shop drawings, the consultant shall be notified in writing, and the equipment shall not be connected until the equipment connection details are confirmed. The final installation must meet the nameplate data of the equipment on site.

.7 No subsequent allowance for time or money for changes to breakers, wiring and conduit, or equipment sizes will be considered for any consequence related to failure by the electrical trade to coordinate final equipment connection requirements with nameplate data and electrical distribution equipment shop drawings.

1.31 GUARANTEE AND WARRANTY

.1 At ready for takeover of this project this Contractor must provide a written guarantee indicating that any defects, not due to ordinary wear and tear or improper use which occur within the first year from the date of ready for takeover will be corrected at the contractor's expense.

.2 Warranty period shall start from date of ready for takeover completion.

.3 Refer to individual specification sections for information on any special manufacturer's equipment warranties.

1.32 SYSTEM START UP

.1 Provide consultant with written notice verifying all equipment operation and installation is complete prior to scheduled start-up period.

.2 Start up shall be in presence of the following: owner or representative, contractor, and manufacturer's representative. Each person shall witness and sign off each piece of equipment. Consultant's attendance will be determined by consultant.

.3 Arrange with all parties and provide 72 hours notice for start up procedure.

.4 Simulate system start up and shut down and verify operation of each piece of equipment.

.5 These tests are to demonstrate that the systems and equipment installed are operational as specified.

.6 The contractor must describe during the start up session the required maintenance for each piece of equipment according to the manufacturer.

.7 The contractor must provide all necessary tools (including a digital multimeter) to successfully complete the start up procedure.

1.33 OPERATION AND MAINTENANCE MANUAL

.1 Provide operation and maintenance data for incorporation into manual as specified in other Sections of this Division.

.2 Operation and maintenance manual to be approved by, and final copies deposited with, consultant before final inspection.

.1 Submit one (1) copy of Operation and Maintenance Manual to consultant for review and approval. Submission of individual data will not be accepted unless so directed by consultant. Submission can be done electronically in PDF format or as a hard copy.

.1 Electronic submission/PDF file is required to be bookmarked. Any submission received without bookmarking will be immediately returned as unacceptable.

.2 Hard copy submission shall be in a three-ring binder (minimum 50 mm (2") ring) and labelled as 'Operation and Maintenance Manual' with project name and location. Dividers are to be used for binder organization.

.2 Make changes as required and re-submit as directed by consultant.

.3 Each manual must include (in "tabbed" sections) the following:

.1 Index

.2 List of General, Electrical Contractors and all associated sub-contractor names, addresses and contact numbers.

.3 List of suppliers and equipment wholesalers local to the project.

.4 Letter of contractor's warranty and guarantee for all parts, equipment and workmanship.

.5 List of manufacturers, spare parts list and source.

.6 Copy of typewritten schedules for all new and renovated panels.

.7 Copy of all substantial performance final certificates.

.8 Copy of electrical shop drawings which have been stamped and reviewed by consultant.

.9 Electrical As-built drawings including contractor company's as built stamp.

.10 Any special warranties on equipment required (i.e. LED lighting, digital lighting control).

.11 Certificate of completion from all associated sub-contractors.

.12 System commissioning certificate and report.

.4 Final Submittals:

.1 Upon acceptance of Operation and Maintenance Manual by the consultant, provide the following:

.1 Provide two (2) copies of final Operation and Maintenance Manuals, as well as a PDF file of the entire approved manual on a USB stick. Only one (1) USB stick is to be provided containing both the approved manual and as-built drawings.

1.34 AS-BUILT DRAWINGS

.1 Site records:

.1 Contractor shall provide two (2) sets of reproducible electrical drawings. Provide sets of white prints as required for each phase of the work. Mark thereon all changes as work progresses and as changes occur. This shall include field and contract changes to electrical systems.

.2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection at all times.

.2 As-built drawings submittal for review:

.1 Identify **each drawing** in lower right-hand corner in letters at least 3 mm (1/8") high as follows: - "AS-BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW ELECTRICAL SYSTEMS AS INSTALLED" (Company Name) (Signature of Contractor) (date).

.2 Submit copy to consultant for approval. When returned, make corrections (if any) as directed.

.3 As-built drawings final submittal:

.1 Once approved, submit completed, reproducible paper as-built drawings as well as a scanned PDF file copy on USB stick with Operation and Maintenance Manuals.

1.35 DEMONSTRATION AND OPERATING AND MAINTENANCE INSTRUCTIONS

.1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.2 Manufacturers or their representatives are to provide demonstrations and instructions.

.3 Use operation and maintenance manual, As-built drawings, audio visual aids, etc. as part of instruction materials.

.4 Instruction duration time requirements as specified in appropriate sections.

.5 Where deemed necessary, consultants may record these demonstrations on video tape for future reference.

1.36 READY FOR TAKEOVER

.1 Complete the following to the satisfaction of the consultant prior to request for ready for takeover.

.1 As-built Drawings

.2 Maintenance Manuals

.3 System Start up

.4 Instructions to Owners

1.37 TRIAL USAGE

.1 Consultant or owner may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

1.38 REVISION TO CONTRACT

.1 Provide the following for each item in a given change notice:

.1 Itemized list of material with associated costs.

.2 Labour rate and itemized list of labour for each item.

.3 Copy of manufacturers/suppliers invoice if requested.

1.39 SLEEVES

.1 Pipe sleeves: at points where pipes pass through masonry, concrete, or fire rated assemblies and as indicated.

.2 Schedule 40 steel pipe.

.3 Sleeves with annular fin continuously welded at midpoint:

.1 Through foundation walls.

.2 Where sleeve extends above finished floor.

.4 Sizes: minimum 6 mm (1/4") clearance all around, between sleeve and conduit.

.5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25 mm (1") above other floors.

.6 Fill voids around pipes:

.1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof fire retardant non-hardening mastic.

.2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors and partitions, maintain fire rating integrity.

.3 Fill future-use sleeves with easily removable filler.

1.40 FIRESTOPPING

.1 Firestopping material and installation within annular space between conduits, ducts, and adjacent fire separation.

.2 Provide materials and systems capable of maintaining effective barrier against flame, smoke, and gases.

.3 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.

.4 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation.

.5 The firestopping materials are not to shrink, slump or sag and be free of asbestos, halogens and volatile solvents.

.6 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.

.7 Firestop materials are to be capable of receiving finish materials in those areas, which are exposed and scheduled to receive finishes.

.8 Firestopping shall be inspected and approved by local authority prior to concealment or enclosure.

.9 Install material and components in accordance with ULC certification, manufacturers instructions and local authority.

.10 Submit product literature and installation material on firestopping in shop drawing and product data manual.

.11 Acceptable manufacturers:

.1 Rectorseal Corporation (Metacaulk)

.2 Proset Systems

.3 3M

.4 Hilti

.5 STI Firestop

Note: Fire stop material must conform to requirements of local authorities having jurisdiction. Contractor to confirm prior to application and ensure material used is compatible with that used by other trades on site.

1.41 PAINTING

.1 Refer to Section Interior Painting and specified elsewhere.

.2 Apply at least one coat of corrosion resistant primer paint to ferrous supports and site fabricated work.

.3 Prime and touch up marred finished paintwork to match original.

.4 Restore to new condition, or replace equipment at discretion of consultant, finishes which have been damaged too extensively to be merely primed and touched up.

1.42 ACCESS DOORS

.1 Supply access doors to concealed electrical equipment for operating, inspecting, adjusting and servicing.

.2 Flush mounted 600 mm x 600 mm (24" x 24") for body entry and 300 mm x 300 mm (12" x 12") for hand entry unless otherwise noted. Doors to open 180º, have rounded safety corners, concealed hinges, screwdriver latches, and anchor straps.

.3 Material:

.1 Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by consultant.

.2 Remaining areas: use prime coated steel.

.3 Fire rated areas: provide ULC listed access doors

.4 Installation:

.1 Locate so that concealed items are accessible.

.2 Locate so that hand or body entry (as applicable) is achieved.

.3 Installation is specified in applicable sections.

.5 Acceptable materials:

.1 Le Hage

.2 Zurn

.3 Acudor

.4 Nailor Industries Inc.

1.43 DELIVERY STORAGE & HANDLING

.1 Follow Manufacturer's directions in delivery, storage, and protection, of equipment and materials. Contractor to include all costs associated with delivery storage and handling in tender price.

.2 Deliver equipment and material to site and tightly cover and protect against dirt, water, and chemical or mechanical injury, but have readily accessible for inspection. Store items subject to moisture damage (such as controls) in dry, heated space.

1.44 REPAIR, CUTTING, CORING AND RESTORATION

.1 Be responsible for required digging, cutting, and patching incident to work of this Division and make required repairs afterwards to satisfaction of consultant. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.

.2 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.

.3 Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

.4 Slots, cores and openings through floors, walls, ceilings, and roofs shall be provided by this contractor but performed by a trade specializing in this type of work. This Division shall see that they are properly located and do any cutting and patching caused by its neglect to do so.

1.45 EXISTING SYSTEMS

.1 Connections into existing systems to be made at time approved by consultant. Request written approval of time when connections can be made.

.2 Be responsible for damage to existing plant by this work.

1.46 CLEANING

.1 Clean interior and exterior of all electrical equipment provided including light fixture lenses.

.2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition.

1.47 DISCONNECTION AND REMOVAL

.1 Disconnect and/or remove equipment as indicated.

.2 Cap and conceal all redundant and obsolete connections.

.3 Provide a list of equipment to be removed to the owner, for his acceptance of same. Remove all equipment from site, which the owner does not retain.

.4 Store equipment to be retained by owner on site where directed by consultant.

1.48 OWNER SUPPLIED EQUIPMENT

.1 Connect to equipment supplied by the owner and make operable.

.2 Design drawings are diagrammatic and do not necessarily indicate all specific final connection requirements. For the purposes of bidding, electrical trade shall include but not be limited to provision of a junction box to connect equipment wiring tail, provision of suitable disconnecting means, and flexible connection directly to equipment.

1.49 ENCLOSURES

.1 This contractor must ensure that all electrical equipment mounted in sprinklered areas is provided with an enclosure in conformance with the Electrical Safety Code.

1.50 INTEGRATED LIFE SAFETY SYSTEM TESTING

.1 The Integrated Life Safety System Testing Coordinator (ITC) shall be hired by the electrical trade as indicated in specification section 26 01 20.

.2 This electrical contractor shall work with the project Integrated Life Safety System Testing Coordinator (ITC) and participate in all phases of the Integrated Life Safety Systems testing process as specified within CAN/ULC S1001-11 (2024 Rev2 updates) as well as the electrical and architectural specifications.

.3 During the ***Planning Phase*** of the Integrated Life Safety Systems Testing process this electrical contractor shall review the Integrated Testing Plan (ITP) and give written confirmation of this review and acknowledgement of affected systems under his responsibility as required by the electrical specifications per the shop drawing submittal process.

.4 Prior to the building Integrated Life Safety Systems Testing this electrical contractor shall startup/commission/verify the operation of all systems under the responsibility of this electrical trade. This electrical trade shall give written indication of completed systems and provide copies of all inspection reports, start-up reports, commissioning reports, verification reports, etc. when requested by the ITC during the ***Implementation Phase***.

.5 Upon completion of the building Integrated Life Safety Systems Testing this electrical contractor shall rectify all deficiencies related to all systems under his responsibility during the ***Testing Phase*** in due time for the ITC to verify and document for the project team.

1.51 PHASING OF WORK

This work for this project shall be constructed in phases. Refer to the architectural drawings for phasing information and details. Misinterpretation of the drawings with respect to the extent of the phasing of the work shall not relieve the contractor of the work required to complete the entire contract.

Part 2 Products

2.1 Not Used.

Part 3 Execution

3.1 Not Used.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

.1 Section 26 01 16 – ELECTRICAL GENERAL REQUIREMENTS and DIVISION 1

.2 Section 26 51 13 – LIGHTING EQUIPMENT

.3 Section 28 31 25 – FIRE ALARM SYSTEM (ADDRESSABLE)

.4 Applicable building systems in item 1.3.10 and as included in all project DIVISIONS.

1.2 REFERENCES

.1 OBC-2024, Ontario Building Code Compendium.

.2 CAN/ULC-1001, Integrated System Testing of Fire Protection and Life Safety Systems.

.3 CAN/ULC-S524, Installation of Fire Alarm Systems.

.4 CAN/ULC-S537, Verification of Fire Alarm Systems.

.5 CAN/ULC-S573, Installation of Ancillary Devices Connected to Fire Alarm Systems

.6 CAN/ULC-S561, Installation and Service for Fire Signal Receiving Centres and Systems

.7 CAN/ULC-S112, Standard Method of Fire Test of Fire Damper Assemblies

.8 NFPA 13, Fire Sprinkler Systems

.9 NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

1.3 OVERVIEW

.1 All work shall be performed in accordance with CAN/ULC-1001 Integrated System Testing of Life Safety and Fire Protection Systems, latest edition.

.2 The Building Code has adopted CAN/ULC-1001 as the standard to comply with Integrated System Testing of Life Safety and Fire Protection Systems. The scope of this project shall follow the strict guidelines laid out in CAN/ULC-1001 for Integrated Testing Planning, review, and implementation.

.3 The Integrated Testing Plan (ITP) will provide a full overview of all integration points of life safety and fire protection systems. The ITP will be submitted for review to the design professionals and Authority Having Jurisdiction (AHJ). Upon the successful completion of the ITP and all the respective systems, the Integrated Testing Coordinator (ITC) will provide a schedule to the design professionals, the AHJ, and all required participating members for the ITP to be conducted.

.4 The ITC will review all drawings, specifications, sequence of operations, and methodology prepared by the design professionals, complete with the contractor's shop drawings and manufacture requirements.

.5 The ITP shall be coordinated with all sub-contractors and suppliers as outlined in item 1.1.

.6 The ITC will conduct the ITP and will sign each integrated test form, complete with signatures from each participating member of the integrated systems.

.7 The ITC shall witness all integrations and not rely on the CAN/ULC-S537 Verification Inspection Report for fire protection system integration testing; however, the ITC may attend the verification to validate the testing.

.8 The ITC will provide all work and ITP including functional documentation, prescribed in CAN/ULC-1001. Such testing and documentation have been deemed to satisfy OBC 2024 Sentence 3.2.9.

.9 The ITC will provide PDF and digital media copy of the buildings ITP and Integrated System Report (ITR) for the building owner's use, re-testing, and reproduction purpose.

.10 The systems applicable to the function testing include but not limited to:

.1 Fire Alarm System (including sequence of operations) and Monitoring
.2 Elevators
.3 Sprinkler Systems (wet, standpipe)
.4 Kitchen Fire Suppression Systems
.5 Magnetic Door Holds
.6 Electromagnetic Locks
.7 Smoke Alarms
.8 Smoke Damper Assemblies
.9 Emergency Lighting
.10 HVAC Shutdown and ON/OFF/Auto Controls
.11 Dust Collector (spark arrest system)

Part 2 Products

2.1 TESTING AND PLANNING

.1 The Integrated Testing Process must include following:

.1 Planning phase by the testing coordinator.
.2 Integrated testing plan review by the design professionals.
.3 Integrated testing plan review by the AHJ.
.4 Review of sequence of operations.
.5 System documentation.
.6 Integrated System Testing Plan consisting of:
.1 Project description.
.2 Project contacts including applicable project responsibilities.
.3 Overview and description of each integrated system.

.4 System integrations and functional objective of each integrated system.

.5 Integration matrix of all integrated system complete with integration type, normal mode and off-normal mode.

.6 Test protocols and procedures of each integrated system,

.7 Notifications.

.8 Personnel safety.

.9 Phased occupancies.

.10 Pre-testing documentation checklist.

.11 Pre-testing documentation acknowledgement forms.

.12 Testing forms.

.13 Ongoing integrated system testing forms.

.14 Integrated system testing completion form.

.15 Integrated testing notes.

2.2 RESPONSIBILITIES

.1 Electrical Contractor:

.1 Electrical Contractor to employ the services of the ITC firm as a sub-contractor and include in bid price. Refer to item 2.6.

.2 The electrical contractor shall confirm all electrical systems listed in item 1.3.10 are complete and fully operational, prior to the ITC commencing the functional testing.

.3 Provide system reports such as but not limited to; ESA Inspection Certificate, Fire Alarm Verification. The Electrical Contractor shall further provide written confirmation that all electrical systems are installed and operating as intended by the contract documents and sequence of operations.

.4 Participate in the ITP and provide function testing of equipment within the electrical contract package.

.5 Allow for any cost associated to re-testing of the ITP due to failures or insufficient work.

.6 Allow for any cost associated with phased occupancy and phased Integrated Testing work.

.2 Equipment Manufacturers:

.1 Where required, shall confirm all respective systems listed in item 1.3.10 are complete and fully operational, prior to the ITC commencing the functional testing.

.2 Participate in the ITP and provide function testing of equipment within the respective contract package.

.3 Design Professionals:

.1 The design professional shall include, but not be limited to, the project Architect, Electrical Consultants

.2 Shall review the ITP, and upon review, accept the ITP as the agreed ITP for implementation.

.3 The design professionals are responsible for design. Upon an unsuccessful test, the failure will be documented and provided to the respective design professionals for review and action.

2.3 NOTIFICATION OF TESTING PLANNING PROCESS

.1 The ITC shall work with the General Contractor, Owner, sub-contractors, design professionals, and the AHJ to provide a schedule for the implementation of the ITP.

.2 The ITC shall obtain contact names, contact details, and system responsibilities for all project design professionals.

.3 The ITC shall provide notification to the integrated testing participants seven (7) days prior to the date and time for the implementing of the ITP.

.4 Prior to testing, the ITC shall obtain written acknowledgement for acceptance and understanding of the ITP by all project design professionals and contractors per 1001 Section 5 and Appendix B. Include ITP Review & Acceptance acknowledgement sheet in the ITR. **Refer to Figure 1.**

.5 Prior to testing, the ITC shall obtain written acknowledgement for acceptance testing of site readiness from all project design professionals and contractors per 1001 Section 5 and Appendix B. Failure to obtain acknowledgement prior to implementation of integrated testing may invalidate the results and could result in delays by the design professionals issuing conformance. Include ITP Acceptance Testing acknowledgement sheet in the ITR. **Refer to Figure 2 and Figure 3.**

.6 In the event of building occupants, the ITC shall provide at a minimum, forty-eight (48) hour notice of the implementation of the integrated testing. Notification shall be provided via written notices posted at each building entrance.

.7 Partial occupancies shall employ this process for each individual occupancy and shall clearly identify the extent of to which the partial occupancy applies when obtaining written confirmations.

.8 Figures 1 through 3 of this specification section are indicated as informative and are for information only regarding the intent for required written acknowledgement gathering by the ITC. All designers and trades listed may not apply to all projects. The ITC shall be responsible for determining all required designers and contractors for the project based on the contact information from the ITP.

2.4 TESTING IMPLEMENTATION PROCESS

.1 Implementation of the integrated test shall follow all job site and personnel safety requirements set out in the contract and General Contractors requirements.

.2 The ITC shall define:

.1 Personnel safety protocols

.2 Special hazards

.3 Team communications

.4 Occupant notification of emergencies

.3 The integrated system test shall follow the methodology and process outlined in CAN/ULC-1001 as the requirement for this project.

.1 Provide the final ITP to the Consultant fourteen (14) days prior to scheduled implementation and test.

.4 The respective contractors and manufactures are responsible to start-up and function test their respective systems, for observation and witnessing by the ITC. The ITC will record the results, and the respective contractor and manufacture will restore the system to a normal condition. Upon successful testing the contractor and manufacture will initial the respective integrated testing from adjacent to their respective test.

.5 Upon a failure of a test, the ITC will document the failure and continue with the testing of other integrations. The respective contractor and manufacture will document the failure, notify they design professional, and correct the failure under the direction of the design professional.

.1 The ITC will re-test the unsuccessful integration after the correction has been documented and verified.

.6 Upon a failure of a device (such as a smoke detector), the contractor may immediately replace the device, and the ITC may continue to test the integration. The device failure maybe documented but shall not result in a failed integrated test.

.7 The ITC shall include in quote costs associated with site testing of all integrated devices. ITPs and testing procedures which include only for a sampling of devices will not be accepted. ITPs and testing procedures which rely solely on inspection reports, start-up reports, commissioning reports, or verification reports, etc. will not be accepted.

.8 Partial occupancies shall employ this process for each individual occupancy and shall clearly identify the extent to which the partial occupancy applies when obtaining written confirmations.

.9 Upon successfully completing the ITP, the ITC shall provide the ITR to the design professionals and building owner.

2.5 QUALITY CONTROL

.1 The ITC must meet the following criteria to be considered acceptable for this project:

.1 Firms regular engaged with contractors in function testing, fire alarm verification, sprinkler system testing, annual inspections and maintenance of fire and life safety systems.

.2 Firms knowledgeable and experience of the respective Codes and Standards of the particular project, including but not limited to; Building Codes, Fire Codes, ULC Standards, CSA Standards, and NFPA Standards.

.3 Firms must be a member in good standing of the Canadian Fire Alarm Association (CFAA).

.4 Vendors must be a 3rd party and independent from the fire protection and life safety system installation company present on the project in accordance with ULC Certification Bulletin 2020-08.

.5 Firms must maintain operations in the province of Ontario for at least five years.

.6 Vendors must be a ULC Listed Integrated Systems Testing Service Provider and posses a ULC Integrated Fire Protection and Life Safety Certification. The ULC Certificate must be valid from the date of project award until the completed Integrated Testing Report. The ULC certification level shall be that which is applicable to the building life safety systems level of complexity for the project.

.1 Submit the ULC Certificate upon project award to the Consultant's office complete with Applicant ID Number.

2.6 QUALIFIED INTEGRATED TESTING COORDINATOR

.1 Bidders may choose from the experienced ITC Firms listed below or local branches of these companies noted in the vicinity of this project and are acceptable as a sub-contractor to the Electrical Contractor:

.1 Lonergan Engineering
Aurora, Ontario L4G 3V5

.2 Great Lakes Fire Consulting & Engineering Group
Windsor, Ontario

.2 Other experienced ITC Firms must submit in writing, to the Consultant's office, confirmation of the items listed in the Quality Control criteria above, prior to tender close to be considered as an acceptable bidder.

END OF SECTION

Figure 1 – Example Pre-Test ITP Acknowledgement (Typical Design Professionals): Informative

INTEGRATED SYSTEMS WRITTEN ACKNOWLEDGEMENT REVIEW AND ACCEPTANCE OF INTEGRATED TEST PLAN (EXAMPLE)			
Per Item 5.2.8 and Section B9.1 of CAN/ULC S1001 (latest version), the respective design professionals shall indicate written confirmation to the Testing Coordinator acceptance of the Integrated systems Test Plan according to the intent of the project design documents.			
List of Design Professionals		Company/Representative	Design Responsibility
Architect	Company Name:		
	Designer Name:		
	Signature		
Electrical Engineer	Company Name:		
	Designer Name:		
	Signature		
Mechanical Engineer	Company Name:		
	Designer Name:		
	Signature		
Fire Protection Engineer (sprinkler)	Company Name:		
	Designer Name:		
	Signature		
(typical responsible consultant on project)	Company Name:		
	Designer Name:		
	Signature		

Figure 2 – Example Pre-Test Trade Site Ready Acknowledgement (Typical Project Trades): Informative

PRE-TESTING INTEGRATED SYSTEMS WRITTEN ACKNOWLEDGEMENT (EXAMPLE)			
Per Item 5.3.1.(B) and Section B8.1 of CAN/ULC S1001 (latest version), the respective installing contractors shall indicate written confirmation to the Testing Coordinator that their respective life safety systems have been installed in accordance with the design are ready for integrated testing as outlined within the Integrated Systems Testing Plan.			
List of Installing Trades		Company/Representative	System Responsibilities
General Contractor	Company Name:		
	Name:		
	Signature		
Electrical Contractor	Company Name:		
	Name:		
	Signature		
Mechanical Contractor	Company Name:		
	Name:		
	Signature		
Sprinkler Contractor	Company Name:		
	Name:		
	Signature		
Elevator Contractor	Company Name:		
	Name:		
	Signature		
(typical responsible trade on project)	Company Name:		
	Name:		
	Signature		

Figure 3 – Example Pre-Test Designer Site Ready Acknowledgement (Typical Design Professionals): Informative

PRE-TESTING INTEGRATED SYSTEMS WRITTEN ACKNOWLEDGEMENT (EXAMPLE)			
Per Item 5.3.1.(A) and Section B8.1 of CAN/ULC S1001 (latest version), the respective design professionals shall indicate written confirmation to the Testing Coordinator that the site is ready for integrated systems testing per the descriptions and integrations outlined within the Integrated Systems Testing Plan.			
List of Design Professionals		Company/Representative	Design Responsibility
Architect	Company Name:		
	Designer Name:		
	Signature		
Electrical Engineer	Company Name:		
	Designer Name:		
	Signature		
Mechanical Engineer	Company Name:		
	Designer Name:		
	Signature		
Fire Protection Engineer (sprinkler)	Company Name:		
	Designer Name:		
	Signature		
(typical responsible consultant on project)	Company Name:		
	Designer Name:		
	Signature		

Part 1 General

1.1 GENERAL

.1 This Section covers items common to Electrical Division 26 and Division 28.

.2 This section supplements requirements of Division 1.

1.2 OCCUPANCY REQUIREMENTS

.1 The contractor shall provide the following documentation to the consultant's satisfaction prior to receiving occupancy. Failure to provide the proper documentation will result in the occupancy not being granted. List of required documentation:

.1 Final Certificates (required prior to consultant's release of conformance letter).

.1 Electrical Safety Authority.

.2 Emergency Lighting.

.3 Testing of Integrated Fire Protection and Life Safety Systems Report.

.4 Fire Alarm Verification Certificate.

Part 2 Product

2.1 Not Used.

Part 3 Execution

3.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CSA C22.2 No.0.3-92, Test Methods for Electrical Wires and Cables.

.2 CAN/CSA-C22.2 No.131-M89(R1994), Type TECK 90 Cable.

.3 CAN/ULC S319 (latest edition), Standard for Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control, and Data Cables.

.4 CSA C22.2 No. 123 (latest edition), Metal Sheathed Cables.

1.2 PRODUCT DATA

.1 Submit product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger.

.2 Minimum size: 12 AWG.

.3 Copper conductors: size as indicated, with 600 V insulation of chemically cross-linked thermosetting polyethylene material 90°C (194ºF) rated T90 for indoor above grade installations and RW90 for below grade installations.

2.2 TECK CABLE

.1 Cable: to CAN/CSA-C22.2 No.131.

.2 Conductors:

- .1 Grounding conductor: Copper.
- .2 Circuit conductors: Copper, size as indicated.

.3 Inner jacket: Polyvinyl chloride material.

.4 Armour: Aluminum.

.5 Overall covering: Polyvinyl chloride material.

.6 Fastenings:

- .1 One hole steel zinc straps to secure surface cables 50 mm (2") and smaller. Two-hole steel straps for cables larger than 50 mm (2").
- .2 Channel type supports for two or more cables at 1500 mm (60") centres.
- .3 Threaded rods: 6 mm (1/4") diameter to support suspended channels.

.7 Connectors must be suitable for:

- .1 Installed environment and approved for use with TECK cable.

2.3 ARMOURED CABLES

.1 Conductors: insulated, copper minimum size as indicated above.

.2 Type: AC90 (minimum size 12 AWG).

.3 Armour: interlocking type fabricated from aluminum strip.

.4 Connectors must be suitable for installed environment and approved for use with armoured cable.

2.4 FIRE RATED CABLES

.1 Cable: to CAN/ULC S319 and CSA C22.2 No. 123.

.2 Conductors: insulated, copper minimum size as indicated above.

.3 Type: Fire-resistive 2-hour certified cable MC/RC90 or Mineral Insulted type MI (minimum size 12 AWG unless otherwise noted).

.4 Armour MC/RC90: Seamless, smooth metal sheath, or seamless, corrugated metal sheath applied over one or more insulated conductors.

.5 Armour MI: Magnesium oxide powder copper sheath applied over one or more insulated conductors, corrosion resistant.

.6 Connectors must be suitable for installed environment and approved for use with fire rated cable type.

Part 3 Execution

3.1 INSTALLATION OF BUILDING WIRES

.1 Install wiring from source to load through raceways as specified.

.2 Provide separate neutral conductors for all lighting circuits and circuits originating from surge protected panels. Size raceways accordingly.

3.2 INSTALLATION OF TECK CABLE 0 - 1000 V

.1 Group cables wherever possible on channels.

.2 Terminate cables in accordance with Wire and Box Connectors - 0 - 1000 V Section.

3.3 INSTALLATION OF FIRE RATED CABLES

.1 Group cables wherever possible.

.2 Terminate cables in accordance with manufacturer's recommended installation instructions.

.3 Cables are to be installed as a single continuous run to maintain fire rating integrity.

.4 Support cables horizontally or vertically every 1219 mm (48") intervals and on each side of a bend.

.5 Provide thermoplastic barrier at all mounting locations as per manufacturer's installation instructions.

3.4 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible.

.2 Terminate cables in accordance with Wire and Box Connectors - 0 - 1000 V Section.

.3 These cables are to be installed in concealed locations only. These concealed locations are considered to be stud walls and "drops" to stud walls, lighting fixtures, and ceiling mounted devices.

.4 These "drops" shall not be permitted to exceed 2.4 m (8'-0"). To limit these "drops" to lengths noted above provide additional branch wiring in conduit.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data for cabinets in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 MATERIALS

.1 Junction and pull boxes must conform to CSA C22.2 No. 40 (latest edition)

2.2 JUNCTION AND PULL BOXES

.1 Welded steel construction with screw-on flat covers for surface mounting.

.2 Covers with 25 mm (1") minimum extension all around, for flush-mounted pull and junction boxes.

Part 3 Execution

3.1 JUNCTION AND PULL BOXES INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Install junction and pull boxes so as not to exceed 30 m (100') of conduit run between pull boxes and in conformance with the Electrical Safety Code.

3.2 IDENTIFICATION

.1 Provide equipment identification in accordance with General Electrical Requirements Section.

.2 Install size 2 identification labels indicating system name, voltage and phase.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Outlet boxes, conduit boxes, and fittings must conform to CSA C22.2 No. 18 (latest edition).

Part 2 Products

2.1 CONDUIT BOXES

.1 Cast FS or FD feraloy boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacle **in areas (other than utility rooms) where surface conduit is used.**

2.2 FITTINGS- GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 32 mm (1- 1/4") and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm (1/4") of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.

.5 Outlets if unwired are to be provided with blank coverplates to suit related sections of this specification.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CSA C22.2 No.65-1956(R1965) Wire Connectors.

Part 2 Products

2.1 MATERIALS

.1 Pressure type wire connectors: with current carrying parts of copper sized to fit copper conductors as indicated.

.2 Fixture type splicing connectors: with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Clamps or connectors for armoured cable, mineral insulated cable, and flexible conduit, as required.

Part 3 Execution

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

.2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.

.3 Install fixture type connectors and tighten. Replace insulating cap.

END OF SECTION

Part 1 General

1.1 Not Applicable.

Part 2 Products

2.1 MATERIALS

.1 Grounding equipment must conform to CSA C22.2 No 41 (latest edition).

2.2 EQUIPMENT

.1 Clamps for grounding of conductor: size as required to electrically conductive underground water pipe and electrically conductive metal gas piping.

.2 Insulated grounding conductors: green with insulation type that matches specified phase conductors. Gauge shall be in conformance with the latest edition of the Electrical Safety Code to suit required installation conditions.

.3 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:

.1 Grounding and bonding bushings.

.2 Protective type clamps.

.3 Bolted type conductor connectors.

.4 Thermit welded type conductor connectors.

.5 Bonding jumpers, straps.

.6 Pressure wire connectors.

Part 3 Execution

3.1 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories. **Where EMT is used, run ground wire in conduit.**

.2 Install connectors in accordance with manufacturer's instructions.

.3 Protect exposed grounding conductors from mechanical injury.

.4 Make buried connections, and connections to conductive water main, electrodes, using copper welding by thermit process inspectable wrought copper compression connectors to ANSI/IEEE 837.

.5 Make bonding connection to gas piping from electrical service ground at each location it enters a building, including multiple entries.

.6 Use mechanical connectors for grounding connections to equipment provided with lugs.

.7 Soldered joints not permitted.

.8 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

3.2 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Electrical Service equipment, electrically conductive metal gas piping, control panels, building steel work

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Electrical General Requirements Section.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

.4 Disconnect ground fault indicator during tests.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CAN/CSA C22.2 No.18-92, Outlet Boxes, Conduit Boxes, and Fittings.

.2 CSA C22.2 No.45-M1981(R1992), Rigid Metal Conduit.

.3 CSA C22.2 No.56-1977(R1977), Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

.4 CSA C22.2 No.83-M1985(R1992), Electrical Metallic Tubing.

Part 2 Products

2.1 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No.45, aluminum threaded.

.2 Electrical metallic tubing (EMT) with couplings: to CSA C22.2 No.83.

.3 Flexible metal conduit: to CSA C22.2 No.56, aluminum and liquid-tight flexible metal.

2.2 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 53 mm (2") and smaller. Two hole steel straps for conduits larger than 53 mm (2").

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 1.5 m (5'-0") oc.

.4 Threaded rods, 6 mm (1/4") diameter, to support suspended channels.

2.3 CONDUIT FITTINGS

.1 EMT fittings shall be set screw style (zinc alloy).

.2 Flexible metal conduit fittings shall be screw-in type.

.3 Coating: same as conduit.

.4 Factory "ells" where 90° bends are required for 27 mm (1") and larger conduits.

.5 Where bushings are noted to be provided they must be “screwed” type fastened to a conduit connector. Push-fit or glued in place bushings will NOT be accepted.

2.4 FISH CORD

.1 Nylon twine.

Part 3 Execution

3.1 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical/ electrical service rooms and in unfinished areas.

.3 Where devices are to be installed on existing walls in finished area, which cannot be "fished", install feeds in a surface metal raceway equal to Wiremold V700 series. Coordinate surface installations with Consultant prior to rough-in, unless otherwise noted.

.4 Use electrical metallic tubing (EMT) for all branch circuits unless specified otherwise.

.5 Use flexible metal conduit for connection to motors in dry areas, connection to recessed fixtures without a prewired outlet box, connection to surface or recessed fixtures, work in movable metal partitions.

.6 **Minimum conduit size for branch circuits shall be 21 mm (3/4").** Single drops from ceiling mounted junction boxes down to a light switch or duplex receptacle may be reduced to 16 mm (½").

.7 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.8 Mechanically bend steel conduit over 27 mm (1") diameter.

.9 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.10 Install fish cord in empty conduits.

.11 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.

.12 Dry conduits out before installing wire.

3.2 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m (5') clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on suspended or surface channels.

.5 Do not pass conduits through structural members except as indicated.

.6 Do not locate conduits less than 75 mm (3") parallel to steam or hot water lines with minimum of 25 mm (1") at crossovers.

.7 Do not fasten surface conduit to roof deck. Provide standoffs or supports as manufactured by Caddy or use unistrut trapeze fastened to structure.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)

.1 ANSI/IEEE C62.41- 1991, Recommended Practices for Surge Voltages in Low-Voltage AC Power Circuits.

.2 American Society for Testing and Materials (ASTM)

.1 ASTM F1137- 88 (1993), Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.

.3 United States of America, Federal Communications Commission (FCC)

.1 FCC (CFR47) EM and RF Interference Suppression.

.4 IESNA LM-79-08, IES Electrical Method for the Electrical and Photometric Measurements of Solid State Lighting Products.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with Electrical General Requirements Section for all light fixtures supplied under this contract.

.2 Submit complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Consultant.

.3 Photometric data to include: VCP Table spacing criterion.

1.3 SCOPE

.1 This contractor is responsible to supply and install all lighting fixtures as scheduled and/or indicated including lamp and those accessories required for a complete lighting system. This contractor must coordinate lighting installations with all other Divisions of this project.

.2 All fixtures must be CSA approved or approved at this contractor's expense by the Special Inspection Division of the Electrical Safety Authority.

1.4 GUARANTEE

.1 Guarantees for materials replacement shall be as follows from date of ready for takeover.

.1 LED fixtures, and driver: 5 years.

.2 The labour required to replace these drivers must be included in the above guarantee, however only for the extent of the contract guarantee and warranty period as noted in Electrical General Requirements.

Part 2 Products

2.1 FIXTURE CONSTRUCTION

.1 Fixtures must be constructed of 20 gauge (minimum) cold rolled steel. All metal edges require smooth finish.

.2 Light leaks must be prevented by providing gasketing, stops, and barriers.

.3 Fixtures must be finished in high reflective baked white enamel. This surface must have a reflectance of not less than 85%.

2.2 FIXTURE LENS

.1 Unless otherwise noted fixture lenses shall be as follows:

.1 Lens thickness: 3.2 mm (1/8")

.2 Material: injection moulded clear prismatic virgin acrylic

.3 Frame: hinged, latched, steel.

2.3 LED FIXTURES

.1 Fixture LEDs must be tested in conformance with IESNA LM80 standard.

.2 LEDs must be selected using a binning algorithm to ensure colour and lumen output of a given fixture are consistent, as well as meet or surpass ANSI C78.377 specification for the rated lifetime of the fixture. Colour accuracy between products must be within a 2-step MacAdam ellipse.

.3 Luminaires must be tested to IESNA LM79 by an independent approved laboratory.

.4 Luminaires must be tested prior to shipping.

.5 Luminaires must be ULC certified and approved for use in Canada.

.6 Fixtures must maintain a minimum of 90% of their initial light output for 60,000 hours. Submit test results upon request.

.7 Lumen values indicated for fixtures in the project documents are to be considered as “absolute” or “delivered” values.

.8 Other than for specialty fixtures, and unless otherwise indicated, the maximum driver current is to be 750 mA.

2.4 STANDARD EXIT LIGHTING UNITS

.1 Exit lighting units must conform to CSA C860, CSA 22.2 No. 141 (latest edition).

.2 Housing: extruded aluminum housing, white finish.

.3 Face and back plates: extruded aluminum.

.4 Lamps: 2W LED.

.5 Operation: 25 year.

.6 Units are to be provided with three (3) pictogram legends indicating “left from here”, “straight from here”, and “right from here”.

.7 Face plate to remain captive for relamping.

2.5 EMERGENCY LIGHTING UNITS

.1 Emergency lighting units must conform to CSA C22.2 No 141 (latest edition).

.2 Supply voltage: As noted on drawings.

.3 Output voltage: 12 V DC.

.4 Battery: Sealed, maintenance free, 10 year life.

Note: Battery units must be capable of supplying the wattage indicated for a minimum of 30 minutes.

.5 Charger: Solid state, multi rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01 V for plus or minus 10% input variations.

.6 Solid state transfer circuit.

.7 Low voltage disconnect: Solid state, modular, operates at 80% battery output voltage.

.8 Signal lights: "AC Power ON" condition and "charging" condition.

.9 Lamp heads: Integral on unit, 345º horizontal and 180º vertical adjustment. Lamp type: minimum 4 watt LED.

.10 Cabinet suitable for direct of shelf mounting to wall and complete with knockouts for conduit. Removable or hinged front panel for easy access to batteries.

.11 Auxiliary equipment:

.1 Test switch.

.2 Ac input and DC output terminal blocks inside cabinet.

.3 Shelf.

.4 Cord and plug connection for AC.

2.6 REMOTE EMERGENCY LIGHTING FIXTURES

.1 Remote emergency lighting fixtures must conform to CSA C22.2 No141 (latest edition).

.2 Fixtures shall be small "micro" size or recessed style as indicated in the Light Fixture Schedule.

.3 Fixtures must be adjustable type heads with canopy.

.4 Fixtures are to be provided with protective lexan cube when specified in the Light Fixture Schedule.

.5 Unless otherwise indicated surface mounted fixtures in washrooms, locker rooms, changerooms, and gymnasiums must be provided with wire guard.

2.7 ACCEPTABLE LIGHTING MANUFACTURERS

.1 Refer to the light fixture schedule as indicated on drawings.

Part 3 Execution

3.1 INSTALLATION

.1 Locate and install luminaires as indicated. Luminaires are not to be supported from the roof deck. Provide additional unistrut support channel and/or support from structure. Co-ordinate with consultant on site.

.2 Fixtures surface mounted to suspended ceilings must be secured through ceiling assembly to cross member supports. These supports are to be steel channels or angles independently secured **to structure** using # 12 “jack” chain. Each chain must be secured so no fixture weight is added to the ceiling assembly.

.3 Plaster frames/flange kits must be provided by this Division for fixtures recessed in plaster and/or drywall ceilings.

.4 Where specified, fixtures to be chain hung shall be hung using “jack” chain with a capacity to suit the fixture weight. Branch circuit wiring feeding these fixtures shall be AC90 cable “ty-wrapped” at 900 mm (36") intervals along length of drop. Final appearance must be neat and professional.

.5 Install exit lighting units with illuminated faces and chevrons/arrows indicating path(s) of exit as indicated. Unless otherwise noted install exit fixtures at 2400 mm (8'-0") above finished floor.

.6 Install emergency lighting units and associated remote mounted fixtures as indicated.

.7 Direct “heads” on units and remote mounted fixtures to illuminate path(s) of exit.

.8 Install emergency lighting units and remote fixtures at 300 mm (12") below finished ceiling, unless indicated otherwise.

.9 Provide a 15 A 120 V duplex receptacle (connected to circuit indicated) adjacent to unit. **This receptacle connection is to be no lower than 8'-0" (2400 mm) AFF.**

.10 All battery units are to be provided with a visible lamicoid label indicating the unit number as per drawings.

3.2 WIRING

.1 Connect luminaires to lighting circuits as indicated.

.2 Connect exit fixtures to exit lighting circuits and unit equipment (if applicable).

.3 Connect unit equipment to circuits as indicated.

.4 All wiring of remote emergency fixtures shall be minimum #10 T90 for each circuit and run in conduit. Wiring must be sized in conformance with manufacturer’s recommendations for distances required.

3.3 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted in continuous rows to form straight uninterrupted line.

.2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

3.4 DELIVERIES

.1 Fixtures are to be completely assembled at the manufacturer's plant and delivered to the project site in original unitized containers. Ensure that a dry, protected and secure space is available for proper storage before scheduling delivery of fixtures.

3.5 TESTING/CERTIFICATION

.1 At the completion of the project and in the presence of the consultant, test all exit and emergency fixtures. On company letterhead, the contractor is to prepare a chart indicating:

.1 Project
.2 Date
.3 Equipment type
.4 Certification of correct connection
.5 Certification of correct operation
.6 Duration of test in minutes (minimum 30)
.7 Actual period of testing (time of day)

3.6 INTEGRATED LIFE SAFETY SYSTEM TESTING

.1 This electrical contractor shall participate in integrated testing of this life safety system in conformance with Electrical General Requirements. Include all associated costs in tender.

3.7 ADDITIONAL INSTALLED EXIT SIGNS

.1 The electrical contractor is to include in their bid the cost to add two (2) additional standard exit lighting units to be installed and tested in locations as directed by the consultant. Note: This installation and test will be occurring after the initial testing/certification testing is complete

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CAN/ULC-S524 (latest edition), Installation of Fire Alarm Systems.

.2 ULC-S525 (latest edition), Audible Signal Appliances for Fire Alarm Systems.

.3 CAN/ULC-S526 (latest edition), Visual Signal Appliances, Fire Alarm.

.4 CAN/ULC-S527 (latest edition), Control Units, Fire Alarm.

.5 CAN/ULC-S528 (latest edition), Manual Pull Stations.

.6 CAN/ULC-S529 (latest edition), Smoke Detectors.

.7 CAN/ULC-S530 (latest edition), Heat Actuated Fire Detectors, Fire Alarm.

.8 CAN/ULC-S536 (latest edition), Inspection and Testing of Fire Alarm Systems.

.9 CAN/ULC-S537 (latest edition), Verification of Fire Alarm Systems.

.10 CAN/ULC-S552 (latest edition), Inspection, Testing and Maintenance of Smoke Alarms.

.11 OBC-2024, Ontario Building Code Compendium.

1.2 DESCRIPTION OF SYSTEM

.1 System includes:

.1 Control panel to carry out fire alarm and protection functions including receiving alarm signals, initiating general alarm, supervising system continuously, actuating zone annunciators, and initiating trouble signals.

.2 Trouble signal devices.

.3 Power supply facilities.

.4 Addressable manual alarm stations.

.5 Addressable and conventional automatic alarm initiating devices.

.6 Audible and visual signal devices.

.7 End-of-line devices.

.8 Annunciators.

.9 Ancillary devices.

.10 Interface and zone modules.

.11 Remote trouble indicator.

1.3 REQUIREMENTS OF REGULATORY AGENCIES

.1 This system is subject to review by local building department officials, local fire department officials. **Therefore, submission of verification certificate and field technician device verification sheets is required prior to inspection by these officials. Schedule accordingly.**

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Electrical General Requirements Section.

.2 Include:

.1 Layout of equipment.

.2 Zoning.

.3 Complete wiring diagram.

1.5 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for Fire Alarm System for incorporation into manual specified in Electrical General Requirements Section.

.2 Include:

.1 Operation and maintenance 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.

.4 List of recommended spare parts for system.

1.6 MAINTENANCE MATERIALS

.1 Include:

.1 10% spare glass rods for total number of manual pull box stations if applicable.

1.7 TRAINING

.1 Arrange and pay for on-site demonstrations by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system. **Obtain written receipt of training session and include in maintenance manual.**

1.8 SYSTEM OPERATION

.1 The system shall be configured for single stage operation as outlined on the design drawings. Refer to Fire Alarm Sequence of Operation for specific fire alarm sequence functions which generally include the following:

.1 Activation of audible and visual signal devices.

.2 Cause alarm and supervisory zone of alarm device to be indicated on control panel and remote annunciator(s).

.3 Cause system trouble indications.

.4 Activate auxiliary functions.

.5 Transmit signal to fire department via monitoring station.

.6 Log the alarm in the historical alarm log file.

.7 System silence parameters.

.8 System reset parameters.

1.9 PERFORMANCE CRITERIA

.1 These specifications describe the minimum functional requirements for an electronically supervised, microprocessor based, fully integrated system. The initial installation shall

include all the necessary electronic hardware, software and memory for a completely operable system in accordance with these specifications.

1.10 QUALITY ASSURANCE

.1 Each and all items of the fire alarm system shall be listed as the products of a single manufacturer under the appropriate category by the Underwriter's Laboratories of Canada and shall bear the "U.L.C." label.

.2 Each and all items of the fire alarm system shall be covered by a one year parts and labour warranty covering defects resulting from faulty workmanship and materials. The warranty shall be deemed to begin on the date the system is accepted by the Project Manager on issuance of the substantial performance certificate for the project.

.3 All control equipment must have Transient Protection Devices to comply with U.L.C. requirements.

Part 2 Products

2.1 GENERAL

.1 The fire alarm system shall be an addressable, single stage, zoned, non-coded, indicating, fully integrated fire alarm.

.2 The fire alarm control panel shall allow for loading or editing of special instructions and operating sequences as required. The system shall be capable of on-site programming to accommodate expansion, and changes required by local codes. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control panel. Loss of primary and secondary power shall not erase the instructions stored in memory.

.3 The ability to selectively program input/output control functions based on ANDing, ORing, NOTing, Timing and Special Coded Operations is also to be incorporated in the resident software programming of the system.

.4 The system shall have the ability to manually disable and enable any device/circuit individually for maintenance or testing purposes.

.5 It shall be possible to reprogram selected or all smoke detector initiating zones for alarm verification.

.6 It shall be possible to program an adjustable time delay circuit for each waterflow initiating circuit to prevent false alarms that may be caused by erroneous pressure surges in the sprinkler system.

.7 All on site programming changes to the fire alarm system shall be password protected.

.8 Wiring to any remote annunciator shall be supervised for open and ground conditions. A separate annunciator trouble indicator must be provided at the control panel, which shall illuminate and an audible trouble signal shall sound at the control panel upon the detection of an open or ground condition.

.9 All Control Panels and Remote Annunciator Cabinets are to be properly grounded to building ground. Conduit ground will not be acceptable. The green coloured grounding loop shall be a minimum #14 AWG insulated copper conductor run in conduit. The ground loop shall be connected to building water supply to the line side of the water meter. Ground wire must not be run in the same conduit as the Fire Alarm wiring.

2.2 POWER REQUIREMENTS

.1 The control panels shall receive 120 VAC power via a dedicated overcurrent protected circuit. The incoming power to the system shall be supervised so that any power failure must be audibly and visually indicated at the control panel and the remote annunciator. A green `Power On' LED shall be displayed continuously while incoming power is present.

.2 Control Panel output power supply shall have the following operating characteristics:

.1 Rated for five Amps continuous duty

.2 24 VDC filtered and regulated

.3 Power limited with a range of 20.4 VDC to 32 VDC.

.4 Automatic "Brownout" transfer to standby batteries when supply voltage falls to 102 VAC

.3 The system shall be provided with sufficient standby capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of twenty-four hours with two hours of alarm operation at the end of this period. The system shall automatically transfer to the standby batteries upon power failure. All battery charging and recharging operations shall be automatic.

.4 The system batteries shall be supervised so that a low battery condition or disconnection of the batteries shall be audibly and visually annunciated at the control panel.

.5 Battery charger shall have the following operating characteristics:

.1 Ability to charge a range up to 33 AH to 70% of their capacity within 12 hours.

.2 Compatible with either lead acid or nicad batteries.

.6 All circuits requiring system operating power shall be individually fused at the control panel.

.7 The system shall be modular in design to allow future expansion with a minimum of hardware additions and system interruptions.

2.3 FIRE ALARM CONTROL PANEL

.1 The fire alarm control panel construction shall be modular in design with solid state microprocessor based electronics. An 80 character Liquid Crystal Display shall indicate alarms, supervisory service conditions and any troubles. The panel shall include but not be limited to the following:

.1 80 character LCD display

.2 Local Energy, Shunt Master Box, or Reverse Polarity Remote Station Connection

.3 Form C Trouble Contact

.4 Earth Ground Supervision Circuit

.5 Basic 8 A power supply

.6 Automatic Battery Charger

.7 Standby Batteries

.8 Resident non-volatile programmable operating system memory for all operating requirements.

.9 Five Programmable Multi-Function keys with status LED's

.10 Red Alarm LED and Acknowledge Button

.11 Yellow Supervisory Service LED and Acknowledge Button

.12 Yellow Trouble LED and Acknowledge Button

.13 Green Power on LED

.14 Alarm/Signal Silence Button

.15 System Reset Button

.16 Operator Interface Keypad for Manual Control and System Information Access

.17 Addressable Interface Control Card

.18 Supervised Annunciator Circuit

.2 The control Panel shall be capable of chronologically logging and storing 300 events in an alarm log and 300 events in a trouble log. The historical logs shall be stored in the CPU's memory and shall be protected by a lithium battery that is supervised for a low battery condition. Each recorded event shall include the time and date of that event's occurrence. The alarm log file must be separate from the trouble log file. It shall be possible for the user to generate a report of both logs upon request.

.3 All auxiliary manual controls shall be supervised so that all switches must be returned to the normal automatic position to clear system trouble.

.4 Signal Circuits shall be independently supervised and fused such that a fault on one circuit shall not affect the operation of any of the other circuits. All signal circuits shall be configured as follows:

.1 Class “B” wiring, current limited.

.2 Rated at two Amps of continuous power.

.3 Capable of powering polarised 24 VDC audible and visual signalling appliances.

.5 Provide dry contact auxiliary control circuits as follows:

.1 Central Station alarm output.

.2 Central Station trouble output.

.3 SPDT Form C relays fused at 2 A @ 24 VDC.

.6 System Expansion Modules connected by ribbon cables shall be supervised for module placement. Should a module become disconnected the system trouble indicator must illuminate and audible trouble signal must sound.

.7 The Fire Alarm Control Panel shall be capable of supporting RS-232-C I/O ports. CPU data output to the I/O ports shall be in a parallel ASCII format at field adjustable baud rates of 220, 300, 1200, 2400 and 4800.

.8 A walk test feature must be provided.

.9 All system controls shall be housed in a surface wall mounted steel cabinets. Finish shall be according to the manufacturer's standards.

.10 All modules shall be secured behind hinged locked door with a full viewing tempered plastic window. The hinged locked doors shall give access to all the operating controls but shall not expose live connections.

.11 All internal wiring, control circuits, connections and terminals shall only be accessible behind a removable metal retainer plate.

.12 All Cabinets are to be properly grounded to building ground. Conduit ground will not be acceptable.

.13 The system must provide communication with addressable initiating devices. All of these devices will be annunciated on the control panel's main LCD display. Annunciation shall include the following conditions for each point:

.1 40 Character Zone/Device Location

.2 Type of Device

.3 Detector Status (Normal/Alarm/Trouble)

.4 Device Missing/Failed

.14 The communication format must be a completely digital poll/response protocol to allow tapping of the circuit wiring. A high degree of communication reliability must be obtained by using parity data bit error checking routines for address codes and check sum routines for the data transmission portion of the protocol.

.15 Each addressable device must be uniquely identified by an address code entered on each device base at time of installation. The use of jumpers to set address will not be acceptable due to the potential of vibration and poor contact.

.16 It shall be possible for the owner's representative to change a smoke detector without any special tools or programming.

.17 The system shall support 100% of addressable devices in alarm or operated at the same time, under both primary (AC) and secondary (battery) power conditions. Systems, which cannot support 100% of their point capacity in alarm simultaneously, cannot assure appropriate system response and are not acceptable.

.18 **The appropriate quantity of isolator modules shall be installed so that a wiring fault (short, open or ground) within one floor area shall not prevent the normal operation of other addressable devices on other floor areas.**

.19 The system shall maintain the sensitivity level set, for each sensor, over time by automatically compensating for environmental factors such as dust and dirt accumulations in a smoke sensor's chamber. The smoke sensor shall be a smoke density measuring device having no self-contained set-point. **The control panel shall determine the alarm decision for each sensor.**

.20 The system shall automatically indicate when an individual sensor needs cleaning. When a sensor's average value reaches a predetermined value a `Dirty Sensor' trouble condition shall be audibly and visually indicated at the control panel for the individual sensor.

.21 All data transmissions, **including the analogue value**, between the smoke sensors and the control panel shall be digitally transmitted and incorporate parity and checksum digital data checks of each transmission.

.22 An operator from the control panel, having a proper access level, shall have the ability to:

.1 Manually access and print the following information for each sensor in a report format that can be easily understood by the user:

.1 Primary Status

.2 Device Type

.3 Present Average Value

.4 Present Sensitivity Selected

.5 Highest Peak Detection Values

.6 Sensor Chamber Status (Normal, Almost Dirty, Dirty, Excessively Dirty)

.2 Manually control the following of each sensor:

.1 Clear Peak Detection Values

.2 Enable or Disable the Point

.3 Clear Verification Tally

.4 Control a Sensor's Relay Driver Output

.23 It shall be possible to program the control panel to **automatically** change the sensitivity settings of each sensor based on **time-of-day** and **day-of-week**.

2.4 ADDRESSABLE MANUAL ALARM STATIONS

.1 Manual alarm stations shall be addressable, single action, non-coded, semi-flush mounted type. Pull stations shall be break-glass style. Contacts are to activate when the handle is pulled down.

.2 Addressable pull station electronics shall be mounted to the back plate of the station. The station's address will be set at the time of installation. Device addressing shall be accomplished by either an electrical or mechanical means.

.3 Where noted on drawings, stations are to be equipped with tamperproof guard equal to Stopper II Cat. # STI-1100.

2.5 INTELLIGENT DETECTORS-GENERAL OPERATION

.1 Addressable devices shall use simple to install and maintain decade, numbered 0 to 9, address switches. Detectors that have expanded addressing will have decade switch numbered from 0 to 15 for the most significant digit to allow detector addressing from 1 to 250.

.2 Device addressing shall be accomplished by either an electrical or mechanical means.

.3 Detectors shall be intelligent (analog) and addressable and shall connect with two wires to the fire alarm control panel signalling line circuits.

.4 Addressable smoke detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.

.5 The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. Sensitivity shall be automatically adjusted by the panel on a time-of-day basis.

.6 Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance.

.7 The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature.

.8 The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.

.9 Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (PHOTO, THERMAL).

.10 Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.

.11 Detectors shall provide address-setting means using decimal switches and shall also store an internal identifying code that the control panel shall use to identify the type of device. LEDs shall be provided that shall flash under normal conditions, indicating that the device is operational and is in regular communication with the control panel.

.12 Addressable devices shall provide address-setting means using decimal switches and shall also store an internal identifying code that the control panel shall use to identify the type of device. LED(s) shall be provided that shall flash under normal conditions, indicating that the device is operational and is in regular communication with the control panel.

.13 The sensors shall be of a low profile design and ULC listed for both ceiling and wall mount applications.

.14 Automatic smoke sensors shall be equipped with a dust cover, which shall be removed at the time of verification to prevent dust and dirt entering the smoke chamber during construction.

.15 A magnetic test switch shall be provided to test detectors and modules. Detectors shall report an indication of an analog value reaching 100% of the alarm threshold.

2.6 INTELLIGENT MULTI-DETECTOR

.1 The intelligent multi-detector shall be an addressable device, which is designed to monitor photoelectric, ionization, and thermal technologies in a single sensing device. This detector shall utilize advanced electronics which react to smaller products of combustion found in fast flaming fires (ionization), slow smouldering fires (photoelectric), and heat (thermal) all within a single sensing device.

.2 The multi-detector shall include two bicolor LEDs, which flash green in normal operation and turn on steady red in alarm.

.3 Detectors are to be provided with relay base where noted on the drawings.

.4 Separately mounted photoelectric ionization and heat detectors in the same location are not acceptable alternatives.

2.7 FIXED TEMPERATURE HEAT DETECTOR

.1 These heat detectors shall have a low mass thermistor heat sensor and operate at a fixed temperature. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the/ time required to process an alarm. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. The heat detector shall have a nominal alarm point rating of 57ºC (1 35ºF). The heat detector shall be rated for ceiling installation at a minimum of 21.3m (70') centres and be suitable for wall mount applications.

2.8 FIXED TEMPERATURE / RATE OF RISE HEAT DETECTOR

.1 These heat detectors shall have a low mass thermistor heat sensor and operate at a fixed temperature and at a temperature rate-of-rise. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm, The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. Systems using central intelligence for alarm decisions shall not be acceptable. The intelligent heat detector shall have a nominal fixed temperature alarm point rating of 57ºC (135ºF) and a rate-of-rise alarm point of 9ºC (15ºF) per minute. The heat detector shall be rated for ceiling installation at a minimum of 21.3m (70') centres and be suitable for wall mount applications.

2.9 PHOTOELECTRIC SMOKE DETECTOR

.1 The intelligent photoelectric detector shall utilize a light scattering type photoelectric smoke sensor to sense changes in air samples from its surroundings. The integral microprocessor shall dynamically examine values from the sensor and initiate an alarm based on the analysis of data. The detector shall continually monitor any changes in sensitivity due to the environmental affects of dirt, smoke, temperature, aging, and humidity. The photo detector shall be rated for ceiling installation at a minimum of Soft (Olin) centres and be suitable for wall mount applications.

.2 The percent smoke obscuration per foot alarm set point shall be field selectable to any of five sensitivity settings ranging from 1.0% to 3.5%. The photo detector shall be suitable for operation in the following environment:

.1 Temperature: 0ºC to 49ºC (32ºF to 120ºF)

.2 Humidity: 0-93% RH, non-condensing

.3 Elevation: no limit

.3 Detectors are to be provided with relay base where noted on the drawings.

2.10 STANDARD DETECTOR MOUNTING BASES

.1 Provide standard detector mounting bases suitable for mounting on North American 1-gang, 85mm (3 ½ ") or 100 mm (4") octagon box and 100 mm (4") square box. The base shall, contain no electronics, support all detector types and have the following minimum requirements:

.1 Removal of the respective detector shall not affect communications with other detectors.

.2 Terminal connections shall be made on the room side of the base. Bases which must be removed to gain access to the terminals shall not be acceptable.

2.11 INTELLIGENT DUCT SMOKE DETECTOR

.1 The smoke detector housing shall accommodate an intelligent photoelectric detector (as noted above) that provides continuous analog monitoring and alarm verification from the panel.

.2 When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.

.3 Duct smoke detector sensor assemblies shall be complete with duct housing, photoelectric smoke detector, and sampling tubes as required. The duct-housing base shall come complete with an auxiliary set of form C dry contacts rated at 120 VAC, 3 Amps.

.4 The system shall automatically indicate when an individual duct sensor needs cleaning.

2.12 AUDIBLE/VISUAL SIGNAL DEVICES

.1 Horn: flush mounted temporal horn, 24Vdc operation, 94 dBA rating at 3 m (10'), red finish, FM and ULC listed.

.2 Mini Horns: flush mounted temporal mini horn, 24Vdc operation, selectable HIGH/LOW setting 94.5 dBA (high)/89.8 dBA (low) at 3 m (10'), white or red coverplate, FM and ULC listed. Suitable for mounting on a single gang box.

.3 Strobe: semi-recessed, 24Vdc operation, complete with selectable 15/30/75/110 candela output (unless otherwise noted set at 75 cd), synchronized strobe, red finish, FM and ULC listed. Suitable for mounting on a single gang box.

.4 Mini Horn/Strobe: flush mounted temporal combination mini horn/strobe, 24 Vdc operation, selectable HIGH/LOW setting 94.5 dBA (high)/89.8 dBA (low) at 3 m (10') selectable 15/30/75/110 candela output (unless otherwise noted set at 75 cd), synchronized strobe white or red coverplate, FM and ULC listed. Suitable for mounting on a single gang box.

NOTES:

.1 Signal devices with integral strobe lights in high abuse areas (i.e. gymnasium, change rooms, etc.) must be provided with protective wireguards.

.2 Any surface mounted signal devices must be provided with suitable backboxes supplied by the manufacturer.

.3 Provide synchronization modules to suit signal devices (if required by manufacturer).

.4 Set signal devices in classrooms to LOW setting.

2.13 END OF LINE RESISTORS

.1 End-of-line resistors for signalling circuits shall be sized to ensure the correct supervisory current flows in each circuit.

.2 End-of-line resistors shall be mounted on a stainless steel plate for mounting on a standard single gang box and bear the ULC label.

2.14 REMOTE ANNUNCIATOR PANELS

.1 Each remote panel in the installed system shall include remote control display annunciators. These annunciators shall have integral membrane style, tactile push-button control switches for the control of system functions, and LED-s with programmable (software-controlled) flash rates and slide-in labels for annunciation of system events.

.2 The remote control display annunciators shall provide the system with individual zone and device annunciation.

.3 Annunciator must be keyed similar to control panel.

2.15 GRAPHIC DISPLAY (PASSIVE)

.1 Colour graphic layout of facility showing all zones as specified/indicated. Zones shall each have descriptions and zone number indications per fire alarm zone schedule.

.2 Display is to be found behind Plexiglas, approximate size: 500 mm x 500 mm (20" x 20"). Adjust frame size of graphic accordingly to clearly display building zones and zone labels clearly. Max frame size shall be coordinated with available wall space at indicated mounting location. Electrical trade to confirm final graphic location on site.

.3 Finish frame to architects' direction.

2.16 ANCILLARY DEVICES

.1 Relay unit to initiate fan shutdown.

.2 Relay unit to facilitate elevator recall functions as indicated.

2.17 INTELLIGENT MODULES – GENERAL OPERATION

.1 The modules shall have a minimum of 2 diagnostic LED's mounted behind a finished coverplate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The module shall be capable of storing up to 24 diagnostic codes, which can be retrieved for troubleshooting assistance. Input and output circuit wiring shall be supervised for open and ground faults. The module shall be suitable for operation in the following environment:

.1 Temperature: 0ºC to 49ºC (32ºF to 120ºF).

.2 Humidity: 0-93% RH, non-condensing.

2.18 MONITOR MODULE

.1 The monitor modules shall have the following operating characteristics:

A flashing LED indicates that the module is in communication with the control panel. The LED latches steady on alarm (subject to current limitations on the loop).

.2 The monitor modules shall have the following features:

Nominal operating voltage:	15 to 32 VDC.
Maximum current draw:	5.1 mA (LED on)
Average operating current:	400 uA (LED flashing)
EOL resistance:	47K ohms.
Temperature range:	0°C to 49°C (32°F to 120°F)
Humidity range:	10% to 93% noncondensing
Dimensions:	114.3mm (4.5") high x 101.6 mm (4") wide x 31.75 mm (1.25") deep. Mounts to a 101.6 mm (4") square x 53.975 mm (2.1/8") deep box.

2.19 ISOLATOR MODULE

.1 Fault isolator modules shall be provide to automatically isolate wire-to-wire short circuits on an SLC loop. The fault isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop. If a wire-to wire short occurs, the fault isolator module shall automatically open-circuit (disconnect) the SLC loop. When the short circuit condition is corrected, the fault isolator module shall automatically reconnect the isolated section of the SLC loop. The fault isolator module shall not require any address-setting, and its' operations shall be totally automatic. It shall not be necessary to replace or reset a fault isolator module after its normal operation. The fault isolator module shall mount in a standard 10.16 cm (4") deep electrical box, in a surface-mounted backbox, or in the fire alarm control panel. It shall provide a single LED which shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

2.20 CONTROL MODULE

.1 Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contract relay.

.2 The control module NACs may be wired for Style Z or Style Y (Class A/B) with up to 1 Amp of inductive A/V signal, or 2 Amps of resistive A/V signal operation, or as a dry contact (Form-C) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% or all auxiliary relay or NACs may be energized at the same time on the same pair of wires.

.3 The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 Amps at 30 VDC.

2.21 DOOR HOLD OPEN DEVICES

.1 Units to be complete with the following features:

.1 Wall mounted style.

.2 Long life electromagnet.

.3 Low current operation.

.4 Completely silent operation.

.5 25 lbf (111N) minimum holding force.

.6 Adjustable swivel contact plate.

.7 Brushed zinc finish.

.8 Maintenance free operation.

.9 Water resistant design.

.10 ULC, CSA, and FM approved.

2.22 SPRINKLER AND SUPERVISED VALVE CONNECTIONS

.1 Sprinkler and standpipe system contacts shall be provided by the mechanical/sprinkler contractor but connected into the fire alarm system by this Division.

2.23 SYSTEM WIRING

.1 The system wiring must be FSA rated in conformance with the Electrical Safety Code to suit the type of installation.

.2 Wiring shall be minimum #18 AWG twisted shielded pair in conduit. “Securex 2” armoured cable will be permitted to be used for “drops” to devices on accessible ceilings.

.3 As indicated on system riser diagram initiating device wiring shall be run in a loop with a home run from the last device to the control panel (Class ‘A’ configuration). Wiring from the “loop” module to conventional devices must be supervised, run in conduit, and conform to the standards of the Electrical Safety Code.

.4 Signal wiring is to be cross connected in a class ‘B’ configuration.

.5 Install isolator modules and end of line resistors in service rooms no higher than 2.4 M AFF. Provide location of these devices at the time of shop drawing submission.

.6 **These are the basic wiring requirements for system operation. Prior to tender close manufacturer and contractor are to confirm all necessary wiring specifications and requirements.**

2.24 APPROVED EQUIPMENT

DEVICE	**NOTIFIER**	**EDWARDS**	**SIMPLEX**	**MIRCOM**
Control Panel				
	NFS2-3030 1-10 loops 318 add/loop	EST 4 or EST 3X	4100-ES	FX-4000 Series
Intelligent Devices				
Manual Alarm Stations 1-Stage	NBG 12LX	SIGA-270	4099-9001	MS-401AD
Addressable Multi-Sensor	FSP-851TA	SIGA2-PS		MIX-2251TB
Addressable Base	B710LPA	SIGA-SB	4098-9792	B21OLPA
Addressable Base c/w Relay	B224RBA	SIGA-RB	4098-9791 c/w 2098-9737	B224RBA
Heat Sensor	FST-851RA	SIGA2-HRS or SIGA2-HFS	4098-9733	MIX-5251RBA Series
Smoke Detectors	FSI-851A	SIGA-PS	4098-9714	MIX-2251BA
Duct Type Smoke Detector (c/w Air Sampling Tubes)	FSD-751PA + ST-X	SIGA-SD c/w SIGA-PS	4098-9755 and 4098-9714	DNRA (Housing) MIX-2251BRA (Detector) DST (Tubes)
Monitor Module	FMM-1A	SIGA-CT Series	ZAM-Monitor 4090-9001	MIX-M500MA
Control Module	FCM-1 or FRM-1	SIGA-CR	ZAM-Control 4090-9002	MIX-M500RA
Isolator Module	ISO-XA	SIGA-IM	4090-9116	M500XA

Annunciator	ACM-32 AEM-32 ACM-32AY	EST3-6ANN	4603-9101 (GEO-7000 Series flush enclosure)	RAX-LCD RAM-1032TZ/RAM-1016TZ RAX-1048
Conventional and Auxiliary Devices				
Horn	Spectralert Series	757 Series	True Alert Series	FH-340
Mini Horn	MHRA (System Sensor)	Genesis G1R-HD	4901-9858	FH-340R
Door Holder	FMM Series	1500 Series	2088 Series	DH Series
Mini Horn complete with strobe	P2RA (System Sensor)	Genesis G1R-HDVM	4906-9127	FHS-340R
Strobe	SRA (System Sensor)	G1R-VM	4906-9101	FS-340R

Part 3 Execution

3.1 INSTALLATION

.1 The entire system shall be installed in accordance with CAN/ULC-S524 (latest edition) and approved manufacturers manuals and wiring diagrams. The contractor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation. All wiring shall be of the type recommended by the Electrical Safety Code, approved by local authorities having jurisdiction for the purpose, and shall be installed in dedicated conduit throughout.

.2 Install main control panel and connect to ac power supply.

.3 Locate and install manual alarm stations and connect to alarm circuit wiring.

.4 Locate and install detectors and connect to alarm circuit wiring. **Do not mount detectors within 1 m (39") of air outlets.** Maintain at least 600 mm (24") radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.

.5 Connect alarm circuits to main control panel.

.6 Locate and install signal devices and connect to signalling circuits.

.7 Connect signalling circuits to main control panel.

.8 Install end-of-line devices at end of applicable alarm and signalling circuits.

.9 Install remote annunciator panels and connect to annunciator circuit wiring.

.10 Locate and install door releasing devices.
Note: Door holders must release by way of local smoke detector and signal from main control panel. Provide additional relays to suit.

.11 Locate and install remote relay units to control fan shut down.

.12 Sprinkler system: wire alarm and supervisory switches and connect to control panel.

.13 Connect fire suppression systems to control panel.

.14 Elevator controllers are to be connected with 4 #14 conductors in conduit from fire alarm control panel to signal elevator recall in the event of a general alarm.

3.2 PROTECTION

.1 Contractor is to ensure all fire protection system detectors are protected from dust, dirt, humidity, and water at all times during construction. This applies to detectors installed, stored on site or stored in storage containers. Any detectors that are damaged or dirty shall be replaced at the contractor's expense.

3.3 FIELD QUALITY CONTROL

.1 The system shall be installed and fully tested under the supervision of trained manufacturer's representative. The system shall be demonstrated to perform all the functions as specified.

3.4 ACCEPTABLE INSTALLER

.1 The fire alarm / life safety system specified herein shall be installed by an Authorized Electrical Contractor who is CFAA certified.

3.5 EXAMINATION

.1 Prior to the commencement of any of the work detailed herein, an examination and analysis of the area(s) where the Fire Alarm / Life Safety System and all associated components are to be installed shall be made.

.2 Any of these area(s) which are found to be outside the manufacturers' recommended environments for the particular specified products shall be noted on a Site Examination Report which shall be given to the Building Owners Representative, and the Consultant.

.3 Any shorts, opens, or grounds found on existing wiring shall be corrected prior to the connection of these wires to any panel component or field device.

3.6 DEMONSTRATION

.1 Each of the intended operations of the installed Fire Alarm / Life Safety System shall be demonstrated to the Building Owners' Representative and the Consultant.

3.7 SYSTEM TEST

.1 Perform tests in accordance with General Electrical Requirements Section and CAN/ULC-S537-(latest edition) Standard for the Verification of Fire Alarm Systems.

.2 Fire alarm system:

.1 Test each device and alarm circuit to ensure noted devices transmit alarm to control panel and actuate general alarm and ancillary devices.

.2 Check annunciator panels to ensure zones are shown correctly.

.3 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of system.

.4 Class A circuits.

.1 Test each conductor on all circuits for capability of providing alarm signal on each side of single open-circuit fault condition imposed near middlemost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.2 Test each conductor on all circuits for capability of providing alarm signals during ground-fault condition imposed near middlemost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.5 Class B circuits

.1 Test each conductor on all circuits for capability of providing alarm signal on line side of single open-circuit fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.3 The control panel shall continuously perform as automatic self-test routine on each sensor, which will functionally check the sensor electronics and ensure the accuracy of the valves being transmitted to the control panel.

.4 Automatic testing will occur at a rate of one sensor every four minutes.

.5 The sensor's average analogue value is the average of the last 2000 recorded analogue entries of its chamber.

.6 Any sensor that fails this test shall indicate a '**SELF-TEST ABNORMAL'** trouble condition with the sensor's address at the control panel.

.7 The system shall automatically indicate when an individual sensor needs cleaning. When the sensor's average value reaches a predetermined value, a **'DIRTY SENSOR'** trouble condition shall be audibly and visually indicated at the local control panel for that sensor. IF a **'DIRTY SENSOR'** indication is left unattended and its average value increases to a second predetermined value, an **'EXCESSIVELY DIRTY SENSOR'** trouble condition shall be indicated at the local control panel for that sensor. To prevent false alarms, these **'DIRTY'** conditions shall in no way decrease the amount of smoke obscuration necessary to generate an alarm condition.

.8 An operator having a proper access level, shall have the capability to manually access the following information from the control panel:

.1 Primary Status

.2 Device Type

.3 Present Average Value

.4 Present Sensitivity Selected*

.5 Highest Peak Detection Values (HVP)*

.6 Sensor Range (Normal, Dirty, Excessively Dirty)

* Values shall be in 'percent of smoke obscuration' format so that no interpretation is required by the operator.

3.8 AUDIBILITY TESTING

.1 Audibility Testing:

.1 The contractor is to coordinate an audibility test prior to occupancy of the facility. The test is to be performed by the representatives of the fire alarm manufacturer in the presence of the consultant. The test report is to be in chart form indicating:

.1 Project

.2 Date of test

.3 Room name and number

.4 Ambient dB level

.5 Alarm dB level

.6 Name of testing technician

.2 The test results are to be submitted to the consultant for review prior to issuing to owner's representatives and/or authorities having jurisdiction.

3.9 INTEGRATED LIFE SAFETY SYSTEM TESTING

.1 This electrical contractor shall participate in integrated testing of this life safety system in conformance with Electrical General Requirements. Include all associated costs in tender.

3.10 ADDITIONAL INSTALLED FIRE ALARM SYSTEM COMPONENTS

.1 The electrical contractor is to include in their bid the cost to add ten (10) additional signaling devices to be installed and verified in locations as directed by the consultant. Note: This installation and verification and subsequent audibility test will be occurring after the initial audibility testing is complete.

.2 The electrical contractor is to include in their bid the cost to add six (6) additional fire detection devices (heat or smoke detectors) to be installed and verified in locations as directed by the consultant.

.3 The electrical contractor is to include in their bid the cost to add three (3) additional fire alarm zones with associated zone modules and including six (6) additional isolation modules to be installed and verified as directed by the consultant.

END OF SECTION