



CLARKE HIGH SCHOOL RENOVATIONS

3425 Highway 35, Newcastle ON.

Project 24035

DATE April, 2024



BARRY BRYAN ASSOCIATES

Architects, Engineers, Project Managers

250 Water Street

Suite 201

Whitby, Ontario

Canada

L1N 0G5

Telephone: 905 666-5252

Toronto: 905 427-4495

Fax: 905 666-5256

Email: bba@bba-archeng.com

Web Site: www.bba-archeng.com

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PART 1 GENERAL

1.1 Section Includes

- .1 Work covered by contract documents
- .2 Location of the site
- .3 Site access .
- .4 Work sequence
- .5 Contractor use of premises
- .6 Engineer design
- .7 Designated substances: ACM and others
- .8 Building smoking environment
- .9 Special conditions
- .10 Site security
- .11 "By Others"
- .12 Protection of Drawings

1.2 Work Covered by Contract Documents

- .1 Work of this Contract comprises the Renovations to Clarke High School for the Kawartha Pine Ridge District School Board as indicated on the Contract Drawings and specifications.

1.3 Location of the Site

- .1 3425 Highway 35, Newcastle, Ontario

1.4 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.

1.5 Work Sequence

- .1 Construct Work continuously.

1.6 Contractors Use of Premises

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

1.7 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.

1.8 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.
- .5 No asbestos-containing materials, as defined by O. Reg. 278/05, may not be specified or used in any project.

1.9 Verification

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

1.10 Building Smoking Environment

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

1.11 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 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.

1.12 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.

1.13 "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.

1.14 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.

1.15 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 expressed interest in the Project.
- .3 Provide Consultant and Owner with access to such websites as noted above.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

Not Used

- 3.1 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 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 Review submittals prior to submission to Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Consultant in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent work are coordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant's review.
- .10 Keep one reviewed copy of each submission on site.

1.3 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 Administrative
- .2 Fires
- .3 Disposal of Wastes

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)

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.

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 GENERAL1.1 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 Access for Inspection and Testing
- .10 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 C22.1-18, 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.

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 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.

1.11 Other Regulatory Requirements

- .1 Conform to the requirements of the Ontario Ministry of Transportation and Local authorities regarding transportation of materials.
- .2 Conform to the requirements of the Ontario Ministry of the Environment.
- .3 Conform to the requirements of the Ontario Ministry of Labour.
- .4 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. Refer to Section 01 29 83 - Payment Procedures for Testing Laboratory Services.
- .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 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 temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 Construction heaters used inside building must be vented to outside or be flameless type. Solid fuel salamanders are not permitted, unless prior approval is given by the Consultant.
- .3 Provide temporary heat and ventilation in enclosed areas as required to:
 - .1 Facilitate progress of Work.
 - .2 Protect Work and products against dampness and cold.
 - .3 Prevent moisture condensation on surfaces.
 - .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
 - .5 Provide adequate ventilation to meet health regulations for safe working environment.
- .4 Maintain temperatures of minimum 10° C in areas where construction is in progress.
- .5 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.
- .6 Permanent heating system of building may be used when available.. Be responsible for damage to heating system if use is permitted.

- .7 On completion of Work for which permanent heating system is used, replace filters.
- .8 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.
- .9 Pay costs for maintaining temporary heat, when using permanent heating system. Owner will pay utility charges when temporary heat source is existing building equipment.
- .10 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.
- .11 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 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.

1.5 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.

1.6 Offices

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

1.7 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.

1.8 Sanitary Facilities

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

- .2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.9 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.

1.10 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 GENERAL1.1 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 GENERAL1.1 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 OHS Act 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 WHMIS 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 Field Engineering survey services.
- .2 Survey services to establish and confirm inverts for Work.

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.
- .2 Submit name and address of Surveyor to Consultant.
- .3 On request of Consultant, submit documentation to verify accuracy of field engineering work.
- .4 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform to Contract Documents.

1.4 Examination of Work and Site

- .1 Examine the 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 Qualifications of Surveyor

- .1 Qualified registered land surveyor, licensed to practice in Place of Work, acceptable to Consultant.

1.6 Survey Reference Points

- .1 Existing control points are designated on drawings.
- .2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- .3 Make no changes or relocations without prior written notice to Consultant.

- .4 Report to Consultant when reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations.
- .5 Require surveyor to replace control points in accordance with original survey control.

1.7 Survey Requirements

- .1 Establish two permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.
- .2 Establish lines and levels, locate and lay out, by instrumentation.
- .3 Stake for grading, fill and topsoil placement and landscaping features.
- .4 Stake slopes and berms.
- .5 Establish pipe invert elevations.
- .6 Stake batter boards for foundations.
- .7 Establish foundation and floor elevations.
- .8 Establish lines and levels for mechanical and electrical work.

1.8 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.

1.9 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.

1.10 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.

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 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 Remove snow and ice from access to building.
- .18 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 - Waste Management and Disposal.

End of Section

PART 1 GENERAL1.1 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 GENERAL1.1 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.

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 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.

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 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.
- .6 Keep dust from entering existing facilities and areas of building not affected by the Work. Comply with Ministry of Health requirements regarding debris control.
- .7 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.
- .8 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.
- .9 If Owner considers additional bracing and shoring necessary to safeguard and prevent such movement or settlement, install bracing or shoring upon Owner's orders.
- .10 Particular attention shall be paid to prevention of fire and elimination of fire hazards which would endanger new work or existing premises.
- .11 Protect existing adjacent work against damages which might occur from falling debris or other causes due to work of this Section.
- .12 At all times protect the structure from overloading.
- .13 Provide protection around floor openings.
- .14 Protect from weather, parts of adjoining structures not previously exposed.
- .15 Protect interiors of building parts not to be demolished from exterior elements at all times.
- .16 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 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.
- .3 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.
- .4 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.

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 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 Reinstate areas and existing works outside areas of demolition to conditions that existed prior to commencement of work.
- .3 Upon completion of demolition work, remove debris, trim surfaces and leave work site clean.

End of Section

PART 1 GENERAL**1.1 General**

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 04 22 00 Concrete Unit Masonry
- .2 Section 05 50 00 Metal Fabrications
- .3 Section 06 20 00 Finish Carpentry
- .4 Section 08 11 00 Metal Doors and Frames

1.3 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 (Galvanealed) by the Hot-Dip Process.
 - .3 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 O121-17 Douglas Fir Plywood.
 - .6 CSA O141:23 Canadian Standard Lumber.
 - .7 CSA O151-17 Canadian Softwood Plywood
 - .8 CSA O437 Series-93 (R2011) Standards on OSB and Waferboard
 - .9 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.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 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.

1.5 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.

1.6 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.

1.7 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.
- .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 Nailing Discs: flat caps, minimum 25 mm diameter, minimum 0.627 mm thick, sheet metal, formed to prevent dishing.
- .9 Wood Preservative to CSA O80 SERIES.
- .10 Adhesive: Contractors gun grade cartridge loaded wood adhesive, general purpose, to ASTM D2559.
- .11 Galvanizing: to CSA-G164. Use galvanized fasteners, and hardware for exterior work, preservative treated lumber, and materials in contact with concrete or masonry.

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 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.

.4 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.

3.2 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 06 10 00 Rough Carpentry
- .2 Section 07 92 00 Joint Sealants
- .3 Section 09 21 16 Gypsum Board
- .4 Section 09 91 23 Interior Painting

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM F1667/F1667M-21a Standard Specification for Driven Fasteners: Nails, Spikes, and Staples
- .2 Architectural Woodwork Manufacturer's Association of Canada (AWMAC)
 - .1 Architectural Woodwork Standards Manual
- .3 American National Standards Institute (ANSI)
 - .1 ANSI A208.1-2009 Particleboard
 - .2 ANSI/NPA A208.2-2009 Medium Density Fibreboard (MDF)
 - .3 ANSI/NEMA LD 3-2005 High-Pressure Decorative Laminates (HPDL)
 - .4 ANSI/HPVA HP-1-2009 Standard for Hardwood and Decorative Plywood
- .4 CSA Group (CSA)
 - .1 CSA O112 SERIES-M1977 (R2006) Wood Adhesives
 - .2 CSA O121-08 (R2013) Douglas Fir Plywood
 - .3 CSA O151-17 (R2022) Canadian Softwood Plywood
 - .4 CSA O153:19 Poplar Plywood
 - .5 CSA Z809-08 Sustainable Forest Management
- .5 Canadian General Services Board (CGSB)
 - .1 CAN/CGSB-11.3-M, Hardboard
- .6 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.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit shop drawings conforming to AWMAC's STANDARDS (NAAWS).
 - .1 Show proposed assembly, connections, anchorage, materials, dimensions, thickness, and finishes.
 - .2 On casework and countertop elevations show location of backing required for attachment within walls.
- .3 Samples:
 - .1 Submit duplicate, 300 mm long samples of each type of solid wood and 300 x 300 mm samples of each type of plywood used in exposed work and scheduled to receive stained or natural finish, complete with specified finish, prior to fabrication of cabinetwork.

- .2 Veneer samples minimum 304 mm x 304 mm. Each sample set of three to represent range of colour and grain expected.
- .3 Submit full range of manufacturer's standard plastic laminates for selection by the Consultant.
- .4 Submit sample of each type of cabinet hardware component used.

1.5 Quality Assurance

- .1 Unless otherwise specified, carry out finish carpentry work in accordance with the requirements of "Millwork Standards" (latest issue) of Architectural Woodwork Manufacturers' Association of Canada (AWMAC), Custom Grade.
- .2 Woodwork Manufacturer Qualifications:
 - .1 Minimum 5 years of production experience similar to this project, whose qualifications indicate ability to comply with requirements of this Section.
- .3 Preinstallation Conference:
 - .1 Before framing completed hold a meeting with the contractor, casework manufacturer, casework installer, and framing sub-contractor.
 - .2 Review locations of backing required for casework installation as shown on casework shop drawings.
 - .3 Review method of attachment for backing to wall system as shown on architectural drawings.

1.6 Definition

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

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

1.8 Protection

- .1 Provide coverings as necessary to protect finish carpentry components from damage of any kind during storage and after installation.

1.9 Waste Management and Disposal

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

1.10 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of two years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS2.1 Materials

- .1 All materials CSA Z809 or FSC Certified.
- .2 Solid Wood:
 - .1 Unless otherwise indicated, provide AWMAC Custom Grade.
 - .2 All wood materials shall be new, straight and clean, free of sap, knots, pitch, and other defects, except as permitted by applicable grading rules.
 - .3 All wood shall be kiln dried to a maximum moisture content of 7%.
 - .4 Softwood: to CSA O141, dressed all sides used in concealed locations.
- .3 Veneers: As required by AWMAC's STANDARDS (NAAWS) for its use and Grade specified. Flat sliced birch veneers from architectural grade flitches to provide uniform grain pattern and colour throughout, free of dark streaks and blemishes. Sharp variation of grain patterns and colour between adjacent jointed pieces is not acceptable.
- .4 Plywood:
 - .1 Veneer core plywood: hardwood with a non-telegraphing grain manufactured with exterior glue. To ANSI/HPVA HP-1-09, minimum five (5) plies.
 - .2 Soft Plywood: to CSA O151-M Standard Grade, solid two sides. Use in concealed locations only, except as indicated.
 - .3 To ANSI/HPVA HP-1-09, Grade A face, book matched, flat cut birch face and No. 3 edge.
- .5 Particleboard: Meeting requirements of AWMAC's STANDARDS (NAAWS). To ANSI A208.1 , minimum density of 720kg/m3 Grade "R".
- .6 MDF: Medium Density Fiberboard meeting requirements of AWMAC's STANDARDS (NAAWS).
- .7 Edgeband
 - .1 For wood veneer casework: Veneer of same species and cut as exposed surfaces.
 - .2 For plastic laminate casework: High Pressure Decorative Laminate (HPDL).
- .8 Plastic laminate facing sheet: ANSI/NEMA LD 3 High-Pressure Decorative Laminates (HPDL) PF-S and GP-S:
 - .1 Backing sheet: BK Grade by manufacturer of facing sheet.
 - .2 Core: CAN3-0188.1M, Grade R.
 - .3 Laminating adhesive: CAN3-O112 Series M.
 - .4 Core sealer: clear water resistant synthetic resin sealer.
 - .5 Colours, pattern, gloss and texture will be selected by Consultant from full range of products by one of the following:
 - .1 Classroom Countertops: Formica Folkstone Celesta 692-58
 - .2 Kitchen Countertops: Formica Navy Grafix 7018-58

- .3 Control Panels: Formica White Matte 949-58.
- .9 Melamine Overlaid Panels:
 - .1 Melamine overlay, heat and pressure laminated with phenolic resin to 12.7 mm thick particle board.
 - .2 Overlay bonded to both faces where exposed two sides, and when panel material require surface on one side only, reverse side to be overlaid with a plain balancing sheet.
 - .3 Furniture finish: solid colour as selected by the Consultant.
 - .4 Edge Finishing: matching melamine and polyester overlay edge strip with self-adhesive.
- .10 Fasteners and Adhesive:
 - .1 Nails and staples: ASTM F1667, galvanized, spiral head nails.
 - .2 Screws: Zinc, cadmium or chrome plated steel.
 - .3 Splines: wood or metal, to suit application.
 - .4 Adhesive: Type 1 waterproof. To CSA O112-M, type as appropriate for the intended application. Complying with ANSI/WDMA I.S-1 series. Contact bond not acceptable.
 - .5 Avoid the use of adhesives, preservatives, synthesizing agents and finish coatings that contain formaldehyde and high V.O.C. content.
- .11 Cabinet Hardware: Products listed are a standard of acceptance. Products by other manufacturers, of equal quality and similar appearance may also be accepted subject to review and approval by Consultant.
 - .1 Draw bolt fasteners: Knappe & Vogt KV 516
 - .2 Recessed Shelf Standard:
 - .1 Knappe & Vogt KV 255, Zinc, finish.
 - .2 Knappe & Vogt KV 256AL Series Aluminum Shelf Support Clip
 - .3 Hinges: Blum concealed hinges, 125° clip and 125° opening with self-closing spring. Soft close. Full or half overlay. Nickel plated steel.
 - .4 Cabinet Pulls: Richelieu D-Pull No: 30134-170, 96 mm c.c. brushed stainless steel.
 - .5 Cabinet Locks: CCL 0737 pin tumbler MK & KA by room.
 - .6 Catches: Type optional with manufacturer.
 - .7 Drawer Slides: Knappe & Vogt 8450FM Soft-Close Full-Extension Drawer Slide
 - .8 Door Bumpers: "Quietex" bumpers.
 - .9 Closet Rods: Commercial grade steel; long-lasting, corrosion resistant finish. Meets and/or exceeds ANSI/BHMA weight load requirements.
 - .1 Richeleau or Knappe and Vogt. round Closet Rod Tubing, Outside Diameter: 27 mm:
 - .2 2.7 mm wall thickness; inside diameter: 21 mm;
 - .3 Finish: Brilliant Chrome; premium double-plated finish, seamless, pit-free.
 - .4 Size as indicated on the drawings.
 - .5 Closet rod supports as recommended by manufacturer.
 - .10 Coat Hooks: Richeleau Rev-A-Shelf sidelines single coat hook. Chrome finish.
 - .11 Provide other hardware and hardware accessories as detailed or required.
 - .12 All exposed hardware to have Platinum (Mica) finish by Teknion or equivalent unless noted otherwise.

2.2 Fabrication

- .1 Materials and methods of construction to meet requirements of AWMAC's STANDARDS (NAAWS) for grade or grades specified.
 - .1 If there is conflict between plans and/or specifications and AWMAC's STANDARDS (NAAWS), plans and specifications shall govern.
- .2 Wood Casework: AWMAC Standard Custom Grade.

- .3 Construction Type: Frameless
- .4 Cabinet and door interface: Flush overlay.
- .5 Exposed joints and edges:
 - .1 Uniformly space exposed joints unless otherwise indicated.
 - .2 No edge grain shall be visible; mitre external corners, house internal fasteners. Glue mitred corners.
 - .3 All exposed edges of plywood and particle board shall have solid wood edging, pressure glued. AWMAC No. 3 edge.
 - .4 Ease edges of solid lumber components to 1.6 mm radius.
- .6 Mechanical Fasteners:
 - .1 Inconspicuously locate mechanical fasteners. Wherever possible, conceal fastenings.
 - .2 Countersink nail heads.
 - .3 Where exposed to view, countersink screw and bolt heads and fill holes with matching wood plugs.
 - .4 Cutting and fitting: make cut-outs in work of this Section as required to accommodate work of other Sections.
 - .5 Make provisions in cabinetwork to accept built-in appliances, provided by others.

2.3 Wood Casework

- .1 Materials and methods of construction to meet requirements of AWMAC's STANDARDS (NAAWS) for grade or grades specified.
- .2 If there is conflict between plans and/or specifications and AWMAC's STANDARDS (NAAWS), plans and specifications shall govern.
- .3 Wood Casework:
 - .1 Grade: AWMAC's STANDARDS (NAAWS) Custom Grade
- .4 Exposed Surfaces [[species], [cut]], [[book][slip] matched] [material suitable for opaque finish]] meeting requirements of AWMAC's STANDARDS (NAAWS) for Grade specified.
- .5 Exposed interior surfaces: Veneer of same species and cut [and grade] as exposed exterior surfaces.

2.4 Plastic Laminate Casework

- .1 Construct cabinetwork components as indicated and in accordance with AWMAC Custom grade.
- .2 Tenon, dado, dowel, or rabbet interior construction with all parts well glued. Shoulder mitre all exposed corners. Open ends or skeleton frames against walls are not permitted. Unless otherwise permitted by Consultant, use unitized construction system for all components.
- .3 Exposed Surfaces: Factory finished birch veneer meeting requirements of AWMAC's Standards (NAAWS) for Grade specified.
- .4 Exposed Surfaces: High Pressure Decorative Laminate (HPDL), meeting requirements of AWMAC's Standards (NAAWS) for Grade specified.
- .5 Semi-exposed surfaces: LPDL

- .6 Apply self-edged minimum 1.0 mm thick plastic laminate to exposed ends of countertops.
- .7 Rout gables for pilaster strips where adjustable shelving is required.
- .8 Construct shelving with edge moulding to match. Shelving to cabinetwork to be adjustable unless otherwise noted.
- .9 Apply moisture repellent sealer to concealed backs of cabinetwork.
- .10 Install cabinet hardware in accord with hardware manufacturer's directions. Unless otherwise indicated, provide each door with pull and with minimum two hinges. Provide locks where indicated.

2.5 Laminated Plastic Countertops

- .1 Core material: exterior grade hardwood plywood with a non-telegraphing grain.
- .2 Use largest practicable plastic laminate sheet size.
- .3 Back splashes: as indicated, 100 mm high.
- .4 Front edges: As indicated
- .5 Provide joints symmetrically; provide joints as corners and at changes in superficial areas; provide concealed draw bolt anchors and joints. All butt joints shall have a blind spine.

2.6 Finishes

- .1 Plastic laminate as indicated. Colours selected by the Consultant.
- .2 Wood Finish: 3 coats clear polyurethane finish on all sides. Factory finish.
- .3 All exposed interior surfaces: melamine unless indicated otherwise.
- .4 Cabinet and case backs unexposed to view shall be back primed with one coat of moisture repellent sealer.
- .5 Apply finishes in accordance with the AWMAC Manual.

2.7 Factory Finishing

- .1 Grade: AWMAC's STANDARDS (NAAWS) Match grade of product to be finished.

PART 3 EXECUTION

3.1 Examination

- .1 Verify mechanical, electrical, plumbing, HVAC and other building components, affecting work in this Section are in place and ready.
- .2 Verify HVAC controls and systems are operating properly.

- .3 Verify adequacy of backing and support framing. Advise Contractor of areas and surfaces requiring further modifications for plumb, level, even or square fitting.

3.2 Installation

- .1 Install work in accordance with AWMAC Installation Manual, Custom grade.
- .2 Secure all work in place, square, plumb, and level.
- .3 Accurately scribe and closely fit components to irregularities of adjacent surfaces.
- .4 Accurately fit joints in true plane, locate joints over bearing or supporting surfaces.
- .5 Countersink mechanical fasteners used at exposed and semi-exposed surfaces, excluding installation attachment screws and those securing cabinets end to end.
- .6 Where permitted, nail with small headed finishing nails. Countersink nail heads with nail setter.
- .7 Install plastic laminate components using concealed fastening devices.
- .8 Where components are fastened with screws or bolts, countersink screw and bolt heads and provide wood plugs matching surrounding wood.
- .9 Where cabinetwork abuts other building elements, provide wood trim matching cabinetwork except where otherwise detailed.
- .10 Cut equipment cutouts shown on plans using templates provided.
 - .1 Radius internal corners at least 3 mm and chamfer edges.
 - .2 Where core edge is to remain exposed, cover with plastic laminate edging.
 - .3 Where core edge is to be concealed, seal with sealer.
- .11 Where access is required to valves and other mechanical and electrical components, located behind cabinetwork, provide removable plywood access panels of size required and secure with four brass screws.
- .12 Provide for wiring and cable management systems wiring grommets as indicated on the drawings.
- .13 Apply mildew resistant silicone sealant to perimeter of all countertops as specified in Section 07 92 00.

3.3 Adjustment

- .1 Adjust all moving and operating parts to function smoothly and correctly.
- .2 Fill and retouch all nicks, chips and scratches. Replace all un-repairable damaged items.
- .3 Replace damaged components which, in the opinion of the Consultant, cannot be satisfactorily repaired.

3.4 Cleaning

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

- .2 Upon completion of installation, clean installed items of pencil and ink marks and broom clean the area of operation.

End of Section

PART 1 GENERAL1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 06 10 00 Rough Carpentry
- .2 Section 06 40 00 Architectural Woodwork

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C679-15(2022) Standard Test Method for Tack-Free Time of Elastomeric Sealants
 - .2 ASTM C719-22 Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)
 - .3 ASTM C794-18(2022) Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
 - .4 ASTM C834-17 Standard Specification for Latex Sealants
 - .5 ASTM C919-22 Standard Practice for Use of Sealants in Acoustical Applications
 - .6 ASTM C920-18 Standard Specification for Elastomeric Joint Sealants
 - .7 ASTM C1087-23 Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems
 - .8 ASTM C1183/C1183M-13(2018) Standard Test Method for Extrusion Rate of Elastomeric Sealants
 - .9 ASTM C1193-16 Standard Guide for Use of Joint Sealants
 - .10 ASTM C1246-17(2022) Standard Test Method for Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants After Cure
 - .11 ASTM C1330-23 Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.
 - .12 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 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.

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 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.

2.3 Silicone Joint Sealants

- .1 SJS#1: 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 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.

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 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.

2.7 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 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.
- .7 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.
 - .2 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 unit masonry.
 - .1 UJS#1: Single-component non-sag urethane sealant.
- .2 Interior perimeter joints of interior frames.
 - .1 UJS#1: Single-component non-sag urethane sealant.
- .3 Interior sanitary joints between plumbing fixtures, food preparation fixtures, and casework and adjacent walls, floors, and counters.
 - .1 SJS#1: Mildew-Resistant, Single-Component, nonsag, acid-curing silicone joint sealant.

.4 Interior non-moving joints between interior painted surfaces and adjacent materials.

.1 LJS#1: Siliconized acrylic latex

.2 Joint-Sealant Colour: Paintable.

.5 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.

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 91 23 Interior Painting

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C840-20 Standard Specification for Application and Finishing of Gypsum Board
 - .2 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
 - .3 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
 - .4 ASTM C1047-19 Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
 - .5 ASTM C1396/C1396M-17 Standard Specification for Gypsum Board
 - .6 ASTM C1629/C1629M-19 Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels
- .2 American National Standards Institute (ANSI)
 - .1 ANSI A118.9-1992 Test Methods and Specifications for Cementitious Backer Units.
 - .2 ULC List of Equipment and Material, Volume III, Fire Resistance Ratings.
- .3 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
- .4 Wall and Ceiling Bureau
 - .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.

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.

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.
- .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.

1.7 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.

1.8 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 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.

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 Sealants: as specified in Section 07 92 00 - Joint Sealants.

PART 3 EXECUTION

3.1 Gypsum Board Application

- .1 Coordinate installation of plywood backing with Section 06 10 00.
- .2 Do application and finishing of gypsum board in accordance with ASTM C840 and/or GA-216 except where specified otherwise.
- .3 Do not apply gypsum board until bucks, anchors, blocking, electrical, and mechanical work are approved.
- .4 Apply gypsum board at right angles to framing members or furring using screw fasteners. Maximum spacing of screws 300 mm o.c.
- .5 Apply water or moisture resistant gypsum wallboard where indicated. Apply water resistant sealant to edges, ends and cut outs which expose gypsum core.
- .6 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.

3.2 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.

3.3 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.

3.4 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.

3.5 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 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 E84-23b 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.
 - .1 Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
 - .2 Surface Burning Characteristics: As follows, tested per ASTM E84 and complying with ASTM E1264 Classification.
 - .3 Fire Resistance: As follows tested per ASTM E119 and listed in the appropriate roof design in the Underwriters Laboratories Fire Resistance Directory

.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 Surface-Burning Characteristics: Conform to ULC S102 or ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- .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 PRODUCTS2.1 Materials

- .1 Acoustic units for suspended ceiling system: to ASTM E1264
- .2 Panel Type : CertainTeed Ceilings - Protecton School Board
 1. Name: Protectone School Board
 2. Physical Characteristics
 - a. Type: III (per ASTM E1264)
 - b. Form: 2 (per ASTM E1264)
 - c. Pattern: C D (per ASTM E1264)
 - d. Size: 2'x4'
 - e. Thickness: 15/16"
 - f. Edges: Square
 - g. Finished Surface: Painted
 - h. Finished Surface Color: White
 - i. Core Composition: Wet-felted mineral fiber
 - j. Recycled Content:
 - 1) School Board: 33%
 1. 28% (pre-consumer)
 2. 5% (post-consumer)
 - 2) Protectone School Board: 44%
 1. 42% (pre-consumer)
 2. 2% (post-consumer)
 3. Performance Criteria
 - a. Noise Reduction Coefficient (NRC) per ASTM C423 (E-400 mounting)
 - 1) 0.55
 - b. Light Reflectance (LR) per ASTM E1477
 - 1) 0.84
 - c. Ceiling Attenuation Class (CAC) per ASTM E1414
 - 1) 40 Protectone School Board 2'x4'
 - d. Humidity Resistance
 - 1) Warranted to withstand relative humidity of up to 90% at 104°F without sagging, warping or delaminating for 10-years
 - e. Flame Spread Classification per ASTM E84, CAN/ULC-S102: Class A
 - f. Underwriters Laboratories, Inc. Fire-resistance Time-rated Assemblies
 - 1) Protectone School Board only: [
 4. Independent Environmental Certifications
 - a. VOC content
 - 1) Third-party certification of compliance
 1. Per California Dept. of Public Health *CDPH/EHLB/Standard Method v1.2, 2017*
 - b. Recycled content
 - 1) Third-party verified Type I Environmental Label
 1. Per ISO 14024 *Environmental Labels and Declarations - Type I Environmental Labeling - Principles and Procedures*
 - c. Environmental Product Declaration
 - 1) Third-party verified Type III Environmental Product Declaration
 1. Per ISO 14025 - *Environmental Labels and Declarations - Type III Environmental Declarations -- Principles and Procedures*
 - d. Health Product Declaration
 - 1) Per Health Product Declaration Standard v2.0
 1. hpdcollaborative.org

- .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 Certaineed

- .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 05 12 23 Structural Steel
- .2 Section 09 21 16 Gypsum Board
- .3 Section 09 51 13 Acoustic Panel Ceilings

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 E84-23b 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 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 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 Fire Resistance: Tested per ASTM E119 and listed in the appropriate roof design in the Underwriters Laboratories Fire Resistance Directory
- .3 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.
- .4 Where required, provide fire-resistance rated suspension system: certified by a Canadian Certification Organization accredited by Standards Council of Canada.
- .5 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 Manufacturer: CertainTeed Ceilings
 - .1 Product
 - .1 Name: [15/16” FireSecure Stab System]
 - .2 Physical Characteristics
 - .1 Structural Classification: [Intermediate Duty] (per ASTM C635)

- .2 Double web design manufactured of hot-dipped galvanized steel [G30]
- .3 Mitered design on cross tee and main runner intersections
- .4 Unique spring-clip joinery for secure install and easy removal
- .5 Underwriters Laboratories, Inc. Fire-resistance Time-rated Assemblies
- .6 Tee height: [1-1/2"]
- .7 Flange Size: [15/16"]
- .8 Recycled Content: 88%
- .9 Underwriters Laboratories, Inc. Fire-resistance Time-rated Assemblies
 - .1 Protectone Cashmere only: [D203, D205, G208, G218, G248, G255, L201, P204, P259, P260, P261, P262, P264, P266, P270]
- .3 Edge Molding
 - a. Type: [angle]
 - b. Profile: As selected by the Architect
 - c. Size: [144"]
- .4 Attachment Devices: Anchors sufficient for five-times design load indicated in ASTM C635 (Table 1). Wire for hangers of size and type to suit intended application, complying with ASTM A641, Class 1 zinc coating, not less than 12 gauge
- .2 Attachment Devices: Size for five times design load indicated in ASTM C635, Table 1, Direct Hung unless otherwise indicated or required.
- .3 Threaded Rod: to ASTM A397. Galvanized or zinc plated.
- .4 Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft annealed, with a yield stress load of at least three times design load, but not less than 2.06 mm thick.
- .5 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 08 11 00 Metal Doors and Frames
- .2 Section 08 14 16 Flush Wood Doors
- .3 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.
- .6 Provide mock-up in accordance with Section 01 45 00 - Quality Control.
 - .1 Prepare and paint designated surface, area, room or item (in each colour scheme) to specified requirements, with specified paint or coating showing selected colours, gloss/sheen and textures. Locate where directed.
 - .2 Mock-up will be used to judge workmanship, substrate preparation, operation of equipment and material application and workmanship to MPI Architectural Painting Specification Manual standards.
 - .3 Allow 24 hours for inspection of mock-up before proceeding with work.
 - .4 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

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.
- .2 Colour schedule will be based upon selection of eight base colours and six 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.

SPEC NOTE: SEE <http://www.paintinfo.com/mpi/guide/fullspecREV.pdf> FOR FULL MPI SPECIFICATION

2.5 Interior Painting Systems

- .1 Concrete Horizontal Surfaces:
 - .1 INT 3.2A Latex floor enamel [gloss] [low gloss] finish.
 - .2 Concrete Floor Sealer: Refer to Section 09 67 00-Fluid Applied Flooring.
- .2 Concrete Vertical Surfaces:
 - .1 Water repellent sealer as specified in Section 07 19 00 –Water Repellants.
- .3 Structural Steel:
 - .1 INT 5.1X Latex G5 semi-gloss finish (over quick dry shop primer).
- .4 Metal Fabrications:
 - .1 INT 5.3A Latex G5 semi-gloss finish
- .5 Metal Floors and Decking:
 - .1 INT 5.1LL Epoxy Deck Coating finish (over epoxy primer).
- .6 Zinc Coated Metal Deck:
 - .1 INT 5.3H. Interior Latex semi-gloss, dry fog/fall type.
- .7 Galvanized Metal: interior doors, frames, railings, misc. steel, pipes, and ducts.
 - .1 INT 5.3A Latex G5 semi-gloss finish
- .8 Concrete Masonry:
 - .1 INT 4.2D High performance architectural latex G5 semi-gloss finish.
- .9 Concrete masonry units at wet areas and change rooms:
 - .1 INT 4.2G Epoxy (tile-like) finish.
- .10 Wood Clear Polyurethane Finish:
 - .1 INT 6.3K Polyurethane varnish G6 gloss finish.
- .11 Interior Wood Doors
 - .1 INT 6.3A High performance architectural latex G5 semi-gloss finish.
- .12 Wood Fire Retardant Finish (ceilings and soffits)
 - .1 INT 6.3S water-borne fire retardant, clear finish, ULC approved. Flame spread rating 150.
- .13 Electrical Equipment Backboards:
 - .1 INT 6.4P Fire retardant, pigmented coating. Low odour/low VOC. Semi-gloss (UL/ULC rated).
- .14 Gypsum Board: Walls and Bulkheads.
 - .1 INT 9.2A Latex G3 eggshell finish over latex sealer.
- .15 Gypsum Board: Ceilings and Bulkheads (wet areas and change rooms)
 - .1 INT 9.2E Epoxy (tile like) finish
- .16 Gypsum Board: Ceilings and Bulkheads:
 - .1 INT 9.2A Latex G2 velvet finish over latex sealer.
- .17 All other surfaces not noted above: high performance finish suitable for commercial and institutional environment and in accordance with MPI painting manual.

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

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 06 20 00 Finish Carpentry

1.3 Reference Standards

- .1 Aluminum Association (AA)
 - .1 Aluminum Association Designation System for Aluminum Finishes

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturer's preprinted technical literature for pre-manufactured products.
- .3 Submit samples of metal finishes when requested by the Consultant.
- .4 Submit operating and maintenance instructions for all manufactured products and specialties, for inclusion in the Operations and Maintenance Manuals specified in Section 01 78 00-Closeout Submittals.

1.5 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 finished surfaces during shipment and installation.

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 Items specified herein shall be standard manufactured items, modified if required and as specified to suit conditions of this project.
- .2 Fabricate work true to dimensions, square and plumb, to suit site conditions.
- .3 Thickness of metals shall be adequate for the various conditions with requirements specified as a minimum.
- .4 Finished work shall be free from warping, open seams, weld marks, rattles and other defects. Drilling shall be reamed and exposed edges finished smooth.

- .5 Provide all fastenings, anchorage and accessories as required to complete the work and as recommended by the manufacturer.
- .6 Fastenings shall be concealed or theft-proof type where possible. Exposed fastenings shall be neatly executed and shall be of the same material and finish as the base metal on which they occur.

2.2 Products

- .1 **Idea boards:** Rite-On, Wipe Off, Series 3000 writing boards, white porcelain enamel on steel, factory pre-framed in clear anodized aluminum trim with chalk rail by Architectural School Products Ltd. Sizes as indicated. Provide one package of companion writing pens (3 each red, blue, green and black) for each whiteboard.
- .2 **Tackboards:** Deluxe Series 4000, fine grain natural cork, light textured, brown with satin finished anodized aluminum frame and concealed fasteners, as manufactured by Architectural School Products Ltd. Sizes as indicated.

PART 3 EXECUTION

3.1 Installation - General

- .1 Install manufactured items in accordance with manufacturer's printed instructions and recommendations.

3.2 Cleaning

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

End of Section

Part 1 General

1.1 GENERAL

- .1 This Section covers items common to Electrical Divisions.**
- .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 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.

1.4 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 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.

1.5 INTERFERENCE AND COORDINATION 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 coordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus, and connections are coordinated.
- .3 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance are indicated on drawings.
- .4 Upon consultant's request submit copies of interference drawings to consultant.

1.6 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.

1.7 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 It is 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.

1.8 EXAMINATION

- .1 Site Inspection
 - .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, valves, 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.

1.9 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 effect these offsets, transitions, and changes in direction.

1.10 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 Cash allowances (itemized)
- .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.**

1.11 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 30 days after award of Contract.
 - .2 Provide a complete list of shop drawings to be submitted prior to first submission.
 - .3 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.
 - .4 If material or equipment is not as specified or submittal is not complete, it will be rejected by Consultant.
 - .5 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.
 - .6 **Submit all shop drawings for the project as a package. Partial submittals will not be accepted.**
 - .7 Catalog data or shop drawings for equipment, which are noted as being reviewed by Consultant or his Engineer shall not supersede Contract Documents.
 - .8 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.

- .9 Check work described by catalog data with Contract Documents for deviations and errors.
- .10 Shop drawings and product data shall show:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances. e.g. access door swing spaces.
- .11 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.
- .12 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.
- .13 Once these shop drawings are returned “reviewed” or “reviewed as noted” fabrication, production, and installation may commence. **NOTE: If a shop drawing is returned “reviewed as noted” this Contractor must provide written indication that the comments have been complied with.**

A partial list of shop drawings includes:

 - .1 Inverter
 - .2 Fire alarm system components.
 - .3 Luminaires
 - .4 Emergency battery units and fixtures
 - .5 Firestopping materials
 - .6 Occupancy sensors
 - .7 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 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.

1.12 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.

1.13 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.

1.14 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 Engineer 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.

1.15 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.

1.16 ELECTRIC MOTORS, EQUIPMENT, AND CONTROLS

- .1 Supplier and installer responsibility is indicated in the Equipment Wiring Schedule on electrical drawings.
- .2 Control wiring and conduit is specified in the Electrical specifications except for conduit, wiring and connections below 50 V, which are related to control systems specified in the Mechanical specifications.

1.17 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
 - .1 Paint outdoor electrical equipment "equipment green" finish.
 - .2 Paint indoor switchgear and distribution enclosures light grey.
- .2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .3 Clean and prime exposed non-galvanized hangers, racks, fastenings, and conduits etc. to prevent rusting.

1.18 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates as follows:
- .2 Nameplates:
 - .1 Lamicoid 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
Size 6	25 mm x 100 mm (1" x 4")	1 line	12 mm (1/2") high letters
Size 7	25 mm x 100 mm (1" x 4")	2 lines	6 mm (1/4") high letters

- .3 Wording on nameplates labels to be approved by Consultant prior to manufacture.
- .4 Allow for average of twenty-five (25) letters per nameplate.
- .5 Identification to be English.
- .6 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .7 Nameplates for disconnects, starters and contactors must indicate equipment being controlled and voltage.

1.19 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.

1.20 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.

	<u>Prime</u>
Up to 208 V	yellow
Fire alarm	red
- .4 This contractor must paint all system junction boxes and covers in conformance with the above schedule.

1.21 PROTECTION OF OPENINGS

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.22 WIRING TERMINATIONS

- .1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.23 MANUFACTURERS AND CSA LABELS

- .1 All labels must be visible and legible after equipment is installed.

1.24 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").

1.25 LOCATION OF OUTLETS

- .1 Do not install outlets back-to-back in wall; allow minimum 150 mm (6") horizontal clearance between boxes.
- .2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3 m (10'), and information is given before installation.
- .3 Locate light switches on latch side of doors. Locate disconnect devices in mechanical and elevator machine rooms on latch side of door.

1.26 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 Local switches: 1100 mm (43.3").

1.27 GUARANTEE AND WARRANTY

- .1 At the substantial completion stage 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 substantial completion will be corrected at the contractors expense.
- .2 **If the electrical sub-contractor's office is 50 kilometers (30 miles) or more from the project site, the sub-contractor is to provide a service/warranty work agreement for warranty period with a local electrical sub-contractor approved by Consultant. Include copy of service/warranty agreement in warranty section of operation and maintenance manual.**

- .3 Warranty period shall start from date of substantial completion.
- .4 Refer to individual specification sections for information on any special manufacturer's equipment warranties.

1.28 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.

1.29 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. Make changes as requested and re-submit as directed by Consultant.
- .3 Submit one manual for approval. Two manuals will be required at project completion. Each of which shall be in a three ring binder (minimum 50 mm (2") ring) labelled:
 - .1 Operation and Maintenance Manual.
 - .2 Project Name.
 - .3 Location.
- .4 Each manual must include (in "tabbed" sections) the following:
 - .1 Index
 - .2 List of Mechanical, Electrical Contractors and all associated sub-contractor names, addresses and contact numbers.
 - .3 List of suppliers and equipment wholesalers local to the project.
 - .4 One year warranty letter 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 Receipt of turned over keys for electrical panels.

- .8 Final certificate from the Electrical Safety Authority.
- .9 Final Fire alarm verification certificate and field technician device sheets.
- .10 Certificate of exit/emergency lighting testing as per the specification.
- .11 Copy of electrical shop drawings which have been stamped and reviewed by Consultant.
- .12 Any special warranties on equipment required (i.e. LED lighting, digital lighting control).
- .13 System commissioning certificate and report.
- .5 Upon acceptance of Operation and Maintenance Manual by the consultant, a pdf file of the entire manual is to be provided on a USB stick. Only one USB stick is to be provided containing both the approved manuals and as-built drawings.

1.30 AS-BUILT DRAWINGS

- .1 Site records:
 - .1 Contractor shall provide 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:
 - .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" (Signature of Contractor) (date).
 - .2 Submit hard copy to Consultant for approval. When returned, make corrections (if any) as directed.
 - .3 Once approved, submit completed reproducible paper as-built drawings as well as a scanned pdf file copy on USB stick with Operating and Maintenance Manuals. Submit approved completed reproducible paper as-built drawings as well as a scan pdf of **each** drawing file on USB stick (note pdf's cannot be combined).

1.31 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.

1.32 SUBSTANTIAL PERFORMANCE

- .1 Complete the following to the satisfaction of the consultant prior to submission of substantial performance.
 - .1 As-built Drawings.
 - .2 Maintenance Manuals.
 - .3 System Start up.
 - .4 Instructions to Owners.
 - .5 Final Certificates (Electrical Safety Authority, Fire Alarm, Emergency Lighting, Integrated Life Safety Systems Commissioning)

1.33 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.

1.34 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.

1.35 EQUIPMENT SUPPORTS

- .1 Equipment supports supplied by equipment manufacturer: shall be installed by the electrical contractor.
- .2 Equipment supports not supplied by equipment manufacturer: fabricate from structural grade steel meeting requirements of - Structural Steel Section. Submit structural calculations with shop drawings if necessary.
- .3 Mount base mounted equipment on chamfered edge housekeeping pads, minimum of 100 mm (4") high and 150 mm (6") larger than equipment dimensions all around. This installation of this pad shall be the responsibility of the electrical contractor.
- .4 This contractor shall be responsible for providing all anchor bolts and associated formed concrete bases for lighting standards as detailed.

1.36 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 Through foundation walls PVC sleeves are acceptable.
- .7 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.

1.37 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 Provide "firewrap" blanket around services penetrating firewalls. Extent of blanket must correspond to ULC recommendations. In general wrap individual conduits with approved firewrap materials on each side of firewall. Refer to architectural drawings for FT ratings. Provide 1 and/or 2 layers of firewrap with transverse and longitudinal seams overlapped and/or butted (second layer offset from first layer). Cut edges are to be sealed with aluminum foil tape. Provide 50 mm stainless steel banding at 200 mm intervals. Install firewrap to manufacturers' recommendations for proper FT rating. Acceptable manufacturers are 3M Firemaster ductwrap or approved equal.
- .6 The firestopping materials are not to shrink, slump or sag and be free of asbestos, halogens and volatile solvents.
- .7 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.
- .8 Firestop materials are to be capable of receiving finish materials in those areas, which are exposed and scheduled to receive finishes.
- .9 Firestopping shall be inspected and approved by local authority prior to concealment or enclosure.

- .10 Install material and components in accordance with ULC certification, manufacturers instructions and local authority.
- .11 **Submit product literature and installation material on firestopping in shop drawing and product data manual.**
- .12 Acceptable manufacturers:
 - .1 Fyresleeve Industries Inc.
 - .2 General Electric Pensil Firestop Systems
 - .3 International Protective Coatings Corp.
 - .4 Rectorseal Corporation (Metacaulk)
 - .5 Proset Systems
 - .6 3M
 - .7 AD Systems
 - .8 Hilti
 - .9 Royal

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.

- .13 Ensure firestop manufacturer representative performs on site inspections and certifies installation. Submit inspection reports/certification at time of substantial completion.

1.38 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.

1.39 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 180°, 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.

1.40 DELIVERY STORAGE, AND HANDLING

- .1 Follow Manufacturer's directions in delivery, storage, and protection, of equipment and materials.
- .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.

1.41 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 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.
- .5 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.

1.42 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.

1.43 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.

1.44 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.

1.45 OWNER SUPPLIED EQUIPMENT

- .1 Connect to equipment supplied by the owner and make operable.

1.46 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.

1.47 EXISTING CONCRETE SLAB X-RAY/SCANNING

- .1 This contractor shall retain the services of a qualified company to provide and X-Ray and/or scan of the existing buried services in walls and/or floors prior to starting any work in the affected area.
- .2 Failure to locate existing piping, conduit, rebar etc., shall not relieve this contractor of repair of same prior to installing his service.
- .3 This contractor shall be responsible for all repairs and/or replacement of existing services caused by cutting the existing concrete slabs and/or walls.

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

- .1 Conform to the General Provisions of Division 1 and Electrical General Requirements Section.
- .2 This project is one of a retrofit nature in part, and which will require selective demolition.
- .3 Allow for all remedial work in areas indicated on the drawings and as generally defined in the relevant sections of the specifications.

1.2 SCOPE OF WORK

- .1 The scope of work is essentially the selected disconnection and/or removal of services and/or equipment, devices etc. as indicated or required to complete the work.

Part 2 Products

2.1 GENERAL

- .1 This Division is to liaise with the Owners or Consultant for equipment being removed that may be suitable for reuse to that specified or handed over to the owner.
- .2 This Division to take full responsibility for any special tools or equipment required to disassemble or remove material from building.

Part 3 Execution

3.1 GENERAL

- .1 The general requirements are indicated on the drawings and on the outline specification in Division 1.
- .2 The general execution of the demolition is to be carried out in a clean and efficient manner.
- .3 Demolition of existing ceiling, walls etc., to facilitate removal of existing services or equipment or installation of new to be kept to a minimum and then restored to match existing.
- .4 All openings or holes created by removal of existing electrical systems which are not being reused are to be patched with the same material surrounding surfaces.
- .5 All new holes and openings to facilitate electrical systems are to be patched to match surrounding surfaces.
- .6 Protect all existing furnishings materials and equipment. Any damage occurring as a result of the work of this Division shall be repaired or replaced at the expense of this Division.

- .7 Where work involves breaking into or connecting to existing services, carry out work at times directed by the Owners in an expedient manner with minimum disruption to the facility and systems downtime.
- .8 Where unknown services are encountered immediately advise Consultant and confirm findings in writing.
- .9 Where the location of any services has been shown on the plans, such information is not guaranteed. It is this Division's responsibility to verify locations, etc., immediately after moving on site. Should for any reason the information obtained necessitates changes in procedure or design, advise the Consultant at once. If verification of existing conditions is not done at the outset and any problems arise, the responsibility for same is entirely this Division's.
- .10 Disconnect and/or remove equipment, devices, cabling, services, etc. as indicated.
- .11 Remove all redundant and obsolete systems, connections, and wiring.
- .12 Provide a list of equipment to be removed to the owner, for their acceptance of same. Remove all equipment from site that the owner does not retain.
- .13 Maintain equipment to be retained by owner on site where directed by consultant.
- .14 Demolition of all parts of the work must be completed within the confines of the work area and in such a way as the dust produced and risk to injury of will not adversely affect the building users.
- .15 Demolished areas of the existing building will remain in their current use in some cases. Demolition in these areas must be kept to the minimum required to complete the work.
- .16 Demolition shall take place within areas isolated from all other areas with appropriate hoarding, scaffolding, netting, fencing or other means of security between building users and the work.

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.

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 (194°F) rated T90 for indoor above grade installations and RW90 for below grade installations.

2.2 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.

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 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 Splitters must conform to CSA C22.2 No. 76 (latest edition).
- .2 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 OUTLET AND CONDUIT BOXES GENERAL

- .1 Size boxes in accordance with CSA C22.1.
- .2 102 mm (4") square or larger outlet boxes as required for special devices.
- .3 Gang boxes where wiring devices are grouped.
- .4 Blank cover plates for boxes without wiring devices.
- .5 347 V outlet boxes for 347 V switching devices.
- .6 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 SHEET STEEL OUTLET BOXES

- .1 Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 76 mm x 50 mm x 64 mm (3" x 2" x 2½") or as indicated. 102 mm (4") square outlet boxes when more than one conduit enters one side with extension and plaster rings as required. Iberville 1104 Series.
- .2 Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit **in utility rooms**, minimum size 102 mm x 57 mm x 38 mm (4" x 2¼" x 1½"). Iberville 1110 Series.
- .3 102 mm (4") square or octagonal outlet boxes for lighting fixture outlets.
- .4 102 mm (4") square outlet boxes with extension and plaster rings for flush mounting devices in finished tile walls.

2.3 CONDUIT BOXES

- .1 Cast FS or FD ferrous alloy 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.**

2.4 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**
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 Rod electrodes: copper clad steel 19 mm (3/4") diameter by 3 m (10') long.
- .3 Plate electrodes: galvanized steel, surface area 0.2 m², minimum 1.6 mm thick.
- .4 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.
- .5 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.
- .6 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 Use mechanical connectors for grounding connections to equipment provided with lugs.

- .6 Soldered joints not permitted.
- .7 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.
- .8 Install separate ground conductor to outdoor lighting standards.
- .9 Ground pad mounted transformers as detailed on the drawings.

3.2 EQUIPMENT GROUNDING

- .1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centres, starters, control panels, building steel work, generators, elevators and escalators, distribution panels, and outdoor lighting.

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.
 - .5 CSA C22.2 No.211.2-M1984(R1992), Rigid PVC (Unplasticized) Conduit.
 - .6 CAN/CSA C22.2 No.227.3-M91, Flexible Nonmetallic Tubing.

Part 2 Products

2.1 CONDUITS

- .1 Rigid metal conduit: to CSA C22.2 No.45, aluminum threaded.
- .2 Epoxy coated conduit: to CSA C22.2 No.45, with zinc coating and corrosion resistant epoxy finish inside and outside.
- .3 Electrical metallic tubing (EMT) with couplings: to CSA C22.2 No.83.
- .4 Rigid PVC conduit: to CSA C22.2 No.211.2.
- .5 Flexible metal conduit: to CSA C22.2 No.56, aluminum and liquid-tight flexible metal.
- .6 Flexible PVC conduit: to CAN/CSA C22.2 No.227.3, ENT.

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 Liquid type flexible metal conduit fittings shall be sealtite type.
- .4 PVC fittings shall be PVC type complete with PVC adaptors at all boxes.
- .5 Rigid conduit and mineral insulated conduit fittings shall be threaded type.

- .6 Coating: same as conduit.
- .7 Factory "ells" where 90° bends are required for 27 mm (1") and larger conduits.
- .8 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 Use electrical metallic tubing (EMT) for all branch circuits unless specified otherwise.**
- .4 Use rigid aluminum threaded conduit where specified and up to 2.1 m (7'0") above finish floor where exposed to mechanical injury.
- .5 **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 (1/2").
- .6 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .7 Mechanically bend steel conduit over 27 mm (1") diameter.
- .8 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .9 Install fish cord in empty conduits.
- .10 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.
- .11 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 larger than 25 mm (1") to roof deck. Provide standoffs or supports as manufactured by Caddy or use unistrut trapeze fastened to structure.**

3.3 CONCEALED CONDUITS

- .1 Do not install horizontal runs in masonry walls.
- .2 Do not install conduits in terrazzo or concrete toppings.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS

- .1 Submit shop drawings for each system in Conformance with The Electrical General Requirements Section.

1.2 PRODUCT/MAINTENANCE DATA

- .1 Submit product/maintenance data for each system for inclusion in maintenance manual conforming to The General Electrical Requirements Section.

1.3 SCOPE

- .1 The scope of this Section will include the following systems.
 - .1 Digital Occupancy & Daylight Control Systems.

Part 2 Products

2.1 DIGITAL OCCUPANCY & DAYLIGHT CONTROL SYSTEMS

- .1 Provide room based lighting control system.
- .2 Basis of design: Sensorswitch nLight.
 - .1 Acceptable alternates:
 - .1 Cooper WaveLinx CAT.
 - .2 Wattstopper DLM.
- .3 Electrical design drawing lighting schematics are generic and meant to show intent of controls approach only. Contact Wharton Sales Co. (WSC) Lighting System for lighting control system schematics, wiring diagrams, controls risers, and installation instructions prior to bid.
 - .1 WSC Lighting System contact information:
 Kory Kieswetter – Tel: 519-575-5483
- .4 All devices have RJ-45 female ports. Making network control cables on site is required.
- .5 Cabling for system shall be Category 5e as per manufacturer's recommendations.
 - .1 Cable shall be 4 pair, 24 AWG solid bare annealed copper conductors, ANSI/TIA/EIA-568-B.2 and ISO/IEC 11801 category 5e compliant.
 - .2 The jacket shall be printed with TRU-Mark™ 1000' to 0' marking system, CMP (FT-6) rated with outer sheath colour for each level in the system to be according to advisement by school board representative.
 - .3 Shall be suitable for use indoor, riser or plenum, and horizontal applications.

Part 3 Execution

3.1 DIGITAL OCCUPANCY AND DAYLIGHT CONTROL SYSTEMS

- .1 Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated.
- .2 Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings.
 - .1 Adjust time delay so that controlled area remains lighted for 5 minutes after occupant leaves area.
- .3 Install power packs in accessible maintenance areas unless noted otherwise. Provide access doors if power packs are installed above drywall ceilings.
- .4 Install sensors in gym where noted on plan at mid-height of wall.
- .5 It shall be the contractor's responsibility to locate and aim sensors in the correct location required for complete and proper coverage within the range of coverage as per the manufacturer's recommendations. The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. The contractor shall provide additional sensors if required to properly and completely cover the respective rooms.
- .6 Provide written or computer-generated documentation on the commissioning of the system including room by room description including:
 - .1 Sensor parameters, time delays, sensitivities, and daylighting setpoints.
 - .2 Sequence of operation, (e.g. manual ON, Auto OFF. etc.)
 - .3 Load Parameters (e.g. blink warning, etc.)
- .7 Re-commissioning – After 30 days from occupancy re-calibrate all sensor time delays and sensitivities to meet the Owner's Project Requirements. Provide a detailed report to the Architect / Owner of re-commissioning activity.
- .8 Include the following support service visits to site:
 - .1 Pre-wiring visit.
 - .2 ASHRAE functional testing coordination visit.
 - .3 Final system commissioning visit.
- .9 Contact owner representatives a minimum of 30 days prior to commissioning of lighting controls:
 - .1 Steven Altpeter, Project Manager, steven_altpeter@kprdsb.ca
- .10 Factory Commissioning
 - .1 Upon completion of the installation, the system shall be commissioned by the manufacturer's factory authorized representative who will verify a complete fully functional system.
 - .2 The electrical contractor shall provide both the manufacturer and the electrical engineer with ten working days written notice of the system startup and adjustment date.

- .3 Upon completion of the system commissioning the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system.
 - .4 Factory commissioning shall include functional testing and documentation of the control system conforming to the "Functional Testing" requirements included in the current ASHRAE standard. This cost shall be included in the Tender Price.
- .11 Cabling Installation
- .1 Cabling Contractor is to adhere to all Standards, regulations and documents listed following.
 - .2 All products installed must meet or exceed all local, provincial, and federal building, fire, health, safety and electrical codes.
 - .3 The responsibility of this sub-contractor is to include but not be limited to:
 - .4 Supply and installation of data cabling to every digital lighting control device as per manufacturer's recommendations.
 - .5 Termination of data cabling as per manufacturer's recommendations.
 - .6 General installation practices shall be as follows:
 - .1 Supply and install cabling to locations as detailed on floor plan(s). The Cabling Contractor shall use the cabling support system (supplied by others) to distribute the cables throughout the facility. Where the cables leave the cable support system and extend to the termination point they shall use the conduit provided or cable management system. Any horizontal exposed cable must be installed in surface raceways equal to Wiremold Series 500/700.
 - .2 All Cables and components to be installed and terminated in accordance with CSA, ANSI/EIA/TIA-568 and its' Amendments as well as UL Guidelines. Particular attention must be given to maintaining the integrity of the pair twists, bend radius and ensuring proper distance is kept from fluorescent light fixtures, electrical cables, or any other source of EMI.
 - .3 The maximum horizontal run length is not to exceed 457 m (1,500').
 - .4 Avoid scraping, denting, or otherwise damaging cables, before, during or after installation. The Cabling Contractor without any additional compensation shall replace damaged cables.
 - .5 Ensure that all cable lengths are sufficient to allow for slack, vertical runs, wastage, connectorization and future moves.
 - .6 Bush, ream and remove any sharp projections on all conduits prior to installation of communications cables.
 - .7 When terminating copper cables remove only enough cable jacket to perform termination, untwist pairs a maximum of 13 mm (1/2") for, Enhanced Category 5.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

- .1 Submit product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 BREAKERS GENERAL

- .1 Moulded case circuit breakers must conform to CSA C22.1 No.5.1-M91 (latest edition.)
- .2 Bolt-on moulded case circuit breaker quick-make, quick-break type, for manual and automatic operation.
- .3 Common-trip breakers: with single handle for multi-pole applications.
- .4 Unless otherwise indicated moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

Part 3 Execution

3.1 INSTALLATION

- .1 Install circuit breakers as indicated complete with all necessary mounting hardware and filler panels if necessary.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 SWITCHES

- .1 General purpose AC switches must conform to CSA C22.2 No. 111 (latest edition).
- .2 15 or 20 A, 120 V, single pole, double pole, three-way, four-way, keyed, or motor rated switches complete with pilot light.
- .3 Manually-operated general purpose ac switches with following features:
 - .1 Terminal holes approved for No. 10 AWG wire.
 - .2 Silver alloy contacts.
 - .3 Urea or melamine molding for parts subject to carbon tracking.
 - .4 Suitable for back and side wiring.
 - .5 Toggle style (Rocker style) (architect to select colour).
- .4 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.
- .5 Switches of one manufacturer throughout project.
- .6 Acceptable materials:
 - single pole: Hubbell Cat # HBL1201 [HBL2101 (decora)] Series
 - three way: Hubbell Cat # HBL1203 [HBL2103 (decora)] Series
 - four way: Hubbell Cat # HBL1204 [HBL2124 (decora)] Series
 - Keyed: Hubbell Cat. #HBL1221 Series complete with 2 keys per switch
 - (Keys): Hubbell Cat. #HBL1209
 - Motor rated: Hubbell Cat. #HBL1221PL [HBL2121 PL (decora)] c/w pilot light (20 A):
- .7 Acceptable alternate manufacturers include:
 - .1 Pass & Seymour
 - .2 Leviton.

2.2 RECEPTACLES

- .1 Receptacles, plugs, and other similar wiring devices must conform to CSA 22.2 No 42 (latest edition).
- .2 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, with following features (20A where noted):
 - .1 Urea molded housing (Colour by architect).
 - .2 Suitable for No. 10 AWG for back and side wiring.
 - .3 Break-off links for use as split receptacles.
 - .4 Eight back wired entrances, four side wiring screws.
 - .5 Triple wipe contacts and rivetted grounding contacts.
- .3 Other receptacles with ampacity and voltage as indicated.
- .4 Receptacles of one manufacturer throughout project.
- .5 Acceptable materials:

Tamper resistant receptacle	Hubbell Cat # BR15TR
Tamper resistant T-slot receptacle	Hubbell Cat. #BR20TR
Tamper resistant ground fault protected receptacle	Hubbell Cat. #GFTR15
Tamper resistant ground fault protected T-slot receptacle	Hubbell Cat. #GFTR20 complete with Decora style coverplate to suit specification below

- .6 Acceptable alternate manufacturers include:
 - .1 Pass & Seymour
 - .2 Leviton

2.3 COVER PLATES

- .1 Cover plates from one manufacturer throughout project.
- .2 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.
- .3 Stainless steel, brushed, 1 mm (1/32") thick cover plates for wiring devices mounted in flush-mounted outlet box.

Part 3 Execution

3.1 INSTALLATION

- .1 Switches:
 - .1 Install single throw switches with handle in "UP" position when switch closed.
 - .2 Install switches in gang type outlet box when more than one switch is required in one location.
 - .3 Mount toggle switches at height specified in Electrical General Requirements Section or as indicated.

- .2 Receptacles:
 - .1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
 - .2 Mount receptacles at height specified in Electrical General Requirements Section or as indicated.
 - .3 Where split receptacle has one portion switched mount vertically and switch upper portion.
- .3 Cover plates:
 - .1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.
 - .2 Install suitable common cover plates where wiring devices are grouped.
 - .3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

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 substantial completion.
 - .1 LED fixtures, and driver: 5 years.
- .2 The labour required to replace these ballasts, lamps or 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.

1.5 EXISTING FIXTURE BALLAST REMOVAL AND DESTRUCTION

- .1 Scope
 - .1 This Contractor is responsible for contracting with an approved company for the dismantling, disposal and removal of all existing fluorescent ballasts and lamps from this project. This process must include but is not limited to the following:
 - .1 Removal of existing ballasts from fixtures by this contractor.
 - .2 This contractor is to compare the ballast number to the PCB ballast identification booklet provided by the disposal company.
 - .3 If the ballast is not contaminated it is to be disposed of by normal means.
 - .4 If the ballast is contaminated provide:
 - .1 Approved interm on site storage area.
 - .2 Approved interm on site storage containers.
 - .3 Any and all necessary on site inspections.
 - .4 All necessary approval certificates (include copies in maintenance manuals).
 - .5 Full dismantling, complete destruction and disposal of all ballasts components.
 - .2 Approved Disposal Companies
 - .1 PCB Containment Technology Inc.
75 Wanless Court
Ayr, Ontario
NOB 1E0
Phone: (519) 740-1333
Fax: (519) 740-2320
 - .3 Payment Procedures
 - .1 Cost of complete services of this sub-contractor shall be paid for by this Section. Refer to Allowances and Fees Section for allowance to be carried for this work.

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 gasketting, 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 LED's must be tested in conformance with IESNA LM80 standard.
- .2 LED's 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.
- .9 Fixtures must be energy star or pcc rated.

2.4 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 Ball align hangers must be provided for rod suspended fixtures.
- .3 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.
- .4 Plaster frames/flange kits must be provided by this Division for fixtures recessed in plaster and/or drywall ceilings.

- .5 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 900mm (36") intervals along length of drop. Final appearance must be neat and professional.
- .6 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.
- .7 Install emergency lighting units and associated remote mounted fixtures as indicated.
- .8 Direct "heads" on units and remote mounted fixtures to illuminate path(s) of exit.
- .9 Install emergency lighting units and remote fixtures at 300mm (12") below finished ceiling, unless indicated otherwise.
- .10 **Special installation: Secure fixtures to structure to conform to the Electrical Safety Code using "jack chain" NOT ceiling suspension wire. Where coreslab is used, suspension point must be independent of the one used for suspension of the ceiling assembly. As an alternate to jack chain the contractor may use a pre-manufactured aircraft cable suspension and fastening system as manufactured by Gripple (Gripple Cat. #HF02-10F2). Provide minimum 2 per fixture.**
- .11 All battery units are to be provided with a visible lamicoïd 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.

END OF SECTION

27.1 Network and Telephony Cabling

- a. Only first class workmanship will be accepted, not only in regards to durability, efficiency and safety, but also in regards to neatness of detail. Present a neat and clean appearance on completion to the satisfaction of the Engineer. Any unsatisfactory workmanship will be replaced at no extra cost.
- b. Data cables to be Cat6 with dark blue outer sheath.
- c. Phone cables to be Cat6 with dark blue outer sheath.
- d. PA speaker cables to be Cat6 with white outer sheath.
- e. All cable to be FT6 rated when used in plenum spaces.
- f. All data drops to be home-run to nearest appropriate Communications Room.
- g. The maximum cable run length is not to exceed 91.4m (300'). If this cannot be met, contractor must consult with Owner to determine a suitable alternative.
- h. All products shall be new, of the latest version at time of bid, and brought to the job site in original manufacturer's packaging. Used equipment and damaged material will be rejected.
- i. Take care during installation to prevent scratches, dents, chips, etc. Equipment with significant or disfiguring cosmetic flaws will be rejected.
- j. In renovations/refreshes, Ethernet TIA cabling standard to be maintained consistently throughout school. For example, if TIA standard "A" is prevalent in the school, continue with "A" standard for all new cabling in the school.
- k. All cabling to be run within existing conduit/raceways/cable trays/cable hooks/paths wherever possible.
- l. Plenum cables are permitted in accessible ceilings. Provide 'J' hooks in these locations.
- m. Fish conduit, clear blockages and outlet and clean out pull boxes at completion of installation. Leave conduit free of water or excess moisture. Install No. 12 gauge galvanized soft iron pull wire, or 3.2 mm (1/8 in) nylon pull cord continuously from outlet to outlet, through conduit and fasten at each box.
- n. Install additional steel pull boxes in such a manner that, throughout entire system, there shall be not more than two 90 degree or equivalent bends or more than 30 m (100 feet) in each run, so that wire or cables may be pulled in or withdrawn with reasonable ease. Minimum space requirements in pull boxes having one conduit each in opposite ends of the box, shall be as follows:

Maximum conduit size	Size of pull boxes in millimetres			For each additional conduit size increase width by:-
	Width	Length	Depth	
21 mm	150 mm	300 mm	100 mm	50 mm
27 mm	200 mm	400 mm	150 mm	75 mm
35 mm	250 mm	450 mm	200 mm	75 mm
41 mm	300 mm	600 mm	250 mm	100 mm
53 mm	350 mm	750 mm	300 mm	125 mm

- o. Firestopping is required in all penetrations to fire rated assemblies according to Code.
- p. All data and telephony drops and corresponding cables removed in construction, which are not re-used immediately as part of the project, are to be fully removed and un-terminated from the patch panel to which it connects. This includes full removal of the redundant cable from applicable ceilings/walls/conduits/raceways/cable trays/cable hooks, and the removal of labels

- at the patch panel. If pulling the wire all the way out is not feasible, Owner may accept just un-terminating the affected cables from the patch panel and orphaning the cable in the ceiling.
- q. BIX (including 'Gigabix') connectors are not acceptable for network cables. If a cable run is too short to reach the required termination point, a new home-run cable must be installed.
 - r. All existing data and telephony drops are to remain, unless explicitly stated otherwise. If any drops are removed, they must not be orphaned in the ceiling; they must be removed from the BIX panel or patch panel as applicable. For example PA speakers and Wireless Access Points shall re-use existing cabling, unless it is otherwise damaged.
 - s. Existing PA, phone, and network cables are not to be replaced, if functioning properly.
 - t. If construction is occurring inside a Communications Closet, contractor must protect the equipment by sealing it off from (i.e. by tarping it off). In cases in which this is not possible, contractor to engage with Owner to arrange for alternative measures.
 - u. All copper cabling to follow standards as required by TIA 568.0-D, 568.01-D, 568.02-D in each respective scenario.
 - v. Cabling systems to meet or exceed the specifications of the T1A-568A standards and ISO/IEC IS 11801, if applicable.
 - w. All cabling to be grounded and bonded as required by TIA 607-D standards.
 - x. All cabling to be concealed and protected in appropriate cable trays or conduit or raceway, unless otherwise safely and aesthetically hidden in ceiling or wall space.
 - y. Modular jacks to be Category 6 compliant.
 - z. Marettes are not to be used with any network or telephony cabling. Bean "B" connectors are acceptable when properly used.

27.2 Faceplates

- a. Faceplates shall be UL Listed and CSA Certified.
- b. Faceplate material and colour to match electrical faceplates.
- c. Faceplate sizing to match electrical faceplates.
- d. Faceplates shall be available to mount up to six in a single gang, and up to twelve in a double gang configuration.

27.3 Backbone Cable

- a. Provide fibre optic backbone cables from the main Communications Room to all new or relocated secondary Communications Rooms, each as a dedicated home run.
- b. Except where VoIP phone systems are in place, provide 25 pair cat3 backbone cable from the main Communications Room to all new or relocated secondary Communications Rooms, each as a dedicated home run.
- c. Provide 12 pair cat3 cable from Phone BIX panel to 12 port patch panel in the Communications Rack, labelled as phone lines. Install in separate U from data patch panels.

27.4 Fibre Optic Connectors and Adaptors

- a. Fibre Optic connectors shall be LC style multimode.
- b. Fibre Optic Adaptors shall be LC duplex multimode with ceramic sleeves.
- c. All fibre optic cabling to follow standards as dictated by TA 569-E.

27.5 Communications Rooms and Patch Panels

- a. No Communications Rooms or IT equipment within, are to be moved, added, or removed without explicit approval from Owner.
- b. Communications Rooms moved or added must include fibre optic backbone cable to primary Communications Room.
- c. Each secondary Communications Closets is to have a dedicated multimode LC fibre connectivity back to the primary Communications Closet
- d. In schools with analogue phone systems, a 25 pair cat3 or cat5 or cat6 cable is required between closets.
- e. Contractor to supply one floor mounted rack for each Communication Rooms.
- f. Communications Rooms to have floor mounted racks, ideally installed 36" from back wall, and minimum of 24" from the back wall, as space allows.
- g. Floor mounted racks to be 2-post, 45RU, and 19" module compatible, manufactured in steel (not aluminum). Example is the Panduit model R2P6S.
- h. Patch panels to be mounted in 19" rack(s) and/or cabinets.
- i. Racks must have 10/32" size screw holes.
- j. Racks and patch panels must be black in colour.
- k. Patch panel jack modules to be Panduit, such as model CJ688TGBL.
- l. Racks to include hinged steal vertical cable management on each side, examples are the Panduit PR2VDo6 and WMPV45E.
- m. Racks to include to include four horizontal cable management 2U trays required per rack spaced with 1U gap between each tray. Example is the Panduit CMPHH2.
- n. Racks much have top 2U must be reserved for patch panels.
- o. All Patch panels should meet or exceed industry standards, fit into a 19" rack and be 1RU in height, black in colour, and flat style (not angled). Example of this is the Panduit model CPP24FMWBLY.
- p. Panel shall have an adapter tray that accepts 6 six-pack adapter plates with LC multimode adapters. The panel adapter tray shall be removable from the front of the panel by sliding the tray forward. Panel shall have built in patch cable management incorporated into the front of the adapter tray and hold 12-24 fibre connections.
- q. Raceway, conduit, J hooks, and other cabling accessories may be of other brands; so long as they can meet the required quality of TIA standards.

27.6 Labelling

- a. Supply and install labels at each terminated location. Labels shall be affixed to the faceplate on the space provided by the manufacturer.
- b. Labels shall be mechanically or digitally printed. Handwritten labels are not acceptable.
- c. For Data and Voice cables, labelling at the faceplate (or on keystone for Wireless Access Points) on the client end and the network rack patch panel to be in the format "*ROOM# {dash} COMMUNICATIONS CLOSET LETTER {dash} DROP#*". For example, a cable terminating in Room 101 wired to Communications Room 'A' into patch panel drop 12, is to be labelled as "101-A-12" at both ends.

- d. PA cables are to be labelled in the format "*ROOM# {dash} COMMUNICATIONS CLOSET LETTER*". For example, a PA speaker terminating in Room 101 wired to Communications Room 'A' is to be labelled as "101-A" at both ends.
- e. BIX panels are to be labelled with corresponding room numbers.
- f. PA cabling for speakers in hallways may use "HallA" and "HallB" instead of a room number. For example, Hall1-A for the first chain of speakers going to Hub A, Hall2-A for the second chain.
- g. Port numbers within a room should be sequential and maintain sequential numbering across adjacent rooms.

27.7 Phone Systems

- a. New voice jacks for existing digital (non-VoIP) systems are to be run and patched to main phone system. Confirm this location with Owner, as it is not always in the main Communications Room.
- b. New voice jacks for new or existing VoIP phone systems are to be installed as a standard data drop to the nearest appropriate Communications Room.
- c. All new voice cabling, whether for Digital or VoIP systems, are to be installed as cat6 with a dark blue outer sheath.
- d. For all existing digital (non-VoIP) phone systems, a 25 pair cable must be terminated at the Voice Patch Panel into a 24 port loaded patch panel, with the other end terminated at the BIX1A punch down blocks mounted in BIX10A at phone system.
- e. All new phone system installs are to be the 'Avaya IP Office 500v2' VoIP phone system with the following features (part number in brackets):
 - I. IP Office R10+ IP Endpoint LIC (383110, minimum 8 per school)
 - II. IP Office R10+ 2Channels Lic (383127)
 - III. IP Office R11 LIC (396445)
 - IV. Power Cord 18AWG (700289770)
 - V. Rack Mounting Kit (700429202)
 - VI. V2 System SD Card (700479710)
 - VII. IP Office 500 Version 2 Control Unit (700501510)
 - VIII. IP500 V2 Combo Card ATM4 V2 TAA (700504897)
 - IX. J139 IP Phone (700513916, minimum 4 per school)
 - X. J179 IP Phone (minimum 3 per school)
- f. Contractor to collaborate with Owner to configure new phone systems and moves/adds/changes to existing phone systems.
- g. For VoIP systems, Avaya J179 handsets are to be used for Principals, VPs, and secretaries; with Avaya J139 handsets in all other locations.
- h. For all Digital (non-VoIP) phone systems, Avaya 9508 digital telephones are to be used for Principals, VPs, and secretaries: with Norstar Cat. #T-7208 handsets for all other locations.
- i. For all phone systems (both VoIP and Digital) an 'emergency' phone is to be installed on the wall near the secretary or principal's desk. This is to be connected directly with an RJ11 cable back to dial tone from the provider, bypassing the phone system.

27.7.1 Elevator Communications

- a. Install phone cable (Cat6 cable with dark blue outer sheath) from elevator room directly to the main phone system.
- b. In coordination with Owner, connect elevator call number to an existing line with a line seizure device. This method will guarantee an outgoing connection for the elevator without requiring an additional phone line for the school.
- c. Owner's preferred line seizure device is the Viking LSR-1:
<https://www.vikingelectronics.com/products/lsr-1/>
- d. Owner requires two pauses before the number to allow the line seizure device time to seize the lines prior to starting to dial.
- e. Self-test of elevator communications is to be done only between 6pm and 6am. This prevents phone calls/lines in the school from being interrupted during regular operating hours.
- f. Elevator communications self-test to be configured to self-test once each day per TSSA requirements: <https://www.tssa.org/en/elevating-devices/resources/Documents/ED-290-20---Elevator-Phones---Various-Technologies.pdf>

27.8 Wi-Fi & Wireless Access Points (APs)

- a. Wherever possible mount APs in middle of room on dropped ceiling.
- b. APs are not to be mounted greater than 15ft AFF, whether ceiling or wall mounted. Purpose is to allow for easy maintenance and optimal RF performance.
- c. When installing APs in a dropped ceiling, cut discrete hole for the data cable to come through, allowing the ceiling tile to lay flat.
- d. Owner's required AP model for most areas (including classrooms) is the [Meraki MR36](#) . High density areas (including but not limited to gymnasiums and auditoriums) require the [Meraki MR46](#). Outdoor Aps require the Meraki [MR76](#) or the Meraki [MR86](#). Substitution of a higher powered or newer model is acceptable with Owner's permission.
- e. All Meraki licensing is to applied to the Owner's existing 'KPRDSB' Organization in Meraki dashboard.
- f. Contractor to install/reinstall (mount) all APs.
- g. Mounting instructions for MR42 can be found here:
https://documentation.meraki.com/MR/Installation_Guides/MR42_Installation_Guide .
Mounting instructions for MR36 are here:
https://documentation.meraki.com/MR/MR_Installation_Guides/MR36_Installation_Guide .
Refer to the 'Installation Instructions' heading.
- h. When mounting APs in T-Rail ceilings, the manufacturer's mounting kit must be used. The mounting kit can be provided by Owner, upon request. Mounting kit specs:
<https://meraki.cisco.com/product/wi-fi/wireless-accessories/wireless-accessories-mount-kits/wireless-accessories-mount-kits-ap-mount-kits/ma-mnt-clg-1/>
- i. Data drops for APs to be terminated as a fully contained data jack. An example is the Panduit CBX1WH-A surface mount box (link: <https://www.panduit.com/en/products/copper-systems/faceplates-boxes/surface-mount-boxes/cbx1wh-a.html>) with the Panduit CJ688TGBU UTP Jack Module (link: <https://www.panduit.com/en/products/copper-systems/connectors/jack-modules/cj688tgbu.html>).

- j. APs that are temporarily removed during construction must be re-installed back to their original location, unless otherwise specified by Owner or the plans.
- k. APs that are 'existing to be removed' must be safely removed by the contractor and returned to Owner.
- l. When APs are being removed (to be reinstalled), APs must be securely stored by contractor and be temporarily labelled (i.e. with masking tape) with room number, and in cases with multiple APs per room to also include coordination N, E, S, W marking.
- m. APs must always remain below or mounted on T-Rail ceilings, they must never be left or installed above a T-Rail ceiling. If a new T-Rail ceiling is installed under an existing AP, the AP must be moved to mount onto the new ceiling.
- n. For APs that are damaged or not returned, a charge back cost of \$1,000 will be applied.
- o. For new APs not already existing, contractor must be provided a minimum of 5 business days notice to Owner, allowing Owner to prepare and supply APs to the contractor.

27.9 Public Address (PA) System

- a. Contractor to collaborate with Owner to configure new PA systems and moves/adds/changes to existing PA systems.
- b. All new or moved PA cables must be run back to the main PA system. Confirm this location with Owner, as it is not always in the main Communications Room.
- c. Where handsets exist for PA speakers, they must remain or be replaced with new compatible handsets.
- d. All new or moved PA cables must be terminated on a 36D BIX or BIX1A or similar modular Jack which must be installed 4'-6" A.F.F. where space permits.
- e. All new PA Systems to be Carehawk model 'CH1000-2I-2A-2PG' with the following hardware features (part numbers in brackets): Email Alert Module (EAM), Switch Security Cards as needed (SS16), Administrative Phone (AC1) with PA-AP1 Power Supply, Telephone Communications Card (TC2-KIT), Digital 100 Watt Class D Paging/Power Amplifier 25V with enclosure (DAF100-25) as needed, Attenuator 25V (AT1) as needed.
- f. Each 'SS16' to have a dedicated homerun, via cat6 cable, to the main PA system and terminated as a data jack next to the main PA System, then use a patch cable to plug it into the PA System.
- g. PA system to include providing and connecting a mixer with the following inputs: XLR mic , 3.5mm input. CD players and FM tuners are not required for PA systems. To be in the main office.
- h. Each room to be configured as its own dedicated channel.
- i. Each hallway to be configured as a single channel but can be adapted as needed for specific circumstances. All hallways programmed to the hallway zone (Zone 2).
- j. Hallways are to have speakers throughout, no more than 10 meters apart.
- k. Require Cat6 cable run from main PA system to PA console (microphone or phone). The console is usually located in the main office.
- l. Require a shielded 4 wire 18-gauge cable from main PA system to the tuner box. Note the tuner box is usually located in the main office near the secretary.

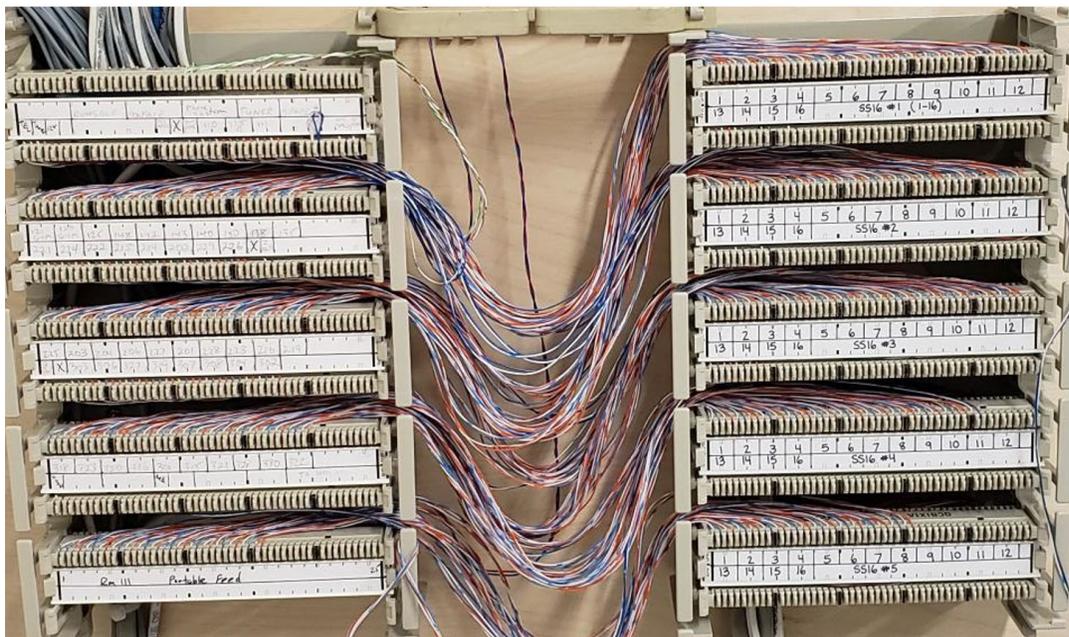
- m. Configuration of PA system to include bells on school's schedule, pre-recorded messages including but not limited to lockdown messaging. If configuration is not able to be completed, contractor must work with Owner to arrange alternative.
- n. PA horns to be TOA brand, model SC-630. Horns are not to be used interior.
- o. Outdoor horns to be mounted no more than 10ft above ground level.
- p. Speakers to be installed on the ceiling T-bars with 25 Volt transformers.
- q. Speaker part number with transformer and white square grill: 8229/25/25 link: <https://mcbrideloudspeaker.com/images/specs/8LS82219.pdf><https://mcbrideloudspeaker.com/McBride-8229-25-25-Assembly.html> . Speaker on its own is the McBride 8LS822-19 <https://mcbrideloudspeaker.com/McBride-8LS822-19.html> . Transformer on its own is the McBride MCT25 <https://mcbrideloudspeaker.com/McBride-MCT25.html>
- r. In suspended ceilings, speaker rails must be supported by ceiling rails.
- s. Ceiling mounted speakers are not to have call buttons.
- t. Speakers in the following spaces to be programmed for emergency paging only: calming / quiet rooms and spaces used primarily by third-party facility partners (i.e. daycares).
- u. Gyms and hallways require multiple speakers each, spaced approximately 20' apart.
- v. In offices speakers are to be tapped to 0.25 Watt.
- w. In all other applications speakers to be tapped to 1 Watt.
- x. In shop classes, gyms, and mechanical rooms; a quantity of at least two (upwards of 4) McBride 8LS822-19 speakers are required, spread throughout the room to provide coverage throughout the room, tapped to 1 Watt each.
- y. Shops, Gyms, and Auditoriums to have speakers wall mounted approx. 10 to 15 AFF, rather than ceiling mounted.
- z. Shop classes to include 1 Carehawk HS100 "Handset Station" connected to the PA speaker.
- aa. For new builds and school refreshes, the [Carehawk 'Classroom Phone'](#) is to be installed in or on the Control Panel of each classrooms, shop, and meeting space. Call button installation is also required in Control Panel.
- bb. All classrooms to have a standard call button (in addition to above Classroom Phone).
- cc. All existing handsets are to remain or be replaced with new HS100 handset or Carehawk Classroom Phone.
- dd. Main cable from the PA system is to be wired to the handset. A separate cable is to be wired from the handset to the PA speaker in the room.
- ee. There must be a white toggle call button installed in every classroom, meeting room, resource room, staff room, and office.
- ff. In gyms, install a white toggle call button in a recessed box with cover.
- gg. In shops install a white toggle call button as well as a PA handset.
- hh. Do not connect to privacy switch in any room.
- ii. Service loops are required at all terminated ends.
- jj. PA systems to be installed in a clean, well organized, and thoroughly labelled manner. A proper backboard and cable management is required. Example pictured below.
- kk. All wires not used on a speaker are to be taped individually or cut and taped so that the wires do not touch metal or each other.
- ll. PA wiring should be fed first to the handset/call-button and a separate cable from there to the speaker itself. The white/blue pair is to be terminated to the speaker and not continue down to the call button. The white/orange pair is to be terminated to the call button. Leave service loop.

- mm. Marette connectors are not acceptable. B-connectors are standard.
- nn. Any spare speaker wires must have the bare ends cut off and taped together with electrical tape to avoid inadvertent contact with other parts or wires.
- oo. BIX panels must have reasonable clearance to provide access to maintain.
- pp. Final terminations to PA and Phone system may be completed by Owner, when/if consulted in advance.

Figure 1: PA system cabling and termination to BIX panel, with service loops and neat cabling



Figure 2: Labelling on BIX panel after cross-connects



27.10 Operational Technology

- a. For purposes of this document Operational Technology (OT) includes, but is not limited to, Building Automation Systems, Card Access Systems, Irrigation Systems, Security Cameras, and Electronic Signs.
- b. All data connections for Operational Technology to be installed under the same standards as all other data cabling, including cat6 cabling and a home run to the nearest Communications Room.
- c. OT network connectivity is to be wired (ethernet) only. Wi-Fi connectivity for OT is not permitted. If a vendor would like to request Wi-Fi connectivity for OT, they must formally request it through Owner's ICT department and request an exemption.
- d. Network drops and interfaces for all operational technology are to be configured in collaboration with Owner and with an IP address, Subnet Mask, and Default Gateway determined by Owner, to ensure network security requirements are met.

27.10.1 Electronic Signs

- a. Electronic signs must utilize cloud-based (internet) management consoles.
- b. The cloud-based management must be compatible with Chrome and Edge modern browsers and must not require the installation of additional software or plugins.
- c. Sign management systems requiring locally installed software are not permitted.
- d. Sign management systems requiring layer 2 network access are not permitted.
- e. Remainder of Electronic Signs are provided in the appropriate Division.

27.10.2 Security Cameras

- a. Security cameras must be [Verkada](#) brand and licensing applied to Owner's existing Verkada Command account (or purchased through Owner) and installed to the manufacturer's specifications with applicable mounting accessories such as the ACC-MNT-2, ACC-MNT3, ACC-MNT-8, and ACC-MNT-10 as required.
- b. Owner's required model for outdoor dome cameras is Verkada CD52-E.
- c. Owner's required model for outdoor bullet cameras is Verkada CB62-TE.
- d. Owner's required model for standard indoor dome cameras is Verkada CD52.
- e. Owner's required model for indoor and outdoor fisheye/360-degree cameras is Verkada CF81-E.

27.10.3 Card Access

- a. Card Access hardware must be RBH brand utilizing model RBH-UNC-500-422M as the primary panel and RBH-RC-2 for secondary panels as required.
- b. Card readers (aka access points) to be the RBH-FR-360N-SWPL.
- c. Panels are to be installed in a RBH approved enclosure such as the ENC1.
- d. Power for panels is to be supplied through appropriate transformers, connected to a surge protected power bar.
- e. Panels to be installed within approved Communications Rooms
- f. All hardware to be wired as one Axiom network per building.
- g. Configuration of card readers and panels to be done in collaboration with Owner, into Owner's existing Axiom enterprise system.

- h. Other door hardware, such as strikes, crash bars, and accessibility operators to be determined in collaboration with other door & entrance specifications in the appropriate Division.

27.10.4 Synchronized Clocks

- a. [Carehawk's synchronized clock system](#) to be utilized with the Master Clock (24ZBMC100) with DC Clock Power Supply (AL600ULPD8).
- b. Each room to have Carehawk brand clock, model 14" Analog Secondary Clock (24ZBM14R).
- c. This system is to be integrated with and installed in the same room as the CH1000 PA System as specified in section 27.9.e, per manufacturer's recommendations.
- d. Configuration and integration of system to be done in collaboration with Owner.

27.11 Third-Party Facility Partners

All other standards within this document are to be adhered to in these spaces. Specific additional requirements for these spaces are listed here.

- a. The priority for location of third-party IT equipment is to utilize a space within the rented area. If no reasonable space exists for the operator/renter's IT equipment they may, where space allows, place their equipment in Owner's Communication Room. In these cases, the Facility Partner's cabling is to be connected to their own independent data rack, keeping it separate from Owner's equipment, creating both a logical and physically separate entity for the networks.
- b. Facility Partner is responsible for supplying and paying for their own internet and telecommunications access and infrastructure.
- c. Facility Partner may choose to have their service providers install their modem/demarcation equipment into KPR's Communication Room but must connect to the Facility Partner's own data rack.
- d. Facility Partner is responsible for the setup and maintenance of their own network, telecommunications, and other technology infrastructure.
- e. Any cabling required for network connectivity, telephone systems, point of sale systems, et al must be specified by Facility Partner.
- f. Facility Partner's wireless communications equipment is not to cause interference with Owner's wireless communications. While the Owner may at times collaborate to assist, Facility Partner is responsible for any configuration and costs associated to ensuring this need is met.
- g. PA speakers in these spaces to be programmed for emergency paging only.
- h. If Facility Partner does not provide specifications for data and telecom infrastructure, the following defaults will be applied: 1x network drop installed in each room, 1x phone drop installed in each room, 1x network drop installed above ceiling in each room.

27.12 Testing and Documentation

- a. All cables and termination hardware shall be tested for defects in installation and to verify cabling system performance.
- b. All call buttons and speakers to be tested individually.

- c. As-Built to include all newly installed or moved telephone systems, PA systems, network closets, and back bone cable runs.

27.13 Audio-Visual Equipment

The following guidelines are for standard instructional spaces. Other instructional spaces require explicit coordination and consultation with Owner: low/high overhead spaces, dual screen configurations, and other rooms that are not considered a standard classroom.

- a. All A/V equipment to be supplied and installed by owner unless otherwise noted (i.e projection screen).
- b. A/V equipment not to be connected to emergency stop, power lockout mechanisms, timers, switches, or advanced controls.

27.13.1 Interactive Display [new builds only]

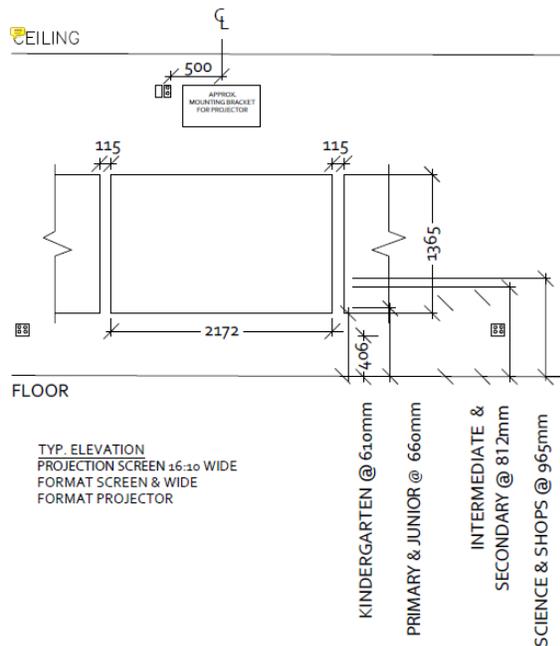
- a. Kindergarten classrooms and collaboration spaces to have interactive displays, rather than a projector/projector screen.
- b. Interactive displays in kindergarten classrooms to be 75" [SMART Board GX075-V2](#) interactive display with embedded OS, 20 continuous points of touch. To be installed on the [SMART Floor Stand Electric, FSE-410](#).
- c. Interactive displays in collaboration spaces to be 65" [SMART Board GX065-V2](#) interactive display with embedded OS, wall mounted.
- d. Substitution of a higher powered or newer model is acceptable with Owner's permission.

27.13.2 Projectors in Classrooms

- a. Projectors to be Epson brand, with the following specifications:
 - I. Compatible with [Epson Projector Management Software](#)
 - II. Minimum 4000 lumens
 - III. Laser-interactive
 - IV. Support aspect ratio of 16:10
 - V. Ethernet network adaptor
 - VI. 5-year warranty (as included from manufacturer)
- b. An example of a product meeting these specifications is the Epson [model 760wi](#).
- c. Substitution of a higher powered or newer model is acceptable with Owner's permission.
- d. Projector to be installed above projection screen +/- 203-254mm by Owner.
- e. Allow 762mm X 406mm at centre line for projector mounting bracket
- f. Do not install any services including surface mounted conduit at this location.
- g. Blocking required behind new drywall at location of projector install.
- h. Blocking required over existing drywall at location of projector install.
- i. Duplex receptacle and data for projector to be installed at high level to a maximum of 3048mm AFF and 500mm from centre of projection screen.
- j. Where existing conduit does not exist, cabling for projector and speaker(s) to be surface mounted and run through channel between projection screen and adjoining whiteboard/tack board ending in surface mounted control box.
- k. Per below drawing (*Figure 3*) projection screen to be installed at specific height AFF based on room use.

- Kindergarten @ 610mm
- Primary & Junior @ 660mm
- Intermediate & Secondary @ 812mm
- Science and Shops @ 965mm

Figure 3: Projection Screen Installation for Classrooms



PROJECTION SCREEN

CENTER LINE OF PROJECTION SCREEN

- CENTRED BETWEEN TACK AND/OR MARKER BOARDS
- DO NOT INSTALL ANY SURFACE MOUNTED CONDUIT BEHIND THE SCREENS.

MOUNTING BRACKET FOR PROJECTOR

- INSTALLED AT CEILING HEIGHT ON THE WALL
- +/- 203-254MM ABOVE WHITE BOARD
- ALLOW 762MM X 406MM @ CENTRE LINE (DO NOT INSTALL ANY SERVICES @ THIS LOCATION)

LOCATION OF ELECTRICAL & DATA FOR PROJECTOR

- AT CEILING HEIGHT TO A MAXIMUM OF 3048 AFF
- 500MM AWAY FROM CENTRE TO ALLOW FOR INSTALLATION OF MOUNTING BRACKET

POWER & DATA

- DUPLEX RECEPTACLE INSTALLED AT HIGH LEVEL ON THE WALL FOR PROJECTOR
- DATA REQUIRED FOR PROJECTOR
- QUAD RECEPTACLE AT BOTH LEFT & RIGHT CORNERS OF TEACHING WALLS BELOW ANY ADJOINING TACKBOARDS OR WHITEBOARDS.

GENERAL

- BLOCKING AS REQUIRED AT NEW WALL TYPES WITH DRYWALL ON THE INTERIOR WALL SURFACE.

CO-ORDINATE EXACT LOCATIONS WITH ARCHITECTURAL ELEVATIONS.

27.13.3 Projection Screens for Classrooms

Screen specifications to include:

- I. projection quality whiteboard compatible with ultra short throw projectors
 - II. 100-inch diagonal measurement
 - III. support 16:10 aspect ratio
 - IV. magnetic
 - V. dry erase
 - VI. 5-year warranty (as included from manufacturer)
- a. Example of a product meeting these specifications is the [DA-Lite Screen 16:10 Wide Format](#) model 25940. Substitution with newer model is acceptable with Owner's permission.
 - b. Height of whiteboard installation to be confirmed by Owner under the guidelines shown in *Figure 3* below.
 - c. No services (i.e., surface mounted conduit) are to be installed where whiteboard is to be installed.
 - d. Whiteboard to be installed on teaching wall between whiteboards/tack boards with a minimum 115mm gap between boards.
 - e. Grade 1 – 12 Classrooms to have Projector and Whiteboard, rather than an interactive display.

27.13.4 Speakers and Amplifiers in Classrooms

- a. Classroom Audio Kit to be the TOA brand [IR-800 Classroom System #3](#).
- b. Speaker to be installed in T-Rail ceiling in centre of Classroom.
- c. Amplifier & microphone to be installed using wall mount bracket, next to projection screen and power receptacle.
- d. Substitution of a higher powered or newer model is acceptable with Owner's permission.
- e. Exception to these specifications is listed below in 27.14.5.

27.13.5 Charging Towers/Mobile Technology Storage

- a. Charging towers to be included in all elementary instructional spaces.
- b. No services, including surface mounted conduit (new or existing), are to be run behind space where charging tower is to be installed.
- c. Space of 355mm W must be available on wall for installation and door opening.
- d. Require a duplex receptacle within 250mm of the charging tower.
- e. Towers to be Powergistics brand, model [Flex20 USB](#).

27.13.6 Science and Shop Classrooms

All above standards for classroom technology and infrastructure apply, with the following exceptions;

- a. Projection screen to be installed at 965 mm to provide students with clear view of board above science/shop bench.
- b. Projector to have conduit at 2" (51mm) from projector location to science/shop bench at side of shelving. The run for this conduit is not to exceed 30' (9144mm). Runs beyond the limit of 30' must be communicated to Owner to determine suitable alternative.
- c. Science/shop bench to have duplex receptacle installed inside bench for other Owner purchased peripherals (i.e., amplifier).
- d. Shop classrooms to have the [TOA IR-800 PLUS Classroom System KIT#2](#) with speakers equally spaced in the room, (instead of the IR-800 Classroom System KIT#3) with amplifier installed at the bench.

27.13.7 Learning Commons

Audio and visual systems for learning commons to utilize the same A/V systems as found Classroom technology standards above, including;

- I. Projector
- II. Projection screen
- III. Two charging towers
- IV. Speakers, microphone, and amplifier
- V. Interactive display

27.13.8 Gymnasium A/V Equipment

Infrastructure for power and conduit for speakers and associated cabling to be supplied and installed by contractor.

Audio and visual systems for gymnasiums & stage to be selected and installed by owner.

- Da-Lite Rear Projection 11 Screen
- Epson Projector Epson L630U Laser Projector or equivalent
- Wall Rack
- Rack Storage Drawer
- Rack Lock Kit
- Dual Wireless Handheld Microphones
- Mixer
- Bluetooth Receiver
- Rack Connection plate
- Rack Surge Protector
- Rack Internal Cabling
- Active HDMI
- Speakers
- Speaker cabling

Part 1 General

1.1 SHOP DRAWINGS

- .1 Submit 6 sets of shop drawings to the electrical contractor for submission to the consultant for review.
- .2 Submit shop drawings of materials and equipment to be supplied on the project. Submission shall include manufacturer, dimensions, appearance and specifications.
- .3 Submit shop drawings for all system components noted herein.

1.2 PRODUCT/MAINTENANCE DATA

- .1 Submit product/maintenance data for each system for inclusion in maintenance manual conforming to Electrical General Requirements Section.

1.3 SCOPE

- .1 **This specification section is the basis for the Kawartha Pine Ridge District School Board ICT Infrastructure system (voice/data network, telephone, public address, classroom audio-visual) installation standard for new builds. Not all sections or components may apply to this particular renovation. Review the site to confirm existing conditions and equipment. Refer to scope of work for this particular renovation.**
- .2 The scope of work for this renovation will include the following revisions to existing systems:
 - .1 Voice/data network installations revisions to suit new drops and/or reworking of wireless access point connections.
 - .2 Public Address system device installation or relocation.
 - .3 Classroom Audio-Visual equipment (Screens and Da-Lite Boards) rough-ins.

Part 2 Products

2.1 NETWORK AND TELEPHONY CABLING

- .1 Data cables to be Cat6 with dark blue outer sheath.
- .2 Phone cables to be Cat6 with dark blue outer sheath.
- .3 PA speaker cables to be Cat6 with white outer sheath.
- .4 All cable to be FT6 rated when used in plenum spaces.
- .5 All data drops to be home-run to nearest appropriate Communications Room.
- .6 Ensure all cable lengths are enough to allow for slack, vertical runs, wastage and future moves.
- .7 The maximum cable run length is not to exceed 91.4m (300'). If this cannot be met, contractor must consult with Owner to determine a suitable alternative.

- .8 In renovations/refreshes, Ethernet TIA cabling standard to be maintained consistently throughout school (i.e. for example, if TIA standard "A" is prevalent in the school, continue with "A" standard for all new cabling in the school).
- .9 All cabling to be run within existing conduit/raceways/cable trays/cable hooks/paths wherever possible.
- .10 All data drops and corresponding cables removed in construction, which are not re-used immediately as part of the project, are to be fully removed and un-terminated from the patch panel to which it connects. This includes full removal of the redundant cable from applicable ceilings/walls/conduits/raceways/cable trays/cable hooks, and the removal of labels at the patch panel. If pulling the wire all the way out is not feasible, Owner may accept just un-terminating the affected cables from the patch panel and orphaning the cable in the ceiling.
- .11 If construction is occurring inside a Communications Closet, contractor must protect the equipment by sealing it off from (i.e. by tarping it off). In cases in which this is not possible, contractor to engage with Owner to arrange for alternative measures.
- .12 All copper cabling to follow standards as dictated by TIA 568.0-D, 568.01-D, 568.02-D in each respective scenario.
- .13 All cabling to be grounded and bonded as needed by TIA 607-D standards.
- .14 All cabling to be concealed and protected in appropriate cable trays or conduit or raceway, unless otherwise safely and aesthetically hidden in ceiling or wall space.
- .15 Modular jacks to be Category 6 compliant.
- .16 Marettes are not to be used with any network or telephony cabling. Bean "B" connectors are acceptable when properly used.

2.2 FACEPLATES

- .1 Faceplates shall be UL Listed and CSA Certified.
- .2 Faceplate material and colour to match electrical faceplates.
- .3 Faceplate sizing to match electrical faceplates.
- .4 Faceplates shall be available to mount up to six in a single gang, and up to twelve in a double gang configuration.

2.3 BACKBONE CABLE

- .1 Provide fibre optic backbone cables from the main Communications Room to all new or relocated secondary Communications Rooms, each as a dedicated home run.
- .2 Provide 25 pair cat6 backbone cable from the main Communications Room to all new or relocated secondary Communications Rooms, each as a dedicated home run. If cat6 in 25 pair is not available, cat5e for the 25 pair is acceptable.

2.4 FIBRE OPTIC CONNECTORS AND ADAPTORS

- .1 Fibre Optic connectors shall be LC style multimode.
- .2 Fibre Optic Adapters shall be LC duplex multimode with ceramic sleeves.
- .3 All fibre optic cabling to follow standards as dictated by TA 569-E.

2.5 COMMUNICATIONS ROOMS AND PATCH PANELS

- .1 No Communications Rooms or IT equipment within, are to be moved, added, or removed without explicit approval from Owner.
- .2 Communications Rooms moved or added must include fibre optic backbone cable to primary Communications Room.
- .3 Primary systems for PA and telephone and data should all be in the same room with fibre connectivity between all Communications Rooms.
- .4 Primary Communication Rooms to have floor mounted racks, ideally installed 36" from back wall, and minimum of 24" from the back wall.
- .5 Secondary Communications Rooms may have floor or wall mounted racks dependent on the number of connections and equipment required.
- .6 In each Communications Room, a dedicated Category 6 patch panel connected to a 25 pair Cat6 cable is required and to be connected at data rack and terminated on BIX1A punch down blocks mounted in the same BIX10A as the phone system. This 25 pair cable must be run behind the BIX10A mount.
- .7 Racks to be 2-post and standard 19" module compatible.
- .8 Patch panels to be mounted in 19" rack(s) and/or cabinets.
- .9 Maximum dimensions: 22"W x 24" D, height dependent on the number of connections required
- .10 Racks must have 10/32" size screw holes.
- .11 Racks and patch panels must be black in colour.
- .12 All floor mounted racks are to be complete with the following features: Vertical cable management on each side, four horizontal cable management trays required per rack spaced with 2U gap between each tray, minimum top 2U must be leave open for patch panels, and one vertical power bar with surge protection.
- .13 All Patch panels should meet or exceed industry standards, fit into a 19" rack and be 1RU in height.
- .14 Panel shall have an adapter tray that accepts 6 six-pack adapter plates with LC multimode adapters. The panel adapter tray shall be removable from the front of the panel by sliding the tray forward. Panel shall have built in patch cable management incorporated into the front of the adapter tray and hold 12-24 fibre connections.
- .15 REQUIRED patch panel manufacturer: Panduit. Note that raceway, conduit, and jacks may be of other brands; so long as they can meet the required quality of TIA standards.

2.6 LABELLING

- .1 Supply and install labels at each terminated location. Labels shall be affixed to the faceplate on the space provided by the manufacturer.
- .2 Labels shall be mechanically or digitally printed. Handwritten labels are not acceptable.
- .3 For Data and Voice cables, labelling at the faceplate (or on keystone for Wireless Access Points) on the client end and the network rack patch panel to be in the format "*ROOM# {dash} COMMUNICATIONS CLOSET LETTER {dash} DROP#*". For example, a cable terminating in Room 101 wired to Communications Room 'A' into patch panel drop 12, is to be labelled as "101-A-12" at both ends.
- .4 PA cables are to be labelled in the format "*ROOM# {dash} COMMUNICATIONS CLOSET LETTER*". For example, a PA speaker terminating in Room 101 wired to Communications Room 'A' is to be labelled as "101-A" at both ends.
- .5 BIX panels are to be labelled with corresponding room numbers.
- .6 PA cabling for speakers in hallways may use "HallA" and "HallB" instead of a room number. For example, Hall1-A for the first chain of speakers going to Hub A, Hall2-A for the second chain.
- .7 Port numbers within a room should be sequential and maintain sequential numbering across adjacent rooms.

2.7 PHONE SYSTEMS

- .1 New voice jacks for existing digital (non-VoIP) systems are to be run and patched to main phone system. Confirm this location with Owner, as it is not always in the main Communications Room.
- .2 New voice jacks for new or existing Avaya VoIP phone systems are to be installed as a standard data drop to the nearest appropriate Communications Room.
- .3 All new voice cabling, whether for Digital or VoIP systems, are to be installed as cat6 with a dark blue outer sheath.
- .4 For all existing digital (non-VoIP) phone systems, a 25 pair cable must be terminated at the Voice Patch Panel into a 24 port loaded patch panel, with the other end terminated at the BIX1A punch down blocks mounted in BIX10A at phone system.
- .5 All new phone system installs are to be the 'Avaya IP Office 500v2' VoIP phone system with the following features (part number in brackets): IP Office R10+ IP Endpoint LIC (383110, minimum 7 per school), IP Office R10+ 2Channels Lic (383127), IP Office R11 LIC (396445), Power Cord 18AWG (700289770), Rack Mounting Kit (700429202), V2 System SD Card (700479710), IP Office 500 Version 2 Control Unit (700501510), IP500 V2 Combo Card ATM4 V2 TAA (700504897), J139 IP Phone (700513916, minimum 4 per school), J179 IP Phone (minimum 3 per school).

- .6 Contractor to collaborate with Owner to configure new phone systems and moves/adds/changes to existing phone systems.
- .7 For VoIP systems, Avaya J179 handsets are to be used for Principals, VPs, and secretaries; with Avaya J139 handsets in all other locations.
- .8 For all Digital (non-VoIP) phone systems, Avaya 9508 digital telephones are to be used for Principals, VPs, and secretaries: with Norstar Cat. #T-7208 handsets for all other locations.

2.8 ELEVATORS

- .1 Install Cat6 cable with dark blue outer sheath from elevator room directly to the main phone system.
- .2 In coordination with Owner, connect elevator call number to an existing line with a line seizure device. This method will guarantee an outgoing connection for the elevator without requiring an additional phone line for the school. Owner requires two pauses before the number to allow the line seizure device time to seize the lines prior to starting to dial.
- .3 Owner's preferred line seizure device is the Viking LSR-1:
<https://www.vikingelectronics.com/products/lsr-1/>

2.9 WIFI AND WIRELESS ACCESS POINTS (APS)

- .1 Wherever possible mount APs in middle of room on dropped ceiling.
- .2 When installing APs in a dropped ceiling, cut discrete hole for the data cable to come through, allowing the ceiling tile to lay flat.
- .3 Contractor to install/reinstall all APs. Physical mounting instructions can be found here: https://documentation.meraki.com/MR/Installation_Guides/MR42_Installation_Guide . Refer to the 'Installation Instructions' heading.
- .4 Data drops for APs to be terminated as a fully contained data jack. An example is the Panduit CBX1WH-A surface mount box (link: <https://www.panduit.com/en/products/copper-systems/faceplates-boxes/surface-mount-boxes/cbx1wh-a.html>) with the Panduit CJ688TGBU UTP Jack Module (link: <https://www.panduit.com/en/products/copper-systems/connectors/jack-modules/cj688tgbu.html>).
- .5 APs that are temporarily removed during construction must be re-installed back to their original location, unless otherwise specified by Owner or the plans.
- .6 APs that are 'existing to be removed' must be safely removed by the contractor and returned to Owner.
- .7 When APs are being removed (to be reinstalled), APs must be securely stored by contractor and be temporarily labelled (i.e. with masking tape) with room number, and in cases with multiple APs per room to also include coordination N, E, S, W marking.

- .8 APs must always remain below or mounted on T-Rail ceilings, they must never be left or installed above a T-Rail ceiling. If a new T-Rail ceiling is installed under an existing AP, the AP must be moved to mount onto the new ceiling.
- .9 For APs that are damaged or not returned, a charge back cost of \$1,000 will be applied.
- .10 For new APs not already existing, contractor must be provided a minimum of 5 business days notice to Owner, allowing Owner to prepare and supply APs to the contractor.

2.10 PUBLIC ADDRESS (PA) SYSTEM

- .1 Contractor to collaborate with Owner to configure new PA systems and moves/adds/changes to existing PA systems.
- .2 All new or moved PA cables must be run back to the main PA system. Confirm this location with Owner, as it is not always in the main Communications Room.
- .3 All new or moved PA cables must be terminated on a 36D BIX or BIX1A or similar modular Jack which must be installed 4'-6" A.F.F. where space permits.
- .4 All new PA Systems to be Carehawk model 'CH1000-2I-2A-2PG' with the following hardware features (part numbers in brackets): Email Alert Module (EAM), Switch Security Cards as needed (SS16 or SS32), Administrative Phone (AC1) with PA-AP1 Power Supply, Telephone Communications Card (TC2-KIT), Digital 100 Watt Class D Paging/Power Amplifier 25V with enclosure (DAF100-25) as needed, Attenuator 25V (AT1) as needed.
- .5 Each 'SS16' or 'SS32' is to have a dedicated homerun, via cat6 cable, to the main PA system.
- .6 Each room to be configured as its own dedicated channel.
- .7 Each hallway to be configured as a single channel but can be adapted as needed for specific circumstances. All hallways programmed to the hallway zone (Zone 2).
- .8 Require Cat6 cable run from main PA system to PA console (microphone or phone). The console is usually located in the main office.
- .9 Require a shielded 4 wire 18 gauge cable from main PA system to the tuner box. Note the tuner box is usually located in the main office near the secretary.
- .10 Configuration of PA system to include bells on school's schedule, pre-recorded messages including but not limited to lockdown messaging. If configuration is not able to be completed, contractor must work with Owner to arrange alternative.
- .11 Outdoor horns to be Bogen Paging horns 25V 15 watt.
- .12 In suspended ceilings, speakers must be McBride white square grill. Speakers to be installed on the ceiling T-bars with 25 Volt transformers. Speaker part number without grill: 8LS822-19 (link: <https://mcbrideloudspeaker.com/images/specs/8LS82219.pdf>)
- .13 PA speakers are to have white grills
- .14 As required, install the McBride MCT25 Transformer (<https://qcomponents.ca/McBride-MCT25.html>)
- .15 In suspended ceilings, speaker rails must be supported by ceiling rails.

- .16 Ceiling mounted speakers are not to have call buttons.
- .17 Speakers in the following spaces to be programmed for emergency paging only: calming /quiet rooms and spaces used primarily by third-party facility partners (i.e. daycares).
- .18 Gyms and hallways require multiple speakers each, spaced approximately 20' apart.
- .19 In offices speakers are to be tapped to 0.25 Watt.
- .20 In all other applications speakers to be tapped to 1 Watt.
- .21 In shop classes, gyms, and mechanical rooms; a quantity of at least two (upwards of 4) McBride 8LS822-19 speakers are required, spread throughout the room to provide coverage throughout the room, tapped to 1 Watt each.
- .22 Shop classes to include 1 Carehawk HS100 "Handset Station" connected to the PA speaker.
- .23 There must be a white toggle call button installed in every classroom, meeting room, resource room, staff room, and office.
- .24 In gyms, install a white toggle call button in a recessed box with cover.
- .25 In shops install a white toggle call button as well as a PA handset.
- .26 Do not connect to privacy switch in any room.
- .27 All unused wire pairs are to be cut flush and wrapped with electrical tape or other appropriate means of securing them and preventing unwanted connections.
- .28 PA systems to be installed in a clean, well organized, and thoroughly labelled manner. A proper backboard and cable management is required. Example pictured below.
- .29 All wires not used on a speaker are to be taped individually or cut and taped so that the wires do not touch metal or each other.
- .30 The white/blue pair is to be terminated to the speaker and not continue down to the call button.

Image of ideal CH1000 installation and BIX panel



2.11 OPERATIONAL TECHNOLOGY

- .1 All data connections for Building Automation Systems (BAS) and other Operational Technology to be installed under the same standards as all other data cabling, including cat6 cabling and a home run to the nearest Communications Room.
- .2 Electronic Signs that must be plugged into a specific switch port and configured with the specific IP address information as defined by Owner. This includes placing the sign's network interface on Owner's "VLAN 12" to ensure network security requirements are met.

2.12 THIRD PARTY FACILITY PARTNERS

All other standards within this document are to be adhered to in these spaces. Specific additional requirements for these spaces are listed here.

- .1 The priority for location of third-party IT equipment is to utilize a space within the rented area. If no reasonable space exists for the operator/renter's IT equipment they may, where space allows, place their equipment in Owner's Communication Room. In these cases, the Facility Partner's cabling is to be connected to their own independent data rack, keeping it separate from Owner's equipment, creating both a logical and physically separate entity for the networks.
- .2 Facility Partner is responsible for supplying and paying for their own internet and telecommunications access and infrastructure.
- .3 Facility Partner may choose to have their service providers install their modem/demarcation equipment into KPR's Communication Room but must connect to the Facility Partner's own data rack.
- .4 Facility Partner is responsible for the setup and maintenance of their own network, telecommunications, and other technology infrastructure.
- .5 Any cabling required for network connectivity, telephone systems, point of sale systems, et al must be specified by Facility Partner.
- .6 Facility Partner's wireless communications equipment is not to cause interference with Owner's wireless communications. While the Owner may at times collaborate to assist, Facility Partner is responsible for any configuration and costs associated to ensuring this need is met.
- .7 PA speakers in these spaces to be programmed for emergency paging only.
- .8 If Facility Partner does not provide specifications for data and telecom infrastructure, the following defaults will be applied: 1x network drop installed in each room, 1x phone drop installed in each room, 1x network drop installed above ceiling in each room.

2.13 TESTING AND DOCUMENTATION

- .1 All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance.
- .2 All Fibre and Cat 6 cabling should be 100% tested to current standards.
- .3 All call buttons and speakers to be tested individually.
- .4 As-Built to include any newly installed or moved telephone systems, PA systems, network closets, and back bone cable runs.

2.14 MOBILE TECHNOLOGY CHARGING TOWERS

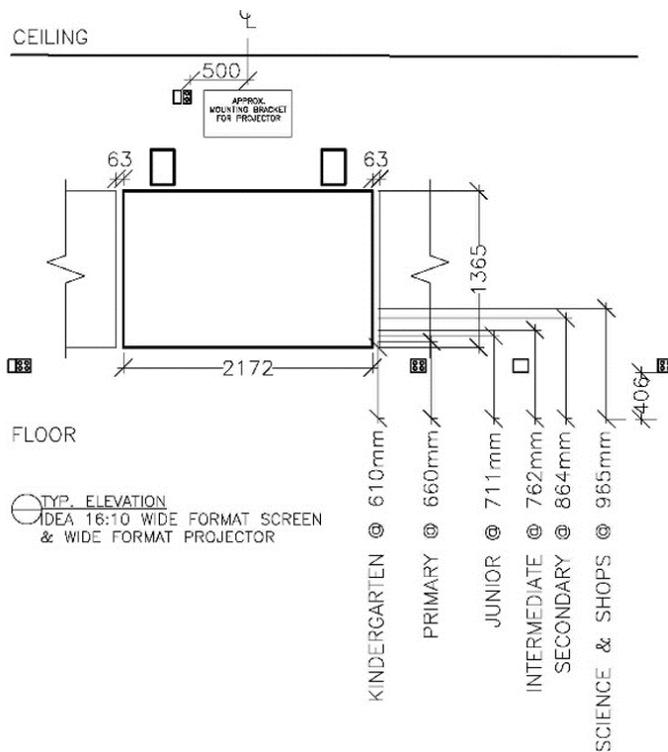
- .1 Purchase of Powergistics mobile charging tower is to be coordinated by Owner.
- .2 Charging tower dimensions: 51.5" H X 10.75" W X 19.5" D (1308mm H X 273mm W X 495mm D).
- .3 Space of 355mm W must be available on wall for installation and door opening.
- .4 Require a duplex receptacle on a separate circuit within 250mm of the charging tower.

2.15 AUDIO VISUAL EQUIPMENT

- .1 Screens and Da-Lite Boards
 - .1 Height of Da-Lite IDEA whiteboard installation to be confirmed by Owner under the guidelines shown in Figure 1 below.
 - .2 No services including surface mounted conduit are to be run behind space where Da-Lite IDEA whiteboard is to be installed on teaching wall.
 - .3 Da-Lite IDEA whiteboard to be installed on teaching wall between whiteboards/tack boards with a minimum 63mm gap between boards.
- .2 Projects and Speakers
 - .1 Projector and speakers to be installed above Da-Lite IDEA screen +/- 203-254mm by Owner.
 - .2 Allow 762mm X 406mm at centre line for projector mounting bracket.
 - .3 Do not install any services including surface mounted conduit at this location.
 - .4 Blocking required behind new drywall at location of projector install.
 - .5 Blocking required over existing drywall at location of projector install.
 - .6 Duplex receptacle and data for projector to be installed at high level to a maximum of 3048mm AFF and 500mm from centre of Da-Lite IDEA screen.
 - .7 Speakers to be wall mounted above the Da-Lite IDEA screen by Owner.
 - .8 Where existing conduit does not exist, cabling for projector and speakers to be surface mounted and run through channel between Da-Lite IDEA screen and adjoining whiteboard/tack board ending in surface mounted control box.

- .9 Per below drawing (Figure 1) IDEA screen to be installed at specific height AFF based on room use.
- .1 Kindergarten @ 610mm
 - .2 Primary @ 660mm
 - .3 Junior @ 711mm
 - .4 Intermediate @ 762mm
 - .5 Secondary @ 864mm
 - .6 Science and Shops @ 965mm

IDEA Screen Installation



IDEA WIDE FORMAT SCREEN

- CENTRE LINE OF WHITEBOARD**
- CENTRED BETWEEN TACK AND/OR MARKER BOARDS
 - MIN. DISTANCE BETWEEN 63mm
- ELECTRICAL RECEPTACLE FOR PROJECTOR**
- AT CEILING HEIGHT TO A MAXIMUM OF 3048 AFF
 - 500MM AWAY FROM CENTRE TO ALLOW FOR INSTALLATION OF MOUNTING BRACKET
- MOUNTING BRACKET FOR PROJECTOR**
- INSTALLED AT CEILING HEIGHT ON THE WALL
 - +/- 203-254mm ABOVE WHITE BOARD
 - ALLOW 762mm X 406mm @ CENTRE LINE (DO NOT INSTALL ANY SERVICES @ THIS LOCATION)
- POWER & DATA**
- PROJECTOR - DUPLEX RECEPTACLE INSTALLED AT HIGH LEVEL ON THE WALL
- MIN. 500mm FROM CENTRE LINE, MAX. 3048
- A.F.F.
- DATA REQUIRED AT THIS LOCATION
 - QUAD RECEPTACLE AT RIGHT CORNER OF TEACHING WALL BELOW ADJOINING TACKBOARD/WHITEBOARD
 - QUAD RECEPTACLE AT LEFT CORNER OF TEACHING WALL
 - KINDERGARTEN CLASSROOMS WILL REQUIRE A QUAD RECEPTACLE TO BE INSTALLED IMMEDIATELY TO THE RIGHT AND BELOW THE IDEA BOARD
- BLOCKING**
- AS REQUIRED AT WALL TYPES WITH DRYWALL
- SEPEAKERS**
- WALL MOUNTED ABOVE SCREEN WITH CONTROL BOX BELOW AND TO THE SIDE (BY SCREEN SUPPLIER)

- .3 Science Rooms and Shops
- .1 Da-Lite Screen to be installed at 965 mm to provide students with clear view of board above science/shop bench.
 - .2 Projector to have conduit at 2" (51mm) from projector location to science/shop bench at side of shelving. The run for this conduit is not to exceed 30' (9144mm). Runs beyond the limit of 30' must be communicated to Owner to determine suitable alternative.

2.16 APPENDIX A – PANDUIT PARTS LIST

- .1 Although Panduit brand parts are only required for patch panels, this list of commonly used parts is available for convenience and reference of architects and contractors. If other manufacturers are chosen for these products, the contractor must ensure they are of similar quality.

Product Category	Part Number	Manufacturer	Part Description
Copper Cabling Products			
	PUP6C04BU-F	Panduit	Category 6 copper cable, 4-pair, 23AWG, U/UTP, CMP, Blue 1000 feet in a carton.
	CJ688TGBU	Panduit	The Category 6, RJ45, 8-position, 8-wire, UTP Mini-Com® universal jack module has TG-style termination and is blue.
	CPPL48FMWBLY	Panduit	Mini Com 48-port modular patch panel with faceplates in black, with label and label covers, (2RU).
	CPPL24FMWBLY	Panduit	Mini Com 24-port modular flush mount patch panel in black, (1RU).
	CFG2WH	Panduit	Mini Com rectangular adapter, mounts behind standard GFCI faceplates, accepts two Mini-Com® Module, White.
	CFG4WH	Panduit	Mini Com rectangular adapter, mounts behind standard GFCI faceplates, accepts two Mini-Com® Module, White.
	CFG6WH	Panduit	Mini Com rectangular adapter, mounts behind standard GFCI faceplates, accepts two Mini-Com® Module, White.
	CFPF12WH-2G	Panduit	Mini Com Classic Series double gang kit, includes faceplate frame and six flat inserts (two port each), accepts twelve Mini-Com® modules. White
	CBXQ2WH-A	Panduit	Mini-Com® surface mount box accepts two Mini-Com® modules. Includes quick release cover. Supplied with cable ties, adhesive backing, label and label cover. White.
	UTPSP7BUY	Panduit	Category 6, UTP patch cord with TX6™ PLUS Modular Plugs on each end. Blue, 7 ft. (Rack end)
	UTPSP10BUY	Panduit	Category 6, UTP patch cord with TX6™ PLUS Modular Plugs on each end, 10 ft. (Workstation end)
CAT 6A WAP DROPS			

Product Category	Part Number	Manufacturer	Part Description
	PUP6AV04BU-G	Panduit	Copper Cable, Cat 6A, Vari-MaTriX, 4-Pair, 23 AWG, UTP, CMP, Blue, 1000ft/305m
	CJ6X88TGYL	Panduit	Category 6A, RJ45, 10 Gb/s, 8-position, 8-wire universal module, Yellow.
	CBX1WH-A	Panduit	Mini-Com® surface mount box accepts one Mini-Com® Module. Supplied with adhesive backing. White.
	UTP28X1YL	Panduit	Category 6A Performance, 28AWG, UTP Patch Cord, CM/LSZH, Yellow, 1ft.
	UTP6ASD7YL	Panduit	Category 6A (SD), 10 Gb/s UTP patch cord with TX6A™ 10Gig™ Modular Plugs on each end. Yellow, 7 ft. (Rack End)
Voice Tie Cable Termination			
	DP245E88TGY	Panduit	DataPatch 24-port category 5e punchdown flat patch panel in black, (1 RU).
Fiber Cabling Products			
	FODPX06Y	Panduit	50um OM3 6 Fiber Indoor Distribution Cable, Plenum (OFNP), 900um Buffered Fibers.
	FODPX12Y	Panduit	50um OM3 12 Fiber Indoor Distribution Cable, Plenum (OFNP), 900um Buffered Fibers.
	FRME1U	Panduit	The Panduit® Opticom® Rack Mount Fiber Enclosure ensures network reliability by housing, organizing, managing and protecting up to 72 fiber optic cable, terminations, splices, connectors and patch cords using up to 3 FAP or FMP adapter panels or FOSM splice modules.
	FAP6WAQDLCZ	Panduit	LC 10Gig™ OM3/OM4 FAP loaded with six LC 10Gig™ Duplex Multimode Fiber Optic Adapters (Aqua) with zirconia ceramic split sleeves.
	FLCSMCXAQY	Panduit	The LC OptiCam® OM3/OM4 50/125µm multimode simplex connector in aqua with zirconia ceramic ferrules is intended for 900µm tight-buffered fiber installations which are outside the scope of the RoHS directive.

Product Category	Part Number	Manufacturer	Part Description
	FX2ERLNLNSNM002	Panduit	2 fiber OM3 LC duplex to LC duplex patch cord OFNR (riser) rated, 16mm jacketed cable Std IL 2 meters.
Racks, Cabinets, and Cable Management			
	R2P	Panduit	The Panduit Two-post Rack System provides a reliable foundation for mounting telecommunication and data center equipment. The modular rack can be used to manage high performance copper and fiber patch cables using Panduit horizontal and vertical cable managers and accessories, such as power outlet unit brackets. Aluminum, 45 RU, #12-24 Threaded Mounting Holes, Black, 1pc + hardware kit and paint piercing bonding kit.
	R4P	Panduit	The premium Panduit Four-post Rack System combines the stability of a cabinet with the accessibility of an open rack to provide the user with maximum flexibility when designing a data-center network layout. Four steel vertical posts and adjustable front and rear mounting rails provide the required strength and flexibility needed to work with various types of active equipment. Steel, 45 RU, 30in deep, #12-24 Threaded Mounting Holes, Black, 1pc + hardware kit and paint piercing bonding kit.
	WMPVF45E	Panduit	The Panduit® NetRunner® Vertical Cable Manager cost-effectively organizes, manages and protects cables on the front of the rack. Plus, bend radius control helps guard against kinks and snags. Single-sided, ABS Plastic, 45RU, Black, 1pc + Cover.
	WMPVHCF45E	Panduit	The Panduit® NetRunner® Vertical Cable Manager cost-effectively organizes, manages and protects cables on the front of the rack. Plus, bend radius control helps guard against kinks and snags. Single-sided, ABS Plastic, 45RU, Black, 1pc + Cover.

Product Category	Part Number	Manufacturer	Part Description
	NMF2	Panduit	The Panduit® NetManager® High Capacity Horizontal Cable Manager cost-effectively organizes and protects copper and fiber network cabling in any standard EIA 19in (483mm) rack or cabinet. Large front finger openings easily accommodate Category 6 and 10G cables, reducing installation time and maintenance costs. Hinged front cover only, ABS Plastic, 2RU, Black, 1pc.
Bonding and Grounding			
	GB2B0306TPI-1	Panduit	1/4" x 2" x 12" Telecommunications Grounding Busbars.
	RGRB19CN	Panduit	Grounding busbar; 19" (483mm) length; tin-plated; twenty holes arranged for flexibility in mounting with twenty #12-24 x 1/2" hex head screws installed; mounting hole sets have 5/8" (15.9mm) spacing; provided with two cage nut bonding studs and four #12-24 bonding nuts.
	HTCT250-2-1	Panduit	Copper Compression HTAP with code 250 kcmil - #2 AWG Run, code #2 - #6 AWG STR/SOL Tap 1 and code #8 - #14 AWG Tap 2 or flex 4/0 - #2 AWG Run, flex #2 - #8 AWG Tap 1 and flex #8 - #14 AWG Tap 2.
	RGCBNJ660P22	Panduit	#6 AWG (16mm ²) jumper, 60 (1.52m) length, 45° bent lug on grounding strip side, provided with .16 oz. (5cc) of antioxidant, two each #12-24 x 1/2, M6 x 12mm, #10-32 x 1/2 and M5 x 12mm thread-forming screws and a copper compression HTAP.
	RGEJ657PFY	Panduit	#6 AWG (16mm ²) jumper, 90° bent lug on grounding strip side, provided with .16 oz. (5cc) of antioxidant and two each #12-24 x 1/2, M6 x 12mm, #10-32 x 1/2 and M5 x 12mm thread-forming screws.
	CNBK	Panduit	Green bonding cage nut, includes 50 #12-24 bonding cage nuts (.06 – .11 thick panel) and 50 #12-24 x 1/2" bonding screws with #2 Phillips/slotted combo hex head (use 5/16" or 8mm socket).

Product Category	Part Number	Manufacturer	Part Description
	RGESD2B-1	Panduit	This two-hole ESD Port Kit with 5/8 spacing is a telecommunications grounding accessory that helps protect against electrostatic discharge to network equipment. It includes a .17 oz (5 cc) tube of antioxidant paste, 1 ESD protection sticker, two 12-24 HDW bonding studs, one M6 x 12mm thread-forming screw, two bonding cage nut HDWs, and one cleaning pad. Designed for flexibility and ease of installation, this kit reduces the risk of damage when a technician performs routine cable maintenance or accidentally touches an I/O port.
	RGESDWS	Panduit	This adjustable, fabric ESD wrist strap with 4mm snap is designed to ground a technician working on highly sensitive electronic equipment. This antistatic device reduces the buildup or discharge of static electricity. It connects to the ground via a 6' (1.8 m) coiled cable, banana plug, and 1 megohm resistor and helps protect the wearer from shock hazards.
Cable Pathways			
J Hooks – Ceiling Mount			
	JP131CMB-L20	Panduit	J-PRO Cable support system, with ceiling mount bracket that has one 3/16 (M5), 1/4 (M6), and 3/8 (M10) mounting hole, 1.31 (33.3mm) max. bundle capacity, nylon 6.6 with metal attachments, black, 50 pc. package quantity.
	JP2CMB-L20	Panduit	J-PRO Cable support system, with ceiling mount bracket that has one 3/16 (M5), 1/4 (M6), and 3/8 (M10) mounting hole, 2.00 (50.8mm) max. bundle capacity, nylon 6.6 with metal attachments, black, 50 pc. package quantity.
	JP4CMB-X20	Panduit	J-PRO Cable support system, with ceiling mount bracket that has one 3/16 (M5), 1/4 (M6), and 3/8 (M10) mounting hole, 4.00 (101.6mm) max. bundle capacity, nylon 6.6 with metal attachments, black, 10 pc. package quantity.
J Hooks – Wall Mount			

Product Category	Part Number	Manufacturer	Part Description
	JP131WP2B-L20	Panduit	J-PRO Cable support system, with ceiling mount bracket that has one 3/16 (M5), 1/4 (M6), and 3/8 (M10) mounting hole, 1.31 (33.3mm) max. bundle capacity, nylon 6.6 with metal attachments, black, 50 pc. package quantity.
	JP2WP2B-L20	Panduit	J-PRO Cable support system, for powder actuated installation on walls, one 5/32 (M4) mounting hole for user supplied fasteners, 2.00 (50.8mm) max. bundle capacity, nylon 6.6 with metal attachments, black, 50 pc. package quantity.
	JP4WP2B-X20	Panduit	J-PRO Cable support system, for powder actuated installation on walls, one 5/32 (M4) mounting hole for user supplied fasteners, 4.00 (101.6mm) max. bundle capacity, nylon 6.6 with metal attachments, black, 10 pc. package quantity.
Network Labeling			
	S100X150YAJ	Panduit	Laser/ink jet self-laminating label, 1" W x 1.50" L, Cat. 5e/Cat. 6 UTP/Cat. 6e UTP/Cat. 5e FTP/10 – 6 AWG, white print-on area, polyester, 7 labels/row, 42 labels/sheet, 2500 pc. package quantity. (cable wrap around labels for CAT 6 & CAT 6A laser jet labels)
	S100X150YAJ	Panduit	Laser/ink jet self-laminating label, 1" W x 1.50" L, Cat. 5e/Cat. 6 UTP/Cat. 6e UTP/Cat. 5e FTP/10 – 6 AWG, white print-on area, polyester, 7 labels/row, 42 labels/sheet, 2500 pc. package quantity. (cable wrap around labels for CAT 6 & CAT 6A LS8 Labels)
	C252X030FJJ	Panduit	Laser/ink jet network label, 2.52" W x 0.30" H, 4-port identifier, adhesive polyolefin, white, 3 labels/row, 75 labels/sheet, 1000 labels per package. (Modular patch panel labels laser jet labels)
	C252X030FJC	Panduit	Network label, P1 cassette, 2.52" W x 0.30" H, polyolefin, white, 125 labels/cassette, 1 pc. package quantity. (Modular Patch Panel LS8 Labels)

Product Category	Part Number	Manufacturer	Part Description
	C061X030FJJ	Panduit	Laser/ink jet network label, 0.61" W x 0.30" H, 1-port identifier, adhesive polyolefin, white, 13 label/row, 325 labels/sheet, 5000 labels per package. (2 ports Decora plate laser jet labels)

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 CAN/ULC-S524 (latest edition), Installation of Fire Alarm Systems.
- .2 ULC-S525-1978, Audible Signal Appliances for Fire Alarm Systems.
- .3 CAN/ULC-S526-M87, Visual Signal Appliances, Fire Alarm.
- .4 CAN/ULC-S527-M87Control 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-S531 (latest edition), Smoke Alarms.
- .9 CAN/ULC-S536 (latest edition), Inspection and Testing of Fire Alarm Systems.
- .10 CAN/ULC-S537-(latest edition), Verification of Fire Alarm Systems.
- .11 CAN/ULC-S552 (latest edition), Inspection, Testing and Maintenance of Smoke Alarms.
- .12 CAN/ULC-S553 (latest edition), Installation of Smoke Alarms.
- .13 OBC-2012, Ontario Building Code.

1.2 DESCRIPTION OF SYSTEM

- .1 System includes:
 - .1 Control panel is existing.
 - .2 Audible and visual signal devices.

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 the Electrical General Requirements Section.

1.5 OPERATION AND MAINTENANCE DATA

- .1 Provide operation and maintenance data for Fire Alarm System for incorporation into manual specified in the Electrical General Requirements Section.
- .2 Include:
 - .1 Technical data - illustrated parts lists with parts catalogue numbers.
 - .2 Copy of approved shop drawings.

Part 2 Products

2.1 MATERIALS

- .1 Equipment and devices: ULC listed and labeled and supplied by single manufacturer.
- .2 Audible signal devices: to ULC-S525.

2.2 SYSTEM OPERATION

- .1 Single stage operation. Operation of any alarm initiating device to:
 - .1 Cause audible signal devices to sound throughout building.
 - .2 Transmit signal to fire department via monitoring station.
 - .3 Cause zone of alarm device to be indicated on control panel and remote annunciator[s].
 - .4 Cause air conditioning and ventilating fans to shut down or to function so as to provide required control of smoke movement.
 - .5 Cause fire doors and smoke control doors if normally held open, to close automatically.

2.3 CONTROL PANEL

- .1 Control panel is existing.

2.4 AUDIBLE/VISUAL SIGNAL DEVICES

- .1 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.

NOTE:

- .1 **Set signal devices in classrooms to LOW setting.**

2.5 APPROVED EQUIPMENT

<u>DEVICE</u>	<u>MIRCOM</u>
Control Panel	
Existing	FA-1000 Series
Devices	
Mini Horn	FH-340R

Part 3 Execution

3.1 INSTALLATION

- .1 Install systems in accordance with CAN/ULC-S524 (latest edition).
- .2 Locate and install signal devices and connect to signaling circuits.

Note: Any required surface mounted signalling devices must be provided with proper surface mounted boxes from fire alarm manufacturer.

3.2 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Electrical General Requirements Section and CAN/ULC-S537 (latest edition).

NOTE: Entire fire alarm system and components are to be tested as per the noted code.

- .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 signaling circuits to ensure proper operation of system.
 - .4 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.
 - .2 Test each conductor on all circuits for capability of providing alarm signal during ground-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 Qualifications:
 - .1 Persons performing any work on this fire alarm system must be CFAA certified. Submit certification upon request.

- .4 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.

END OF SECTION