KAWARTHA PINE RIDGE
DISTRICT SCHOOL BOARD

CAMBORNE PUBLIC SCHOOL
INTERIOR RENOVATIONS
3546 Kennedy Road, Cobourg, Ontario

Project No. 18022

Date: April 27, 2018

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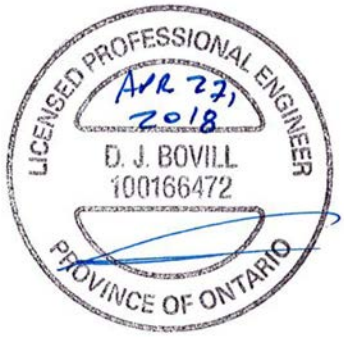
PROFESSIONAL SEALS

ARCHITECTURAL	STRUCTURAL
	

End of Section

End of Section

PART 1 – GENERAL

Dwg. No.	Title	Issue No.	Rev. No.	Issue Date
ARCHITECTURAL				
A000	List of Drawings & OBC Matrix			
A201	Demolition Floor Plan			
A202	Demolition Reflected Ceiling Plan			
A203	Floor Plans			
A204	Reflected Ceiling Plan			
A801	Schedules and Legends			
A901	Interior Elevations			
A902	Millwork Elevations			
A903	Millwork Elevations			
A904	Millwork Elevations			
MECHANICAL				
M101	Overall Demo Layout			
M102	South Wing Demo Mechanical Layout			
M103	North & South Wings Demo Mechanical Layouts			
M201	Overall New Mechanical			
M202	South Wing New Mechanical Layout			
M203	North & South Wings New Mechanical Layouts			
M801	Legends, Notes, Schedules & Details			
ELECTRICAL				
E101	Overall Demo Layout Key Plan			
E102	South Wing Demo Power Layout			
E103	North & South Wings Demo Power Layouts			
E104	Overall Demo Lighting			
E201	Overall New Layout Key Plan			
E202	South Wing New Power Layout			
E203	North & South Wings New Power Layouts			
E301	Overall New Lighting			
E801	Legends			
E802	Notes			
E803	Schedules & Details			

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Work covered by contract documents
.2 Location of the site
.3 Site access
.4 Contractor traffic route
.5 Work sequence
.6 Contractor use of premises
.7 References and codes
.8 Engineer design
.9 Hazardous material discovery
.10 Building smoking environment
.11 Site security
.12 Protection of Drawings
.13 "By Others"

1.2 Work Covered by Contract Documents

.1 Work of this Contract comprises the **Camborne Public School, Interior Renovations, 3546 Kennedy Road, Cobourg, Ontario,** for the **Kawartha Pine Ridge District School Board,** and as indicated on the drawings and specifications.

1.3 Partial Owner Occupancy

.1 Owner, or other contractors or suppliers retained by the Owner, will occupy areas of the building and site during the course of the work.

.2 The existing **Camborne Public School** beyond the work area limits, will remain in use by the Owner throughout the construction period.

.3 The Contractor will be the "Constructor" as defined by the Occupational Health and Safety Act on this project and will be solely responsible for all persons on the Site including Owner and contractors or suppliers retained by the Owner.

.4 Work in occupied areas beyond the limits of hoarding shall be completed during non-school hours as approved and agreed with the Owner.

1.4 Owner Furnished Items

.1 The following items will be supplied by the Owner for installation by the Contractor:
1. Any items specifically mentioned in the Contract Documents.

1.5 Site Access

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

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

1.6 Contractor Traffic Route

.1 Commercial motor vehicles are defined as any heavy equipment, tractor trailers, cement trucks, dump trucks, cranes, any vehicle towing a trailer, and delivery type trucks larger than cube vans.

.2 Maintain fire department access/control from the street.

.3 Contractor site access shall be from the street.

1.7 Work Sequence

.1 Construct Work continuously.

1.8 Site Reference and Documentation

.1 Obtain from the Owner and be familiar with all available reference material and historic documentation for the building site.

.2 Maintain a copy of all reference materials and documents on site for the duration of the Work.

.3 No claims for extras or for delay will be considered due to the Contractor's failure to fully apprise himself of the condition of the site prior to commencement of the work.

1.9 References and Codes

.1 Perform Work in accordance with Ontario Building Code (OBC), National Fire Code of Canada (NFC), the Canadian Electrical Code CAN C22.1-2009, and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of:
.1 Contract documents.
.2 Specified standards, codes and referenced documents.

1.10 Engineer Design

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

1.11 Hazardous Material Discovery

.1 Should hazardous materials be encountered which are not identified in the referenced reports, stop work and contact the Owner and Consultant immediately

1.12 Building Smoking Environment

.1 Smoking is prohibited in all work places within the Owner's buildings and on School Board property.

1.13 Site Security

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

1.14 Protection of Drawings

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

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

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

1.15 "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.

PART 2 PRODUCTS

2.2 Materials

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Consultants

.1 ARCHITECT:
Barry Bryan Associates
201 - 250 Water Street, Whitby, Ontario L1N 0G5
Tel: 905-666-5252
Fax: 905-666-5256
Attention: Mr. John Moses, B.Tech. (Arch.Sc.), M.Arch., OAA, OAA, MRAIC, LEED BD&C

.2 STRUCTURAL ENGINEER:
Barry Bryan Associates
201 - 250 Water Street, Whitby, Ontario L1N 0G5
Tel: 905-666-5252
Fax: 905-666-5256
Attention: Mr. David Bovill, P.E., P. Eng.

.3 MECHANICAL ENGINEER:
Durham Energy Specialist Limited
209 Dundas Street East, Unit 106, Whitby, Ontario L1N 7H8
Tel: 905-430-7151
Fax: 905-430-7154
Attention: Ms. Leanne Skribe, P. Eng.

.4 ELECTRICAL ENGINEER:
Durham Energy Specialist Limited
209 Dundas Street East, Unit 106, Whitby, Ontario L1N 7H8
Tel: 905-430-7151
Fax: 905-430-7154
Attention: Ms. Leanne Skribe, P. Eng.

PART 2 PRODUCTS

3.1 Not Used

.1 Not used

PART 3 EXECUTION

3.2 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Cash Allowances

1.2 References

.1 Canadian Construction Documents Committee CCDC2-2008, Stipulated Price Contract including the Supplementary Conditions.

1.3 Cash Allowances

.1 Refer to General Conditions, GC4.1.

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

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

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

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

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

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

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

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

.10 Refer to Instructions to Bidders and Tender Form for list of Cash Allowances.

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 Related Sections

.1 Section 01 31 00 Project Management and Coordination
.2 Section 01 33 00 Submittal Procedures

1.3 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.
  .1 An RFI shall not constitute notice of claim for a delay.

1.4 Submittal Procedures

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
  .1 Number RFI's consecutively in one sequence in order submitted, in numbering system as established by the Contractor.

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

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

.4 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 and with each application for payment submission.

.5 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.

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

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

1.5 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.

1.6 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.

1.7 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 and the originator of the RFI within 3 Working Days of receipt of such RFI's, and the Consultant, the Contractor, and the originator will jointly prepare an estimate of the time necessary for processing same as well as an order of priority among the RFI's submitted. The Contractor and originator shall accommodate such necessary time at no increase in the Contract Time and at no additional cost to the Owner.

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 Related Requirements

.1 Particular requirements for inspection and testing to be carried out by testing laboratory are specified under various sections.

1.3 Appointment and Payment

.1 The Owner will appoint an independent inspection and testing agency to provide Quality Assurance (QA) testing.

.2 Contactor will pay the independent inspection/testing agency from the Cash Allowance, including costs for equipment, facilities, and labour, except follows:
- .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
- .2 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
- .3 Mill tests and certificates of compliance.
- .4 Tests specified to be carried out by Contractor under the supervision of Consultant.
- .5 Additional tests specified in the following paragraph.

.3 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Consultant or Consultant to verify acceptability of corrected work.

1.4 Contractor’s Responsibilities

.1 The contractor shall be responsible for his own Quality Control and is responsible to appoint and pay for independent inspection/testing agency, equipment, facilities, and labour to provide Quality Control (QC) testing where necessary to satisfy the contractor's quality control plan. Such inspection and testing services will not be paid out of the Cash Allowance.

.2 Where independent inspection and testing has been appointed by the Consultant or Owner for Quality Assurance, the contractor shall provide labour, equipment and facilities to assist in the independent inspection and testing agency and their representatives by:
- .1 Providing access to Work to be inspected and tested.
- .2 Facilitating inspections and tests.
- .3 Making good Work disturbed by inspection and testing.

.3 Notify Owner and Consultant sufficiently in advance of testing & inspection operations (24hrs minimum).

.4 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.5 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed.

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 Preconstruction Conference

.1 The Consultant will call for and administer 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 Schedules
- .3 Personnel and vehicle permit procedures
- .4 Use of premises
- .5 Location of any Contractor on-Site facilities
- .6 Security
- .7 Housekeeping
- .8 Submittal and RFI procedures
- .9 Inspection and testing procedures, on-Site and off-Site
- .10 Control and reference point survey procedures
- .11 Injury and Illness Prevention Program
- .12 Contractor's Schedule of Values if applicable.
- .13 Contractor's Schedule of Submittals

.4 The Consultant will distribute copies of minutes to attendees. Attendees shall have seven (7) 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 Project meetings shall be held bi-weekly.

.3 Meeting minutes shall be distributed to all parties within three days of the meeting.

.4 Attendees at project meetings shall include as a minimum; Owner, Consultant, Contractors Project manager and Site Superintendent and major subcontractors.

1.4 Safety Meetings

.1 Conduct monthly contractor safety committee meetings.

.2 Conduct weekly toolbox talks.

1.5 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 Copy of approved Work schedule.
- .10 Manufacturers' installation and application instructions.
- .11 Health and Safety Plan and Other Safety Related Documents.
- .12 Designated substances reports.
- .13 Other documents as specified.

1.6 Schedules

.1 Submit a construction progress schedule to Consultant within 10 working days of the Contract award and at least 10 working days prior to the submission of the first progress claim. The construction progress schedule must show anticipated progress stages and final completion of the work within the time periods required by the Contract documents.

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

1.7 Requests for Information (RFI's)

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

1.8 Closeout Procedure

.1 Notify Consultant when Work is considered ready for Substantial Performance.

.2 Accompany Consultant on preliminary inspection to determine items listed for completion or correction.

.3 Comply with Consultant's instructions for correction of items of Work listed in executed certificate of Substantial Performance.

.4 Notify Consultant of instructions for completion of items of Work determined in Consultant's final inspection.

1.9 Cost Breakdown

.1 Submit a detailed cost breakdown to Consultant at least ten (10) 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 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 01 33 00 Submittal Procedures
.2 Section 01 77 00 Closeout Procedures

1.3 Submittals

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

1.4 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.
  .6 Shutdown or closure activity.

1.5 Format

.1 Prepare schedule in form of a horizontal bar chart using MS Project spreadsheets.

.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.

.7 Maintain schedule up to date.

1.6 Submission

.1 Submit initial format of schedules with bid submission.

.2 Submit schedules in electronic format, forward on disc as PDF files.

.3 Submit one opaque reproduction, plus 2 copies to be retained by Consultant.

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

.5 Following Consultants review, and prior to commencement of the Work, the schedule shall be reviewed jointly, by the Owner, Consultant and Contractor and approved by all parties.

.6 Resubmit finalized schedule within 7 days after return of review copy.

.7 No changes are to be made to the agreed upon construction schedule without prior approval by all parties (owner, architect & contractor) through a signed change order.

.8 Submit revised progress schedule at each regularly scheduled project meeting and with each application for payment.

.9 Indicate any changes in completion dates in relation to the original Contract dates.

.10 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.

1.7 Critical Path Scheduling

.1 Include complete sequence of construction activities.

.2 Include dates for commencement and completion of each element of construction and as a minimum shall include the following.
- .1 Selective Building Demolition
- .2 Foundation Work.
- .3 Structural framing.
- .4 Concrete floor slabs
- .5 Concrete unit masonry
- .6 Metal Studs.
- .7 Gypsum Board.
- .8 Fire proofing & sealing
- .9 Painting
- .10 Resilient flooring
- .11 Elevator
- .12 Electrical work broken down by elements
- .13 Mechanical work broken down by elements
- .14 Special Subcontractor Work.
- .15 Equipment Installations.
- .16 Finishes.

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

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

.5 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.

.6 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.

1.8 Submittals Schedule

.1 Include schedule for submitting shop drawings, product data, and samples.

.2 Indicate dates for submitting, review time, resubmission time, 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 General

.1 Conform to the requirements of Division 1.

1.2 Section Includes

.1 Shop drawings and product data.

.2 Samples.

.3 Certificates and transcripts.

1.3 Related Sections

.1 Section 01 26 15 Requests for Information
.2 Section 01 31 00 Project Management and Coordination

1.4 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 Review submittals prior to submission to Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.5 Notify Consultant in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

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

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

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

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

1.5 Requests for Information (RFI’s)

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

1.6 Shop Drawings and Product Data

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided 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 Allow ten (10) days for Consultant's review of each submission.

.6 Adjustments made on shop drawings by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.

.7 Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of revisions other than those requested.

.8 Accompany submissions with transmittal letter containing:
- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.9 Submissions 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.

.10 After Consultant's review, distribute copies.

.11 Submit 3 prints plus one electronic copy in PDF format of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.

.12 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.

.13 Delete information not applicable to project.

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

.15 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.

.16 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.

1.7 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 The Contractor is responsible to have reviewed the drawings prior to submission of his bid and confirms that all equipment can be installed as proposed in the drawings. No additional costs will be accepted for failure to complete this review.

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

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

1.8 Progress Photographs

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

1.9 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.

1.10 Mock-Ups

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

1.11 Certificates and Transcripts

.1 Submit Workers' Compensation Board status.

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 Related Sections

.1 Section 01 41 00 Regulatory Requirements
.2 Section 01 51 00 Temporary Utilities
.3 Section 01 56 00 Temporary Barriers and Enclosures

1.3 References

.1 Statutes of Canada 1999 Chapter 33. Canadian Environmental Protection Act 1999.
  .1 SOR/2003-289. Federal Halocarbon Regulations, 2003.
  .2 Transportation of Dangerous Goods Act, 1992 (1992, c. 34)
.2 OPSS 805 “Construction Specification for Temporary Erosion and Sediment Control Measures”.

1.4 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 The Work Site is subject to inspection by the Consultant, without prior notice.

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

.4 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.

.5 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.

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

1.5 Fires

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

1.6 Disposal of Wastes

.1 Plan for the re-use, recycling, or disposal of all waste materials as per applicable legislation.

.2 Do not bury rubbish and waste materials on site.

.3 Do not dispose of any deleterious substances into waterways, storm or sanitary sewers.

1.7 Drainage

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

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

.3 Protect storm drains against entry by sediment, debris, oil, or chemicals.

.4 Control disposal or runoff of water containing deleterious substances or other harmful substances in accordance with local authority requirements.

1.8 Unanticipated Soil Contamination

.1 Should unanticipated soil contamination be discovered:
- .1 Stop work, and assess the situation for safety.
- .2 If situation does not appear to be safe, evacuate workers from area.
- .3 If safe to do so, take immediate steps to control any spread of contamination, in accordance with Contractor's spill prevention and response plan.
- .4 Immediately contact 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 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 Related Sections

.1 Section 01 70 03 Safety Requirements

1.3 References

.1 Perform Work in accordance with the Ontario Building Code Act, O. Reg. 332/12, the Ontario Building Code (OBC) including all Supplements and other codes of provincial or local regulation 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.

1.4 Owner's Regulations

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

1.5 Standards and Definitions

.1 Where a reference is made to specification standards produced by various organizations, 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.

.3 Where a standard designates authorities such as the "Engineer", the "Owner" (when used in a sense other than that defined in the General Conditions) the "Purchaser" or some other such designation, these designations shall be taken to mean the Consultant.

.4 Wherever the words "acceptable", "approved", "satisfactory", "selected", "directed", “inspected”, “instructed”, “required”, "submit", or similar words or phrases are used in standards or elsewhere in the Contract Documents, it shall be understood that they mean, unless the context provides otherwise, "acceptable to the Consultant", "approved by the Consultant", "satisfactory to the Consultant", "selected by the Consultant", "directed by the Consultant", "inspected by the Consultant", "instructed by the Consultant", "required by the Consultant" and "submit to the Consultant".

1.6 Designated Substances

.1 Known designated substances are identified in the Designated Substance Reports.

.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.

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

.3 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.

.4 Provide MSDS for all materials brought to the Place of Work.

.5 Many common construction materials such as asbestos pipe and various insulations are designated substances and shall not be used under any circumstances. Such materials are banned from the Owner’s facilities.

1.8 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.

1.9 Protection of Water Quality

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

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

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

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

1.10 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

1.11 Access for Inspection and Testing

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

1.12 Other Regulatory Requirements

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

.2 Obtain required road occupancy permits.

.3 Pay any required roadway damage deposits required by the Municipality.

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

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

.6 Conform to the requirements of the local Conservation Authority.

.7 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 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 01 21 13 Cash Allowances
.2 Section 01 29 83 Payment Procedures for Testing Laboratory Services

1.3 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.

1.4 Independent Inspection Agencies

.1 Independent Inspection/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.

.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 Consultant. Pay costs for retesting and re-inspection.

1.5 Access to Work

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

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

1.6 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

1.7 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 Contractor's 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.

1.8 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.

1.9 Contractors Responsibilities

.1 Contractor is 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.

1.10 Tests and Mix Designs

.1 Furnish test results and mix designs as requested.

.2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Consultant and may be authorized as recoverable.

1.11 Mock Ups

.1 Prepare mock-ups for Work specifically requested in specifications.

.2 Construct in locations acceptable to Consultant.

.3 Prepare mock-ups for Consultant’s review with reasonable promptness and in orderly sequence, to not cause delays in Work.

.4 Failure to prepare mock-ups 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.

1.12 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 General

.1 Conform to the requirements of Division 1.

1.2 Section Includes

.1 Temporary utilities.

1.3 Related Sections

.1 Section 01 52 00 Construction Facilities.
.2 Section 01 56 00 Temporary Barriers and Enclosures

1.4 Installation and Removal

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

.2 Remove from site all such work after use.

1.5 Dewatering

.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

1.6 Water Supply

.1 Provide continuous supply of water for construction use.

.2 Arrange for connection with local utility company and pay all costs for installation, maintenance and removal.

.3 Pay all utility charges.

.4 Conveniently locate water supply for use by all sections of the work. Protect water lines from freezing.

.5 Water shall be potable and shall meet the requirements of the technical sections of the specifications.

1.7 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 not be used when available, unless there are savings to the contract price and Consultant's written permission is obtained stating conditions of use, provisions relating to guarantees on equipment and operation and maintenance of system. 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.

1.8 Temporary Power and Light

.1 Provide and pay for all temporary power during construction.

.2 Arrange for connection with utility company. Pay all costs for installation, maintenance and removal.

.3 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.

.4 All equipment used shall be CSA approved.

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

1.9 Temporary Communication Facilities

.1 Provide and pay for temporary telephone, fax, data hook up, lines and equipment necessary for own use.

1.10 Fire Protection

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.

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 Offices and sheds.
.3 Parking.
.4 Project identification.

1.2 References

.1 Canadian Standards Association (CSA International)
  .1 CAN/CSA Z321-96 (R2006), Signs and Symbols for the Workplace

1.3 Installation and Removal

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

.2 Remove from site all such work after use.

1.4 Scaffolding

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

1.5 Hoisting

.1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.

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

1.6 Site Storage/Loading

.1 Do not unreasonably encumber premises with products.

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

1.7 Construction Parking

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

.2 Provide and maintain adequate access to project site.

.3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.8 Offices

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

1.9 Equipment, Tool and Material Storage

.1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.

1.10 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.

1.11 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 Z321-96 (R2006).

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

1.12 Shoring

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

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

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

.4 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.

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

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

.7 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.

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

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

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

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Barriers.
.2 Environmental Controls.
.3 Traffic Controls.
.4 Fire Routes.

1.2 Installation and Removal

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.3 Site Fencing

.1 Rigid Fencing: The general public, as well as adjacent properties and plantings, shall be protected from harm by the installation of continuous, durable, rigid fencing at the limit lines of the construction area.

1.4 Hoarding

.1 Erect temporary enclosures where required using new solid plywood hoarding, minimum 1.8 metres high. Provide gates as necessary. Maintain hoarding in good repair.

1.5 Guard Rails and Barricades

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.

.2 Provide as required by governing authorities.

1.6 Weather Enclosures

.1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.

.2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.

.3 Design enclosures to withstand wind pressure and snow loading.

1.7 Dust Tight Screens

.1 Provide dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.

.2 Maintain and relocate protection until such work is complete.

1.8 Access to Site

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

.2 Maintain access for staff, students and visitors to the existing school and designated school areas.

1.9 Public Traffic Flow

.1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect the public.

1.10 Fire Routes

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.11 Protection for Off Site and Public Property

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred

1.12 Protection of Building Finishes

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with Consultant locations and installation schedule 3 days prior to installation.

.4 Be responsible for damage incurred due to lack of or improper protection.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Product quality, availability, storage, handling, protection, and transportation.
.2 Manufacturer's instructions.
.3 Quality of Work, coordination and fastenings.
.4 Existing Utilities

1.2 Quality

.1 Products, materials, equipment and articles (referred to as products throughout specifications) 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.

1.3 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.

1.4 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.

1.5 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.

1.6 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.

1.7 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.

1.8 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.

1.9 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.

1.10 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.

1.11 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.

1.12 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.

1.13 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.

1.14 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 Consultant.

1.15 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.

1.16 Hazardous Materials

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

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

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

1.2 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 Site-specific Health and Safety Plan prior to commencement of work on the work site.
  .2 Fire Safety Plan.
  .3 Reports or directions issued by authorities having jurisdiction, immediately upon issuance from that authority.
  .4 Accident or Incident Reports, within 24 hours of occurrence.

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

1.3 Compliance Requirements

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

1.4 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 Environmental Protection Act.
  .8 The Power Commission Act.
  .9 The Boiler and Pressure Vessels Act.
  .10 The Elevators and Lifts Act.
  .11 The Operating Engineer's Act.
  .12 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 The Contractor will be the "Constructor" as defined by the Occupational Health and Safety Act, will file a Notice of Project with the Ontario Ministry of Labour prior to commencement of the work and will pay all associated fees.

.4 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.

.5 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.

.6 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, and any expense incurred will be the responsibility of the Contractor.

.7 Notify the Owner should any hazardous condition become apparent.

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

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

.10 Provide safeguard and protection against damage to adjacent structures, properties and services.

1.5 Fire Protection

.1 Provide 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 Prior to construction, 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.

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

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

1.6 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.

.2 For the purpose of this contract immediately investigate and provide a report to the Consultant on incidents and accidents that involve:
  .1 A resulting injury that may or may not require medical aid but involves lost time at work by the injured person(s).
  .2 Exposure to toxic chemicals or substances.
  .3 Property damage.
  .4 Interruption to adjacent and/or integral infrastructure operations with potential loss implications.

1.7 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 to measure and stake site.
.2 Survey services to establish and confirm inverts for Work.
.3 Recording of subsurface conditions found.

1.2 Qualifications of Surveyor

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

1.3 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.

1.4 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.

1.5 Existing Services

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

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

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

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

1.6 Location of Services, Equipment and Fixtures

.1 Location of services, equipment, fixtures and outlets indicated 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.

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

.4 Submit field drawings to indicate relative position of various services and equipment when required by Consultant. Refer to requirements for interference drawings specified elsewhere.

.5 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.

.6 Submit field drawings and interference to indicate relative position of various services and equipment.

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

.8 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.

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

.10 Submit two (2) copies of interference drawings to Owner and Consultant in accordance with Section 01 33 00.

1.7 Records

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

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

1.8 Submittals

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

.2 Submit name and address of Surveyor to Consultant.

.3 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.

1.9 Subsurface Conditions

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

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

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

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

1.2 Submittals

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

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

1.3 Materials

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

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

1.4 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.

1.5 Execution

.1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.

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

.3 Uncover Work to install ill-timed Work.

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

.5 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.

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

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

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

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

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

.11 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with “ULC approved firestopping material, full thickness of the construction element.

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

.13 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

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 Progressive Cleaning
.2 Final Cleaning

1.2 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 Remove debris daily. The work site must be left clean and tidy upon completion, to the satisfaction of the Consultant.

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

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

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

.11 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 General

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

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

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

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

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

.10 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.11 Remove dirt and other disfiguration from exterior surfaces.

.12 Clean and sweep roofs. Clear all drains.

.13 Sweep and wash clean paved areas.

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

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

.16 Remove snow and ice from access to building.

End of Section

PART 1 GENERAL

1.1 Section Includes

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

1.2 Related Sections

.1 Section 01 33 00 Submittal Procedures
.2 Section 01 35 43 Environmental Procedures
.3 Section 01 74 11 Cleaning

1.3 References

.1 O. Reg. 102/94, Waste Audits and Waste Reduction Work Plans.

1.4 Submittals

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

.2 Submit 2 copies of completed Waste Management Plan (WMP) including Waste Reduction Workplan (WRW) and Materials Source Separation Program description prior to project start-up.

1.5 Definitions

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

.2 Waste Audit (WA): Relates to projected waste generation. Involves measuring and estimating quantity and composition of waste, reasons for waste generation, and operational factors which contribute to waste.

.3 Waste Reduction Work Plan (WRW): Written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.

.4 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.

.5 Waste Management Coordinator (WMC): Designate individual who is in attendance on-site, full-time. Designate, or have designated, individuals from each Subcontractor to be responsible for waste management related to their trade and for coordinating activities with WMC.

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

1.6 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 inevitable 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.

1.7 Documents

.1 Maintain at job site, one copy of following documents:
- .1 Waste Audit
- .2 Waste Reduction Workplan
- .3 Material Source Separation Plan

1.8 Waste Management Plan

.1 Waste Management Plan: Within 10 calendar days after receipt of Notice of Award of Contract, or prior to any waste removal, whichever occurs sooner, submit to the Owner and Consultant a Waste Management Plan. 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.

1.9 Waste Audit

.1 Prepare Waste Audit prior to project start-up.

.2 Record, on Waste Audit , extent to which materials or products used consist of recycled or reused materials or products

1.10 Waste Reduction Work Plan

.1 Prepare WRW prior to project start-up.

.2 Reduce construction and demolition waste in compliance with O. Reg. 102/94.

.3 Reduction will involve action to minimize quantity of waste at source. Reuse products which would become waste where practical. Recycling will involve collection and source separation at the site, of materials for use as feedstock in manufacturing of new products.

.4 Conform to local Municipal Landfill Solid waste management requirements. Consider reduction, reuse and recycling of waste generated during construction such as dimensional lumber, clean drywall, concrete, brick, scrap metal and corrugated cardboard.

1.11 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.

1.12 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.

.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.

1.13 Scheduling

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

1.14 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 Refer to disposal requirements and Designated Substances reports listed in Section 02 41 00-Demolition.

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. Provide instruction on disposal practices.

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

End of Section

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PART 1 GENERAL

1.1 Section Includes

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

1.2 Related Sections

.1 Closeout Submittals Section 01780

1.3 References

.1 Canadian Construction Documents Committee CCDC 2-2008, 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 Lien Act.

1.4 Inspection and Declaration

.1 Contractor's Inspection: The Contractor and all Sub-contractors 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 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 the Construction Lien Act 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 5.7 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 5.5

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

.

PART 1 GENERAL

1.1 Section Includes

.1 As built drawings, 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.
.7 Specialty Engineers sign off.
.8 Final site survey.

1.2 Submittals

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

1.3 Definitions

.1 As-Built Drawings are those prepared by the Contractor as it constructs the project and upon which it documents the actual locations of the building components and site components and changes to the original contract documents.

.2 Record Drawings are those drawings prepared by the Consultant. These are the compendium of the original drawings, site changes known to the Consultant, and information taken from the Contractor's As-Built Drawings.

.3 The above definitions are founded on the OAA Joint Best practices Statement As-Built and Record Drawings dated October 21, 2010 and issued jointly by the OAA and the Ontario General Contractors Association.

1.4 General

.1 The General Contractor shall assemble and submit the following close-out submittals for approval:
  .1 General Drawings (GD) manual containing project components that are static, not operational in nature or do not require routine scheduled maintenance.
  .2 Operation and Maintenance (O&M) manual containing operating systems with moving parts or safety systems requiring regularly scheduled inspection, maintenance or monitoring.
  .3 Warranty Manual
  .4 Complete drawing file containing as-built drawing and Autocad site record drawings.
  .5 Maintenance material receipts.
  .6 Owners signed certificate that specified training has been provided and accepted.

.2 Document close-out submittals shall be submitted on a single labelled write-protected USB flash drive labelled "Closeout Documents" with:
  .1 Project Title;
  .2 Project Job Number;
  .3 Date

.3 The USB flash drive shall be fully indexed and shall include:
  .1 File Folders and subfolders created for content itemized in 3.1.
  .2 Table of Contents for each manual.

.4 All pdf content must be legible. Poor resolution content shall be substantiation for rejection of the entire submission.

.5 Autocad drawings shall be created using version 2007 or later. Where contract drawings are created in BIM, the BIM model shall be modified. PDF format shall be version 7.0 or later.

.6 Closeout submittals are to be delivered for review a minimum of 14 calendar days prior to application for certificate of Substantial Performance. Time frame is to allow the Owner to coordinate review of submission by the consultant and the owner. Consultant will review selected items. Consultant is reviewing that required as-built drawings, shop drawings, product data and warranties are included and that they are the approved version.

.7 Only copies of reviewed shop drawings and product data are to be submitted. Rejected and not reviewed shop drawings and product data are not to be included.

.8 Shop drawings for temporary works required to facilitate construction and that will be removed during or at the completion of construction do not have to be submitted in closeout submittals.

.9 Consultant may reject the closeout submission for failure to meet the quality or organizational requirements listed in this specification.

.10 The pdf document files of the GD Manual, O&M Manual and Warranty Manual shall be bound and securely protected so that content cannot be removed or added to each manual but only viewed or printed.

.11 Improper Content or organization shall be substantiation for rejection of the entire submission.

.12 Supplementary content such as tab pages and table of contents to organize and coordinate the file folders and manuals shall be created using typed text.

1.5 General Drawings (GD) Manual

.1 GD Manual file folder shall include but not be limited to the following content: building envelope, structure, static Building, Civil, Landscape, Mechanical, Electrical, and Communications System Components.

.2 The general arrangement of the file shall include:
- .1 Cover sheet and table of contents;
- .2 Folder for each Drawing series 100, 200, 300 etc. and folders for approved shop drawings and product data by specification section. Each section providing shop drawings shall contain a tab page;
- .3 In each drawing series provide the As-Built Drawings and Autocad record drawings in pdf format;
- .4 The approved shop drawing and product data and warranty folder shall:
  - .1 Include approved shop drawing log;
  - .2 Be organized by specification division and section number.
- .5 The Building envelope and Structure shop drawings and product data file shall include but not be limited to: concrete reinforcing, structural steel and decking, steel staircases and ladders, structural precast concrete, trusses and joists, masonry mixes, masonry reinforcement, metal fabrications, cladding and insulation, roofing, windows, doors and hardware, flooring, millwork, firestopping, sealants, paints, paint colour information, test, inspection and deficiency reports.

.6 The static building mechanical , electrical and communications systems shop drawings and product data file shall include but not be limited to" plumbing pie and fittings, hangers and guides, floor and roof drains, insulation, power cable and wiring, power receptacles, switches, cable trays, racking systems, data outlets, test, inspection, deficiency and acceptance reports, TAB reports.

.3 For As-Built Drawings recording field information, site instructions and change orders the drawings shall include but not be limited to the following content:
- .1 Field Information:
  - .1 Foundation depth including stepped footing locations;
  - .2 Structure reinforcement specified as a standard detail to be field located as directed;
  - .3 Deviations in piping and ductwork systems and communication conduit and cable tray routing;
  - .4 Valve tag numbers and function located on piping system drawings;
- .2 Site Instructions and Change Orders:
  - .1 Dimensional and layout alterations;
  - .2 Material and construction type changes;
  - .3 Additional works added to the project;
  - .4 Works removed from the project.

1.6 Operations and Maintenance (O&M) Manual

.1 O&M Manual shall be for operating systems with moving parts or safety systems requiring regularly scheduled inspection, maintenance or monitoring, typically but not restricted to operable walls , lockers, electric door operators, mechanical systems, electrical, automated control and alarm systems, elevators, rigging and anchorages.

.2 The O&M Manual file folder structure shall include:
- .1 Cover sheet and table of contents;
- .2 Name, address and telephone number of General Contractor and all subcontractors;
- .3 Folder for each Drawing series 100, 200, 300 etc. and folders for approved shop drawings and product data by specification section. Each section providing shop drawings shall contain a tab page;
- .4 In each drawing series provide the As-Built Drawings and Autocad record drawings in pdf format;
- .5 The approved shop drawing and product data and warranty folder shall:
  - .1 Include approved shop drawing log;
  - .2 Be organized by specification division and section number.
- .6 Owners signed certificate that specified training has been provided and accepted.
- .7 Reviewed shop drawings and product data sheets shall include but not be limited to:
  - .1 Motorized equipment, HVAC equipment, kitchen equipment, plumbing fixtures, pressure vessels, hydronic systems, high and low pressure steam systems, ductwork, dampers and louvres, sprinkler systems, control systems, electrical distribution system components, UPS systems, fire alarm systems, lighting, door operators, electrically operated partitions and screens, and anchor points for rigging, lifeline connectors, elevators and lifts;
- .8 Schematics for HVAC systems, hydronic systems, steam systems, power distribution, and automated control systems.
- .9 Automated control system sequence of operations;
- .10 Manufacturer's published wiring, operating, maintenance and troubleshooting manuals;
- .11 TAB report and testing, commissioning, inspection and deficiency reports.

.12 Inspection and manufacturer's warranty and guarantee certificates. Manufacturer's warranty and guarantee information shall include all pertinent contact information and clearly identify the starting date and duration of warranty period.

.13 List of spare parts and maintenance tools provided and copy of signed delivery receipts.

1.7 As-Built Drawings and Samples

.1 Owner will supply a complete set of tender drawings including amendments drawings in hard copy and pdf format. The drawings are to be used as "As-Built Drawings" to record field information, site instructions and changes.

.2 As-Built Drawings shall be kept on site at all times during construction without exception but are not to be taken to construction areas. Change orders and Site Instructions are to be kept in a binder with the As-Built Drawings.

.3 Neatly record changes in permanent red fine line marker on the As-Built Drawings concurrently with the implementation.

.4 Site Instruction number and Change Order number shall be annotated on the As-Built Drawings.

1.8 Spare Parts

.1 Provide spare parts, in quantities specified in individual specification sections. 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. If requested, furnish evidence as to type, source and quality of products provided.

.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.

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

1.9 Maintenance Materials

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections. Ensure maintenance materials provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work. If requested, furnish evidence as to type, source and quality of products provided.

.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.

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

1.10 Special Tools

.1 Provide special tools, in quantities specified in individual specification sections. Ensure special tools provided are new, undamaged or defective, and of same quality and are provided or recommended by manufacturer of products provided in Work. If requested, furnish evidence as to type, source and quality of products provided.

.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.

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

1.11 Storage, Handling and Protection

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration. Store in original and undamaged condition with manufacturer's seal and labels intact.

.2 Store components subject to damage from weather in weatherproof enclosures.

.3 Store paints and freezable materials in a heated and ventilated room.

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

1.12 Warranty Manual

.1 The Warranty Manual file folder structure shall be organized by specification division and section number and shall include:
  .1 Cover sheet and table of contents;
  .2 Name, address and telephone number of General Contractor and subcontractor;
  .3 Folder for each Drawing series 100, 200, 300 etc. and;
  .4 All pertinent contact information for the manufacturer and supplier;
  .5 A duplicate copy of all manufacturer’s warranties organized by specification section number.

.2 Each section shall contain a tab page.

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

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

.5 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.

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

.7 Co-execute submittals when required.

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

1.13 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.

1.14 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 USB Flash Drive File Structure

.1 General Layout:

- .1 Project Name
  - .1 GD Manual
    - .1 Cover Table of Contents
    - .2 Drawings
      - .1 Drawing List
        - .1. 100 Series
        - .2. 200 Series
          - .1 As Built/Record
          - .2 300 Series

- i. As Built/Record
- .3 400 Series
  - i. As Built/Record
- .4 500 Series
  - i. As Built/Record
- .5 Etc.

.2 Shop Drawings Product Data Warranty

- .1. Division xx
  - .1 Section xx xx xx
- .2. Division xx
  - .1 Section xx xx xx
- .3. Division xx
- .4. Etc.

.3 Inspection Reports

- .1. Materials Testing
- .2. Site Reports

.4 Independent Specialty Engineers sign-off

.5 Final survey drawing

.2 O&M Manual

- .1 Cover Table of Contents
- .2 Drawings
  - .1 Drawing List
  - .2 100 Series
    - .1. As Built
    - .2. Record
  - .3 200 Series
    - .1. As Built
    - .2. Record
  - .4 300 Series

.1. As Built
.2. Record
.5 Etc.
.3 Shop Drawings Product Data Warranty
.1 Contents
.1. Division xx
.2. Section xx
.3. Division xx
.4. Etc.
.2 TAB Inspection Reports
.1. Inspection Reports
.1 Materials Testing
.2 Site Reports
.3 Air Balancing
.4 Automated Control Systems Operation
.5 Etc.
.4 Spare Parts listing.
.5 Maintenance Materials listing.
.6 Special Tools listing.
.3 Warranty Manual
.1 Cover Table of Contents
.2 Contractors
.3 Warrantees and Guarantees

.2 Typical shop drawing, product data and warranty folder contents in GD Manual

.1 Section xx xx xx
.2 1 Section xx xx xx Tab page
.3 2 Shop Drawing x
.4 3 Warranty

.3 Typical shop drawing, product data and warranty folder in O& M Manual

.1 Section 25 xx xx

.2 1 Section x Tab page

.3 2 Shop Drawing x

.4 3 Operating Instructions x

.5 4 Maintenance Instructions x

.6 5 Warranty x

.4 Specialty Engineer Sign Offs

.5 Final Site Survey

.6 USB flash drive file structure shall be edited to suit the project type.

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Procedures for demonstration and instruction of equipment and systems to Owner's personnel.

1.2 Description

.1 Demonstrate operation and maintenance of equipment and systems to Owner's personnel two (2) weeks prior to date of Substantial Performance.

.2 Owner will provide list of personnel to receive instructions, and will co-ordinate their attendance at agreed-upon times.

1.3 Quality Control

.1 When specified in individual Sections require manufacturer to provide authorized representative to demonstrate operation of equipment and systems, instruct Owner's personnel, and provide written report that demonstration and instructions have been completed.

1.4 Submittals

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

.2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Owner's approval.

.3 Submit reports within one (1) after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

.4 Give time and date of each demonstration, with list of persons present.

1.5 Conditions for Demonstrations

.1 Equipment has been inspected and put into operation.

.2 Testing, adjusting, and balancing have been performed and equipment and systems are fully operational.

.3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions

1.6 Preparation

.1 Verify that conditions for demonstration and instructions comply with requirements.

.2 Verify that designated personnel are present

1.7 Demonstrations and Instructions

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times.

.2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.

.3 Review contents of manual in detail to explain aspects of operation and maintenance.

.4 Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instructions.

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 Related Sections

.1 Section 01 35 43 Environmental Procedures
.2 Section 01 56 00 Temporary Barriers and Enclosures
.3 Section 01 74 11 Cleaning
.4 Section 01 74 19 Construction Waste Management and Disposal

1.3 References

.1 The National Building Code of Canada, Part 8-Safety Measures on Construction and Demolition Sites.
.2 Ontario Regulation 102/94, Waste Audits and Waste Reduction Work Plans.
.3 Ontario Regulation 103/94, Environmental Protection Act.
.4 Ontario Regulation 213/07 -The Fire Code.
.5 Ontario Regulation 232/98 - Landfilling Sites.
.6 Ontario Regulation 278/05 -Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations.
.7 Ontario Regulation 347- Environmental Protection Act, General — Waste Management.
.8 Ontario Regulation 332/12 - The Building Code.
.9 The Workplace Health and Safety Act, and Regulations for Construction Projects.
.10 The Contractors Health and Safety Policy.
.11 Laws, rules and regulations of other authorities having jurisdiction.

1.4 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 to Consultant and Owner 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 a construction waste management plan including demolition and removal procedures under provisions of Section 01 74 19.

.6 Submit proposed dust-control measures.

.7 Submit proposed noise-control measures.

.8 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.
.3 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

1.5 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.

1.6 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.

1.7 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.

1.8 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.

1.9 Project Site 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 Conform to requirements of Division 1, in particular, articles on Design and Safety Requirements for Temporary Work. 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 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 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

3.3 Protection

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

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

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

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

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

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

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

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

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

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

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

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

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

.14 At all times protect the structure from overloading.

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

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

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

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

3.4 Preparation

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

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

.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.

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

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

3.5 Temporary Ventilation

.1 Provide all required temporary ventilation for demolition work.

3.6 Environmental Controls

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

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

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

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

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

3.7 Performance

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

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

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

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

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

3.8 Demolition

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

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

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

.4 Prevent movement, settlement or damage of adjacent structures, services, adjacent grades, and existing building to remain. Make good damage caused by demolition.

.5 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 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.

.5 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 F710-03. Refer to original building drawings and remove and replace existing concrete floor toppings as necessary and where required.

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

.7 At exterior and interior bearing walls to be removed, include breaking out and removal of existing concrete foundations to a minimum of 8" below new finished floor level.

3.10 Handling of Demolished Materials

.1 Conform to the approved Waste Management Plan.

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

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

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

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

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

3.11 Cleaning

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

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

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

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

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

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 03 20 00 Concrete Reinforcing
.2 Section 03 30 00 Cast-in-Place Concrete
.3 Section 05 50 00 Metal Fabrications
.4 Section 31 23 10 Excavating, Trenching and Backfilling
.5 Section 32 16 13 Concrete Curbs
.6 Section 32 16 23 Sidewalks

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM D1751-04(2008) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
  .2 ASTM D1752-04a (2008) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
.2 American Concrete Institute (ACI)
  .1 ACI 117-10, Standard Specifications for Tolerances for Concrete Construction and Materials.
  .2 ACI 347-04, Guide to Formwork for Concrete.
.3 Canadian Standards Association (CSA)
  .1 CSA-A23.1-09, Concrete Materials and Methods of Concrete Construction.
  .2 CAN/CSA S269.3-M92 (R2008), Concrete Formwork.
  .3 CAN/CSA O86.1-14, Engineering Design in Wood (Limit States Design)
.4 Canadian General Services Board (CGSB)
  .1 CGSB 41-GP-35M Polyvinyl Chloride Waterstop.

1.4 Submittals

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

.2 Shop Drawings:
  .1 Submit shop drawings showing type, extent and locations of items to be built into concrete.
  .2 Sleeving Drawings: Submit drawings showing sleeves required through floors, roof and other structural members.
  .3 Submit drawings showing size and spacing of conduits and piping, if requested by Consultant.
  .4 Coordinate with other Divisions prior to submittal.
  .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 Consultant will review and return submitted drawings in accordance with an agreed schedule. Consultant's review will be for conformity to design concept and for general arrangement, and shall not relieve Contractor of responsibility for errors or omissions in submitted drawings or of responsibility for meeting requirements of Contract Documents.

.8 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.

.9 Do not commence placing sleeves, conduits, or piping before drawings have been reviewed and Consultant's comments incorporated on drawings issued to site.

.10 Assume responsibility for accuracy of Work. Review of submitted shop drawings does not relieve Contractor from compliance with requirements of Contract Documents.

.3 Submit shop drawings as follows:

.1 4 copies for review before any Work commences.

.2 1 additional copy for distribution as directed by Consultant.

.3 1 copy to Inspection and Testing Company.

.4 Required by Regulatory Agencies: Submit shop drawings bearing signature and seal of Professional Engineer responsible for formwork design, as may be required by regulatory Agencies. Proceed with construction of formwork only with their approval.

1.5 Requirements of Regulatory Agencies

.1 Conform to local and provincial regulations, including construction safety regulations.

1.6 Quality Assurance

.1 Obtain a copy of CSA-A23.1-09 and maintain on site

.2 Design of Formwork: Assume full responsibility for complete structural design and construction of formwork in accordance with CAN/CSA S269.3-M92 (R2008) and CAN/CSA O86.1-14, Engineering Design in Wood (Limit States Design) as applicable.

1.7 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Protect formwork to prevent functional damage and damage to faces affecting appearance of concrete surfaces exposed to view.

1.8 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

.1 All materials shall be new, in accordance with referenced standards.

.2 Plywood: Douglas Fir, conforming to CSA O121-08. Sound undamaged sheets finished one side, fabricated especially for use as concrete form panels, with sealed edges. Minimum 17mm thickness.

.3 Lumber: Conforming to CSA O141-05 (R2009), with grade stamp clearly visible.

.4 Chamfers: Cut from 19mm x 19mm wood, smooth with no open defects.

.5 Form Ties: snap ties, with spreader washer and 25mm break back.

.6 Void Form: Honeycomb cellular core structure manufactured from kraft fibre. Top and sides protected with wax coated corrugated board, and bottom unprotected.

.7 Round Column Fibre Forms: Sonotube "W" Coated, by Sonoco Limited.

.8 Joint Tape: non-staining, water impermeable, self-release.

.9 Nails, Spikes and Staples: Galvanized, conforming to CSA B111-1974 (R2003).

.10 Waterstops: PVC Waterstop to CGSB 41-GP-35M, types 2 and 3 and OPSS 1204:
- .1 Construction Joints, Internal Waterstop. 150 mm wide, ribbed, centre bulb style tapered thickness varying from 9.5 mm minimum near centre to 6.4 mm minimum near edge.
  - .1 Wirestop PVC Waterstop type CR-6380, with steel wire fastening loops, by Paul Murphy Plastics Company.
  - .2 Vinylex PVC Waterstop type RB6-38 ribbed with centre bulb, by Gamco Inc.
  - .3 Durajoint PVC Waterstop type 5, by Durajoint Concrete Accessories.
  - .4 PVC Waterstop Type 6380, by W. R. Meadows of Canada Ltd.

.11 Form Release Agent: Colourless mineral oil which will not stain concrete.

.12 For concrete surfaces exposed to view, provide panels smooth and free of defects which would be reproduced as concrete blemishes.

PART 3 EXECUTION

3.1 Examination

.1 Before starting this work, examine work done by others which affects this work.

.2 Notify the Consultant of any conditions which would prevent proper completion of this work.

.3 Commencement of work implies acceptance of existing conditions.

3.2 Erection

.1 Verify lines, levels and centres before proceeding with formwork. Ensure dimensions agree with drawings.

.2 Align joints and make watertight, to prevent leakage of cement paste and disfiguration of concrete.

.3 Construct formwork to produce concrete with dimensions, lines and levels within tolerances specified in ACI 347-04.

.4 Provide formed openings where required for pipes, conduits, sleeves and other work to be embedded in and passing through concrete members.

.5 Install chamfers at all external corners exposed to view.

.6 Provide waterstops in accordance with manufacturer's instructions at construction joints in walls which retain earth, and wherever else indicated or detailed. Waterstops shall be continuous.

.7 Bed mud sills on sand, gravel or crushed stone placed on unfrozen, dry, solid and stable subgrade.

.8 Adequately brace and shore formwork to sustain loads (both concrete and working loads) applied during construction.

.9 Be responsible for safety of the structure both before and after the removal of forms, until the concrete has reached its specified 28 day strength.

.10 Voidform: Install voidform and place 7.5 mm thick plywood over voidform, to provide firm surface for supporting reinforcement.

.11 Round Fibre Forms:
- .1 At concealed locations, provide uncoated fibre form.
- .2 Provide round fibre form where indicated for piers, equipment bases, light pole bases, fence foundation and wherever indicated or required.

3.3 Built-In Work

.1 Form openings and build in anchors, inserts, sub-frames, key-ways, sleeves, miscellaneous metal items, reglets and similar items furnished under Work of other Sections, which are indicated on Drawings and on shop drawings of other trades, and as required for proper completion of Work.

.2 Do not embed wood in concrete.

.3 Anchor Bolts: Tie anchor bolts securely in position to prevent movement during concrete placing. Use template to locate bolts. Verify that bolts have specified projection above concrete.

.4 Openings or Sleeves Not Shown on Structural Drawings:
- .1 Obtain Consultant's written approval before forming openings of sleeves through columns and beams, or through slabs within 1800 mm of their supports.
- .2 Obtain Consultant's written approval before forming openings or sleeves larger than 200 mm square in any location.

.5 Embedded Pipe or Conduit Not Shown or Detailed on Structural Drawings:
- .1 Obtain Consultant's written approval before placing conduit or pipe which would be embedded in finished structure.

.6 Confirm that built-in items that penetrate surface waterproofing or damp proofing are installed to meet requirements of waterproofing trade.

3.4 Construction Joints

.1 Form construction and expansion joints with bulkheads to ensure straight lines. Immediately before subsequent pour at construction joint, remove bulkhead and tighten forms so that concrete surfaces will be on same plane with no overlapping of concrete.

.2 Review with Consultant proposed location and details of construction joints in walls, columns, beams and slabs.
  .1 Construction joints shall present appearance of normal form panel joint.
  .2 Install continuous shear key in construction joints in walls and framed floors which are 152mm or more thick.
  .3 Provide vertical construction joints in walls at not more than 20 metres centre to centre.
  .4 Provide waterstops in accordance with manufacturer's instructions at construction joints in walls which retain earth. Waterstops shall be continuous.

3.5 Treatment of Formwork Surfaces

.1 Form Release Agent:
  .1 Coat formwork with form release agent before reinforcement, anchors, accessories, and other built in items are installed.
  .2 Do not coat plywood forms pre-treated with release agent.
  .3 On surfaces to receive finish materials, adhesives, sealers, paint or other coatings or materials, use a compatible release agent.

3.6 Stripping of Formwork

.1 Strip formwork on vertical surfaces when concrete has hardened sufficiently that no damage will result from stripping operations.

.2 Do not remove plywood formwork by jerking loose or by metal pinch bars. Use wood wedges and gradually force panels loose. Leave plywood forms in place as long as possible to permit maximum shrinkage away from concrete.

.3 Take particular care not to damage external corners when stripping formwork.

.4 When forms are stripped during curing period, cure and protect exposed concrete in accordance with Section 03 30 00 - Cast-in-Place Concrete.

3.7 Defective Work

.1 Movement and displacement of formwork during construction, variations in excess of specified tolerances, marked and disfigured surfaces, and failure of materials or workmanship to meet requirements of this specification, and which cannot be repaired by approved methods, will be considered defective work.

.2 Replace defective work, as directed by Consultant.

.3 Pay for additional inspection and testing, redesign, corrective measures, and related expenses, if work has proven to be deficient.

.4 Reconstruct defective formwork and replace concrete and reinforcement placed in defective formwork at no additional cost.

3.8 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 03 10 00 Concrete Forming and Accessories
.2 Section 03 30 00 Cast-in-Place Concrete
.3 Section 04 05 19 Masonry Anchorage and Reinforcing
.4 Section 04 22 00 Concrete Unit Masonry
.5 Section 05 50 00 Metal Fabrications

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM A143/A143M-07 Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
  .2 ASTM A185/A185M-07 Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
  .3 ASTM A497/A497M-07 Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
  .4 ASTM A775/A775M-07b Standard Specification for Epoxy Coated Steel Reinforcing Bars.
.2 American Concrete Institute (ACI)
  .1 ACI SP-66 (04) ACI Detailing Manual.
  .2 ACI 315-99, Details and Detailing of Concrete Reinforcement.
  .3 ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.
.3 Canadian Standards Association (CSA)
  .1 CSA A23.1-09, Concrete Materials and Methods of Concrete Construction.
  .2 CSA A23.3-04, Design of Concrete Structures.
  .3 CSA G30.5-M1983 (R1998), Welded Steel Wire Fabric for Concrete Reinforcement
  .4 CSA G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
  .5 CSA W186-M1990 (R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.
.4 Reinforcing Steel Institute of Canada (RSIC)
  .1 RSIC Reinforcing Steel Manual of Standard Practice.

1.4 Submittals

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

.2 Shop Drawings:
  .1 Submit shop drawings, including placing drawings and bar lists.
  .2 Prepare placing drawings and bar lists in accordance with the American Concrete Institute (ACI) Detailing Manual, and the Reinforcing Steel Institute of Canada (RSIC) Reinforcing Steel Manual of Standard Practice, the typical details included with Contract Documents.
  .3 Prepare placing drawings to minimum scale of 1:50.
  .4 Submit placing drawings and bar lists sufficiently detailed and dimensioned to permit correct placement of reinforcement and accessories without reference to architectural or structural Drawings.
  .5 Show reinforcement, including dowels, in elevation on placing drawings for wall reinforcement.
  .6 Show concrete cover to reinforcement.
  .7 Show location of construction joints.

.8 Prior to submission to Consultant, review all shop 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 shop drawing with the requirements of Work and Contract Documents.

.9 Review of each shop drawing shall be indicated by stamp, date, and signature of a responsible person.

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

.11 Consultant will review and return shop drawings in accordance with the agreed schedule. Consultant's review will be for conformity to design concept and for general arrangement, and shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of Contract Documents.

.12 Make any changes in shop 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.

.13 Do not commence fabrication of reinforcement before drawings have been reviewed and Consultant's comments incorporated on drawings issued to fabricating shop.

.3 Inspection Reports: Inspection and Testing Company shall submit reports of inspections and tests.

.1 Distribute inspection reports as follows:

.1 2 copies to Consultant.

.2 1 copy to Consulting Structural Engineer

.3 1 copy to Contractor.

.4 Quality Assurance Submittals:

.1 Mill Test Report: upon request, provide Consultant with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.

.2 Upon request submit in writing to Consultant proposed source of reinforcement material to be supplied.

1.5 Quality Assurance

.1 Obtain a copy of CSA A23.1-09, and maintain on site.

.2 Qualifications:

.1 Welding: Undertake welding of reinforcement only by a fabricator or Subcontractor approved by Canadian Welding Bureau to requirements of CSA W186-M1990 (R2012).

.3 Source Quality Control:

.1 Source Quality Control may be performed by an Inspection and Testing Company appointed by Consultant.

.4 Review provided by Inspection and Testing Company does not relieve Contractor of his sole responsibility for quality control over Work. Performance or non-performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of the Specification.

.5 Identify and correlate reinforcing steel from Canadian mills with test reports for compliance with requirements specified.

.6 Test unidentified reinforcing steel at expense of Contractor. Perform testing for each 1 tonne or part thereof supplied for incorporation in Work.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.7 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

.1 In accordance with reference standards.

.2 Substitute different size bars only if permitted in writing by Consultant.

.3 Bar Reinforcing Steel:
.1 Bars which are to be welded by arc-welding process: to CSA G30.18-09, Grade 400W.
.2 Other bars: to CSA G30.18-09, Grade 400R.

.4 Welded Wire Fabric: to CSA G30.5-M1983 (R1998) and ASTM A185/A185M-07 and in flat sheets, not rolls.

.5 Welded deformed steel wire fabric: to ASTM A497/A497M-07 and in flat sheets, not rolls.

.6 Cold-drawn annealed steel wire ties: to ASTMA497/A497M-07.

.7 Chairs, bolsters, bar supports, spacers: to CSA A23.1-09.

.8 Mechanical splices: subject to approval of Consultant.

.9 Plain round bars: to CSA G40.20-04/G40.21-04 (R2009).

2.2 Fabrication

.1 Fabricate reinforcing steel only in permanent fabricating shop.

.2 Fabricate reinforcing steel in accordance with shop drawings.

.3 Tag reinforcing bars to indicate placement as designated on shop drawings.

.4 Splices:
.1 Provide splices only where specifically indicated on Drawings.
.2 Stagger alternate mechanical splices 750 mm apart.
.3 Stagger alternate end bearing splices 750 mm apart.
.4 Install on threaded splices, plastic internal coupler thread protector and plastic bar end thread protector.

PART 3 EXECUTION

3.1 Examination

.1 Before starting this work, examine work done by others which affects this work.

.2 Examine formwork to verify that it has been completed, and adequately braced in place.

.3 Notify the Consultant of any conditions which would prejudice proper completion of this work.

.4 Commencement of work implies acceptance of existing conditions.

3.2 Installation

.1 Place reinforcing steel in accordance with reviewed placing drawings, typical details, and CSA A23.3-04.

.2 Adequately support reinforcing and secure against displacement within tolerances permitted.

.3 Place reinforcing steel to provide minimum spacing and proper concrete cover as noted on drawings.

.4 Do not cut reinforcement to incorporate other Work.

.5 Relocate or rebend bars only on written instructions of Consultant.

.6 Tie, do not weld, reinforcement in place.

3.3 Adjusting and Cleaning

.1 Adjust and secure reinforcement in correct position immediately before concrete is placed.

.2 Remove contaminants which lessen bond between concrete and reinforcement.

3.4 Field Quality Control

.1 Provide competent supervisor, with at least three years of experience in reinforcement placement, to direct placement of reinforcement.

.2 Inspect placement of reinforcement for conformance with Drawings and Specifications, before each concrete placement, and correct as necessary.

.3 Be aware that Consultant's periodic review of selected areas of reinforcement are for verification of conformity to design concept and general arrangement only, and shall not relieve Contractor of responsibility for quality control, errors, or omissions, or conformance with requirements of Contract Documents.

3.5 Defective Work

.1 Incorrectly fabricated, misplaced or omitted reinforcement, will be considered defective Work.

.2 Replace or adjust defective reinforcement before concrete is placed as directed by Consultant.

.3 Replace or strengthen concrete work which is deficient as a result of incorrectly fabricated, misplaced, or omitted reinforcement, which was not corrected before concrete was placed.

.4 Pay for additional inspection and testing, redesign, corrective measures, and related expenses, if Work has proven to be deficient.

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 03 10 00 Concrete Forming and Accessories
.2 Section 03 20 00 Concrete Reinforcing
.3 Section 04 05 19 Masonry Anchorage and Reinforcing
.4 Section 04 22 00 Concrete Unit Masonry
.5 Section 05 50 00 Metal Fabrications
.6 Section 07 92 00 Joint Sealants

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C150/C150M-12, Standard Specification for Portland Cement
  .2 ASTM C260/C260M-10a Standard Specification for Air Entraining Admixtures for Concrete
  .3 ASTM C309-11 Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete
  .4 ASTM C330/C330M-09 Standard Specification for Lightweight Aggregates for Structural Concrete
  .5 ASTM C494/C494M-12 Standard Specification for Chemical Admixtures for Concrete
  .6 ASTM C881/C881M-10 Standard Specification for Epoxy Resin Base Bonding Systems for Concrete
  .7 ASTM C1017/C1017M-07 Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
  .8 ASTM C1107/C1107M-11 Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink)
  .9 ASTM D412 - 06ae2 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
  .10 ASTM D624-00(2012) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
  .11 ASTM D1751-04(2008) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
  .12 ASTM D1752-04a(2008) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
.2 American Concrete Institute (ACI)
  .1 ACI 117-10, Standard Specifications for Tolerances for Concrete Construction and Materials.
  .2 ACI 232.1R-12, Use of Raw or Processed Natural Pozzolans in Concrete
.3 Canadian Standards Association (CSA International)
  .1 CSA-A3001-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005), Includes Update No. 1 (2009), Update No. 2 (2010), Update No. 3 (2011)
  .2 CSA A23.1-09, Concrete Materials and Methods of Concrete Construction.
  .3 CSA A23.2-09, Methods of Test for Concrete.
  .4 CSA CAN3-A266.2 Chemical Admixtures for Concrete.
  .5 CSA A283-06 (R2011), Qualification Code for Concrete Testing Laboratories.

.4 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-19.13-M87, Sealing Compound, One Component, Elastomeric, Chemical Curing.
  .2 CAN/CGSB-19.24-M90, Multi Component, Chemical-Curing Sealing Compound.
.5 Ontario Provincial Standard Specifications (OPSS)
  .1 OPSS 1010, Material Specification for Aggregates - Granular A, B, M and Select Subgrade Material.
  .2 OPSS 1212, Material Specification for Hot-Poured Rubberized Asphalt Joint Sealing Compound.

1.4 Submittals

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

.2 Samples: Submit for inspection, material samples of specified mix designs.

.3 Concrete Mix Designs:
  .1 Submit concrete mix designs for review; when optimum bulk density of aggregates is specified, provide supporting evidence of compliance with requirements.
  .2 Review of mix design does not relieve Contractor from responsibility for compliance with Contract Documents.
  .3 Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CAN/CSA A23.1-09, Clause 7. Mix design shall be adjusted to prevent alkali aggregate reactivity problems.
  .4 Provide certification that plant, equipment, and all materials to be used in concrete comply with the requirements of CAN/CSA- A23.1-09.
  .5 Submit mix design for each type of concrete. Specify intended use for each mix design.
  .6 Submit written requests for use of admixtures not specified, for site mixing of concrete, and for use of bonding agents.
  .7 Submit in writing, proposed method of in-situ strength testing.
  .8 Review of submittals by the Consultant is for the sole purpose of ascertaining conformance with the general design concept. This review does not mean approval of detail design inherent in submittals, the responsibility for which remains with the Contractor submitting same. Contractor is responsible for conditions to be confirmed and correlated at the job site, for information that pertains solely to the fabrication, or to techniques of construction and installation, and for co-ordination of work of all trades.

.4 Inspection Reports: Inspection and Testing Company shall:
  .1 Submit written reports of inspection and tests.
  .2 Distribute reports as follows:
    .1 2 copies to Consultant;
    .2 1 copy to Consulting Structural Engineer;
    .3 1 copy to Contractor.
  .3 On concrete cylinder test reports, include:
    .1 Specific location of concrete represented by sample
    .2 Design strength.
    .3 Unit weight of sample
    .4 Class of exposure
    .5 Aggregate size and mixtures incorporated
    .6 Date, hour and temperature at time sample taken
    .7 Percentage air content
    .8 Test strength of cylinder
    .9 Type of failure if test fails to meet specification.

1.5 Quality Assurance

.1 Obtain a copy of CSA CAN/CSA-A23.1-09 and A23.2-09, and maintain on site.

.2 Pre-Construction Conference:
- .1 At least 35 days prior to the start of concrete construction schedule, conduct a meeting to review proposed mix designs and to discuss detailed requirements of the proposed concrete operations. Review requirements for submittals, coordination, and availability of materials. Establish work progress and sequencing schedules and procedures for material testing, inspection and certifications.

.3 Source Quality Control:
- .1 Both source quality control, and field quality control specified in Article 1.5.4, may be performed by an Inspection and Testing Company appointed by Consultant.
- .2 Review provided by Inspection and Testing Company does not relieve the Contractor of his sole responsibility for quality control over Work. Performance or non- performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of the Specification.
- .3 Inspection and Testing Company shall be certified under CSA A283-06 (R2011), Qualification Code for Concrete Testing Laboratories, for Category 1 Certification.
- .4 Payment for specified Work performed by Inspection and Testing Company will be made from Cash Allowance.
- .5 Payment for additional tests (including testing of structure and its performance and load testing) required by changes of materials or mix design requested by Contractor, and failure of completed Work to meet specified requirements, shall be made at Contractor's expense.
- .6 Perform Work of source quality control in accordance with CSA A23.2-09 and to include:
  - .1 Verification that ready-mix supplier is qualified to supply concrete in accordance with Specification.
  - .2 Review of proposed concrete mix designs.
  - .3 Sampling, inspection, and testing of materials as may be required.

.4 Field Quality Control:
- .1 Inspection and Testing Company, when appointed as specified for Source Quality Control, shall perform sampling, inspection and testing of concrete work at site.
- .2 Perform sampling, inspection and testing in accordance with CSA A23.2-09, and to include:
  - .1 Making of standard slump tests.
  - .2 Obtaining of three standard specimens for strength tests from each 100 m of concrete, or fraction thereof, of each mix design of concrete placed in any one day. In addition, for slabs-on-grade, obtain beam specimens for determination of modulus of rupture.
  - .3 Verification that test specimens are stored within an enclosure, maintained at specified temperatures.
  - .4 Making compression tests of each set of three specimens, one at 7 days and two at 28 days; modulus of rupture tests at 90 days.
  - .5 Verification of air content of air-entrained concrete.
    - .1 For Class of exposure F-1, and C-2, test at frequency in accordance with CSA A23.1-09 Clause 4.4.4.1.1.
    - .2 Make first test before placing any concrete.
    - .3 After stable air content has been established, frequency of tests will be determined by Consultant.
    - .4 For other Classes of exposure, test at time of obtaining strength test specimens.
- .3 Inspection for Tolerances:
  - .1 Confirm that concrete work meets specified tolerance requirements.

.2 Use the elevation survey records of elevations of finished concrete surfaces specified in Section 03 10 00 and this section as basis for judging compliance.
.3 Use approved aluminum straightedge to judge compliance with specified slab tolerances, except use dipstick equipment where F-number tolerance is specified.

.4 Slabs-on-Grade:
.1 Observe application of curing compound to sample slab, recording rate of application.
.2 Monitor on a random basis acceptable to the Consultant, that slab is being saw cut before slab temperature starts to fall.
.3 Qualifications: Floor finishing shall be undertaken only by contractors with at least 10 years' experience.
.4 Sample of Finish Flooring:
.1 Finish an area of floor slab where directed by Consultant to provide sample of finish for approval.
.2 Protect new sample area until finish is approved.
.3 If liquid membrane curing compound is to be used on Project, determine and apply correct quantity required to meet rate of coverage recommended by manufacturer for measured test area.
.4 Approved sample will provide standard by which subsequent finishing will be judged and will be incorporated into Work.

1.6 Tolerances

.1 In accordance with ACI 117-10 and CAN/CSA A23.1-09, Table 15.

.2 Difference between elevation of high point and low point in specified area not to exceed:
.1 In any bay up to 100 m2: 12 mm.
.2 In any bay up to 400 m2: 25 mm.

.3 Straightedge method: Finish floor slabs to meet following tolerances when measured at 72 +/- 12 hours after completion of floor finishing, before shores are removed from formed slabs, by placing a freestanding unleveled straight edge anywhere on slab and allowing it to rest on two high points. Gap between straightedge placed on two high points and slab not to exceed:
.1 3 metre straightedge: 8 mm (Class A).
.2 2 metre straightedge: 4 mm.

1.7 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

1.8 Job Conditions

.1 Protect floor slabs, and concrete surfaces exposed to view or on which finishes are to be applied, from grease, oil, and other soil which will affect the appearance of the concrete, or impair the bond of finish material.
.2 Environmental Conditions: In addition to Cold Weather and Hot Weather Requirements of CSA A23.1-09, the following shall apply to Work of this Section:
.1 Provide protection or heat, or both, so that temperature of concrete at surfaces is maintained at not less than 21^{O}C for three days after placing, not less than 10^{O}C for the next two days and above freezing for the next two days.
.2 Do not permit alternate freezing and thawing for fourteen days after placing.
.3 Vent exhaust gases from combustion type heaters to atmosphere outside protection enclosures.

.4 Provide protection to maintain concrete continuously moist during curing period.
.5 For field cured cylinders representing strength development of in-situ concrete, provide same specified hot and cold weather protection for storage of each concrete compression specimen as for concrete from which it was taken, until it is sent to testing laboratory.
.6 Do not place concrete during rain. Should rain commence during placing, cover freshly placed concrete.
.7 Do not grout at ambient air temperatures or concrete surface temperatures less than 5^{O}C, or when temperature is forecast to fall to less than 5^{O}C within 24 hours of grouting.
.8 Do not apply sealants at ambient air temperatures or concrete surface temperatures less than 5^{O}C.

1.9 Project Records

.1 Maintain record of all concrete pour related to time, date, delivery slip serial number and location of each concrete pour and identify related test cylinders. Keep records on site until project is completed.

.2 Delivery Records: File duplicate copies of concrete delivery slips on which shall be recorded: supplier, serial number of slip, date, truck number, contractor, Project, Class of exposure, cementing materials content, air content, volume in load, and time of first mixing of aggregate, cementing materials and water.

.3 Record Drawings:
.1 Record on a set of Drawings:
.1 founding elevations of all footings
.2 variations of foundation Work from that indicated on Drawings.
.2 Make record drawings available for Consultant's inspection at all times.

1.10 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

.1 To meet specified requirements of referenced Standards.

.2 Cement:
.1 Portland Cement: to ASTM C150/C150M-12.
.2 Cementitious Hydraulic Slag: to ACI 232.1R-12
.3 Fine Aggregate: For slabs-on-grade, fineness modulus of fine aggregate to be between 2.7 and 3.1.

.3 Coarse Aggregates:
.1 20 mm to 5 mm (No. 4 sieve) except as specified below.
.2 For slabs-on-grade 125 mm and thicker: 40 mm to 5 mm (No. 4 sieve); combine at least two of the single sizes specified in Table 5 Group II of CSA A23.1-09, one of which is to be 40 mm, to obtain maximum bulk density (unit weight) and optimum grading, in accordance with an approved procedure.

.3 For slabs-on-grade: Abrasion loss not to exceed 35%. Petrographic number of aggregate not to exceed 125 when tested in accordance with ASTM C295/C295M-12 Standard Guide for Petrographic Examination of Aggregates for Concrete.
.4 For slabs over open web steel joists: 12 mm to 5 mm (No. 4 sieve).

.4 .Admixtures:
.1 Conform to Reference Standards for chemical and air-entraining admixtures.
.2 Provide only admixtures that are free of chlorides.
.3 When requested, provide evidence acceptable to Consultant that superplasticizer does no increase shrinkage of concrete.

.5 .Premoulded Expansion Joint Filler:
.1 Asphalt impregnated fibreboard conforming to ASTM D1751-04(2008), sizes indicated on drawings.

.6 Curing Compound:
.1 Membrane curing compound formulated from chlorinated rubber resins, or acrylic emulsion, solvent free to ASTM C309-11, type 1.

.7 Bonding Agent: To ASTM C881/C881M-10, 100% reactive, 2 component, low viscosity, high modulus bonding adhesive.

.8 Saw Cut Filler: Semi-rigid flexible epoxy joint filler shall be a two-component, pourable, moisture insensitive formulation and possess the following characteristics:
.1 Compliance to ACI 302.1R for joint fillers used in control and construction joints.
.2 Solids, % by weight, ASTM D1259-06(2012): 100%.
.3 Tensile adhesion to concrete 24^{O} C, ASTM D5329-09: 290 psi.
.4 Shore D Hardness (7 days), ASTM D2240 - 05(2010): 60.
.5 Shore A Hardness (7 days), ASTM D2240 - 05(2010): 95.
.6 Tensile Strength, ASTM D638-10.
.1 24^{O} C, (3 days): 660 psi.
.2 24^{O} C, (7 days): 770 psi.
.7 Elongation, ASTM D638-10.
.1 24^{O} C, (3 days): 72%.
.2 24^{O} C, (7 days): 53%
.8 Water Absorption 24^{O} C (24 hrs.), ASTM D570-98(2010)e1: 0.56% by weight.

.9 Sealant: Refer to Section 07 92 00 – Joint Sealants

.10 Mechanical Anchors: 'Kwik' Bolts, 'Cinch' Anchors or Parabolts.

.11 Tie Hole Plugs: A58 Sure Plug by Dayton Superior or approved equal.

2.2 Concrete Mixes

.1 Ready Mix, with 28 day compressive strength as indicated on Drawings.
.2 Design concrete mix in conformance with CSA A23.1-09, Tables 1, 2, 5 (Alternative 1) and 17, and as follows. Provide concrete meeting water/cementing materials ratio and air content of Table 14 in accordance with Class of exposure specified in following sub-paragraphs, and minimum strength specified on Drawings. Note that concrete designed in accordance with water/cementing materials ratio of Table 14 may yield strength exceeding minimum strength specified on Drawings.

.1 Class of exposure C-2 with 25 percent Portland cement replaced with cementitious hydraulic slag: for pavements, sidewalks, curbs and gutters.
.2 Class of exposure F-2 with 25 percent Portland cement replaced with cementitious hydraulic slag: for grade beams, and for exposed exterior beams, columns, walls and slabs.
.3 Slabs-on-Grade:
  .1 Use type 20 Portland cement, or replace 35 percent type Portland cement with cementitious hydraulic slag.
  .2 When mean daily temperature exceeds 25^{O}C at time of placement, replace 25 percent of type 20 cement, or 50 percent of type 10 cement, with cementitious hydraulic slag.
  .3 Use water/cementing materials ratio 0.45 maximum.
  .4 Use aggregates specified in paragraphs 2.1.3.
  .5 Cementing materials content 325 kg/m.
  .6 Modulus of rupture 3.5 MPa average, 3.0 MPa minimum.
  .7 Slump at delivery, before addition of superplasticizer, 50 mm; add superplasticizer, not water, to bring slump to level acceptable to floor finisher for placement.
.4 Interior Concrete, other than specified above, and not exposed to freezing and thawing or the application of deicing chemicals: select water/cementing materials ratio and cementing materials content on basis of strength, workability, and finishing requirements.

.3 Submit evidence, and material samples, if requested, acceptable to the Inspection and Testing Company, to verify that the proposed concrete mix design will produce specified quality of concrete.

.4 List all proposed admixtures in mix design submission. Do not change or add admixtures to approved design mixes without Consultants approval.

.5 Concrete Weight: Air dry unit weight: minimum 2,300 kg/m; adjusted proportionally for maximum air content listed in CSA A23.1-09, Clause 15, Table 10.

2.3 Admixtures

.1 Chemical Admixture: Incorporate water-reducing admixture, type WN, in all concrete.

.2 Air Entraining Agent: Incorporate air-entraining agent in addition to chemical admixture in concrete of relevant Class of exposure, in accordance with CSA A23.1-09, Clause 15, Table 10.

.3 Chloride: Do not use calcium chloride or admixtures containing chloride in concrete.

2.4 Premixed Grout

.1 Non-Shrink Metallic: Non-catalyzed metallic grout to ASTM C1107/C1107M-11, Compressive strength at 28 days: 48 MPa.

.2 Non-Shrink, Non Stain, Non-Metallic: to ASTM C1107/C1107M-1. Compressive strength at 28 days: 59 MPa.

.3 Flowable Grout: High-tolerance Non-shrink, Non-metallic shrinkage compensating grout to ASTM C1107/C1107M-11. Compressive strength at 28 days: 59 MPa.

PART 3 EXECUTION

3.1 Examination

.1 Before starting this work, examine work done by others which effects this work.

.2 Notify Consultant of any condition which would prejudice proper completion of this work.

.3 Commencement of work implies acceptance of existing conditions.

.4 Confirm that surfaces on which concrete is to be placed are free of frost and water before placing.

.5 Confirm that reinforcement, dowels, control joints, inserts and all other built in work are in place and secured.

.6 Confirm that underslab vapour retarder specified in Section 07 26 00 and underslab insulation specified in Section 07 21 13 is in place and has been inspected.

3.2 Treatment of Formed Surfaces

.1 Conform to the requirements of CSA A23.1-09, Clauses 24.1 and 24.2 and as additionally specified herein.

.2 .Treat concrete surfaces which will be exposed or painted in the completed building to provide a "Smooth Rubbed Finish" in accordance with CSA A23.1-09, Clause 7.7.3.6, uniform in colour and texture.

.3 Plugs at Recessed Ties:
.1 Clean tie holes to remove all foreign matter.
.2 Coat plugs by dipping in adhesive and insert in hole.
.3 Remove excess adhesive immediately with thinner which will not stain concrete, as recommended by manufacturer.

.4 Obtain Consultant's approval of finished exposed concrete and grind or otherwise correct to the satisfaction of the Consultant.

3.3 Placing Concrete

.1 Place concrete in accordance with requirements CAN/CSA A23.1-09.

.2 Notify Consultant and inspection and testing firm at least 24 hours prior to commencement of concrete placing operation and 24 hours before wall forms are closed in.

.3 Do not place concrete in water or open frozen surfaces.

.4 Remove contaminants which lessen concrete bond to reinforcement before concrete is placed.

.5 Maintain accurate records of cast in place concrete items. Record date, location of pour, quantity, air temperature and test samples taken.
.6 Ensure that reinforcement, inserts, embedded items, formed expansion joints and the like, are not disturbed during concrete placement.

.7 Provide construction joint as indicated on the drawings. Ensure dowels are adequately anchored and placed at right angles to the joint before placing concrete.

.8 Place floor slabs to depth indicated on the drawings with 25 MPa minimum concrete unless otherwise noted on drawings but consistent with minimum cement content specified for exposed floors in this specification.

.9 Sloping Surfaces and Slabs: commence concrete placement at bottom of sloping surfaces.

.10 Obtain Geotechnical Engineer's confirmation that thickness, elevation and compaction of sub-grade meets specifications before placing concrete.

3.4 Finishing Concrete

.1 Perform finishing operations on plastic concrete surfaces in accordance with CSA A23.1-09, and as specified herein.

.2 Refer to the drawings for floor finishes and coverings.

.3 Screed the top of rough floor slabs to an even level or sloping surface at the proper elevation to receive the finish or topping specified on the drawings and in finish schedule.

.4 Provide a smooth steel trowel finish on all areas scheduled to receive a covering, or painted finish.

.5 Exposed Floor Surfaces: Provide hard, smooth, dense, steel trowelled surface, free from blemishes, and of uniform appearance

.6 Non-slip Surfaces: Provide swirl trowel or broom finish of texture acceptable to Consultant.

.7 Curb Edging: Finish external corners of curbs rounded and smooth.

3.5 Curing

.1 Cure concrete in accordance with CSA A23.1-09, Clause 7.4 and as specified herein.

.2 Curing Compound Method:
  .1 Use curing and sealing compound specified except:
    .1 On surfaces to receive epoxy or similar paint finish.
    .2 On surfaces to which architectural finishes will be adhered, the adhesives for which are incompatible with the curing compound.
    .3 On air-entrained concrete for exterior slabs and sidewalks placed between October 1 and April 1.

.3 Select acrylic water compound except that if ambient conditions extend drying time unduly and if area is well ventilated and unoccupied by other workers, solvent based compound may be used.

.4 Apply curing compound in accordance with manufacturer's instructions, increasing application rate as necessary to cover surface completely.

.5 Curing Blanket or Wet Burlap Method: For exterior sidewalks and other finished concrete surfaces that will be exposed to freezing and thawing or deicing chemicals:

.1 Cover with curing blanket or wet burlap overlaid with 0.102 mm thick polyethylene, and maintain in place for the additional curing for durability period in accordance with CSA A23.1-09 Clause 7.4.1.6, but in no case for less than 7 days.
.2 Wet blanket or burlap regularly to maintain in moist condition. Do not allow to dry out.

.6 Cure finished concrete surface with an approved curing and sealing compound which will leave the surface with a uniform appearance and with a minimum of discolouration after drying. Ensure that the curing compound will be compatible with the architectural finishes or adhesives for finishes to be applied later. Apply the compound in strict accordance with the manufacturer's instructions.

.7 Protect surface which will be exposed to direct sunlight during the curing period, with a light coloured, laminated waterproof paper immediately after the curing and sealing compound has hardened sufficiently for the paper to be placed without damage to the sealed surface. Lap the paper a minimum of 100 mm and seal the laps. Leave the paper in place for at least seven days.

3.6 Grouting

.1 Mix prepackaged grout with water in accordance with manufacturer's printed instructions.

.2 Dampen concrete surfaces immediately before installing grout.

.3 Use non-shrink and shrinkage-compensating grouts only when grout will be contained against expansion and self-disintegration.

.4 Slope grout beyond edge of plate at 45 degrees.

.5 Provide same environmental protection and curing as specified for concrete.

3.7 Joint Sealant

.1 Apply sealant to thoroughly dry surfaces only, at ambient air temperatures above 5^{o}C.

.2 Provide sealant on top of joint filler with a polyethylene bond breaker between joint filler and joint sealant applied in accordance with manufacturer's direction.

.3 Confirm that preformed joint filler and backer rod are compatible with sealant.

.4 Caulk joints in accordance with the following:
.1 Do not commence joint preparation until concrete is at least 28 days old.
.2 Thoroughly clean sides of joints with mason's router, or power saw, equipped with double blade where necessary to suit joint width.
.3 Blow clean with compressed air with oil trap on line, or vacuum clean.
.4 Install backer rod of diameter 25 percent greater than joint width, and type recommended by sealant manufacturer to be compatible with sealant. Locate backer rod to provide for sealant depth of one-half joint width, but not less than 12 mm.
.5 Prime joint if required, as recommended by sealant manufacturer.

3.8 Defective Work

.1 Variations in excess of specified tolerances and marked and disfigured surfaces that cannot be repaired by approved methods will be considered defective work.

.2 Replace or modify concrete that is out of place or does not conform to lines, detail or grade as directed by the Consultant.

.3 Replace or repair defectively placed or finished concrete as directed by the Consultant.

.4 Testing and Replacement of Deficient Concrete in Place:
.1 Pay for additional testing and related expenses if concrete has proven to be deficient.
.2 Replace or strengthen deficient concrete work as directed by the Consultant, and pay for all testing and related expenses for replaced work until approved by the Consultant.

3.9 Cleaning

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

.2 Clear away from the building site excess and waste materials and debris resulting from Work of this Section.

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 04 27 00 Multiple Wythe Unit Masonry
.3 Section 05 12 23 Structural Steel
.4 Section 05 50 00 Metal Fabrications

1.3 References

.1 Canadian Standards Association (CSA)
  .1 CSA-A371, Masonry Construction for Buildings.
  .2 CSA-S304.1, Masonry Design for Buildings (Limit States Design)
  .3 CSA G30.3, Cold-Drawn Steel Wire for Concrete Reinforcement.
  .4 CSA G30.12, Billet-Steel Bars for Concrete Reinforcement.
  .5 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.
  .6 CSA-A23.1, Concrete Materials and Methods of Concrete Construction
.2 American Concrete Institute (ACI)
  .1 Detailing Manual
.3 Reinforcing Steel Institute of Canada (RSIC)
  .1 Reinforcing Steel Manual of Standard Practice,

1.4 Submittals

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

.2 Submit the following samples:
  .1 Two (2) of each type of masonry reinforcing and connector specified.

.3 Product Data: Submit manufacturer's printed product literature, specifications and data sheets.

.4 Submit two copies of MSDS - Material Safety Data Sheets. Indicate VOC's for protective coatings and touch-up products.

.5 Shop Drawings:
  .1 Submit shop drawings for all masonry reinforcing. Include placing drawings, bar lists and details. Indicate clearly reinforcing bar sizes, spacing, bending details, lap details, dowels to adjacent construction location and quantities of reinforcement and connectors.
  .2 Prepare placing drawings and bar lists in accordance with the American Concrete Institute (ACI) Detailing Manual, and the Reinforcing Steel Institute of Canada (RSIC) Reinforcing Steel Manual of Standard Practice, the typical details included with Contract Documents.
  .3 Prepare placing drawings to minimum scale of 1:50.
  .4 Submit placing drawings and bar lists sufficiently detailed and dimensioned to permit correct placement of reinforcement and accessories without reference to architectural or structural Drawings.
  .5 Show reinforcement, including dowels, in elevation on placing drawings for wall reinforcement.

.6 Show cover to reinforcement
.7 Show location of construction joints.
.8 Prior to submission to Consultant, review all shop 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 shop drawing with the requirements of Work and Contract Documents. Contractor's review of each shop drawing with the requirements of Work and Contract Documents. Contractor's review of each shop drawing shall be indicated by stamp, date, and signature of a responsible person.
.9 At time of submission, notify Consultant in writing of any deviations in shop drawings from requirements of Contract Documents.
.10 Consultant will review and return shop drawings in accordance with an agreed schedule. Consultant's review will be for conformity to design concept and for general arrangement, and shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of Contract Documents.
.11 Make any changes in shop drawings which Consultant may require consistent with Contract Documents and resubmit unless otherwise directed by Consultant. When resubmitting, Contractor shall notify Consultant in writing of any revisions other than those requested by Consultant.
.12 Do not commence fabrication of reinforcement before drawings have been reviewed and Consultant's comments incorporated on drawings issued to fabricating shop.

1.5 Design Criteria

.1 Non-conventional Masonry Connectors
.1 Deflection: maximum 2.0 mm, including free play when acted upon by 0.45 kN lateral load, in all possible positions of adjustment.
.2 Positive restraint at position of maximum adjustment.

.2 Multi-component Ties - Free Play: Maximum 1.2 mm, when assembled in any possible configuration.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

1.7 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

.1 All metal components: hot dipped zinc galvanized to CSA-S304 unless otherwise indicated.

.2 Bar Reinforcement: To CSA-A371 and CSA G30.18, grade 400R, deformed billet steel bars.

.3 Column Ties: Fero CAT Tie (Column Adjustable Tie), spot weld to columns at 400 mm c/c.

.4 Connectors: to CSA-A370 and CSA-S304.
.1 Finish: Steel components, hot dip galvanized to CAN/CSA A370-04.

.5 Wire Reinforcement: To CSA-A371 and CSA G30.3, truss type:
.1 Masonry Veneer Walls: hot dipped galvanized to CSA-S304, 4.76 mm wire diameter, to suit overall wall thickness. BL-42 Ladder Reinforcement and System 2000 Seismic Adjustable Tie by Blok-Lok Ltd.
.2 Interior bearing walls: hot dipped galvanized to CSA-S304, 4.76 mm wire diameter, Blok-Trus BL-30 by Blok-Lok Ltd.
.3 Interior non-bearing walls and partitions: bright wire finish, standard duty, 3.66 mm wire diameter: Blok-Trus BL-30 by Blok-Lok Ltd.

.6 Equivalent products as manufactured by the following manufacturer's may be used subject to submission and acceptance by the Consultant of technical data:
.1 Dayton Superior Dur-O-Wall
.2 Hohmann and Barnard Inc.

2.2 Fabrication

.1 Fabricate reinforcing in accordance with CSA-A23.1 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Ontario.

.2 Obtain Consultant's approval for locations of reinforcement splices other than shown on placing drawings.

.3 Upon approval of Consultant, weld reinforcement in accordance with CSA W186.

.4 Ship reinforcement clearly identified in accordance with drawings.

PART 3 EXECUTION

3.1 Installation

.1 Install masonry anchors in accordance with CSA-A370, CSA-A371, CSA-A23.1 and CSA3-S304 unless indicated otherwise.

3.2 Reinforcement

.1 Unless otherwise noted, all masonry walls shall be reinforced with joint reinforcement.

.2 Reinforcement shall be installed in the first and second bed joints, 200 mm apart immediately above lintels and below sill at openings, and in bed joints at 400 mm vertical intervals elsewhere. Reinforcement in the second bed joint above or below openings shall extend two feet beyond the jambs. All other reinforcement shall be continuous except that it shall not pass through vertical masonry control joints. Side rods shall be lapped at least 150 mm at splices.

.3 Use prefabricated corner and tee sections for continuous reinforcement at corners and intersecting walls.

.4 Terminate reinforcement 25 mm short of each side of control joints as indicated.

.5 Vertical reinforcement shall have a minimum clearance of 13 mm from the masonry and not less than one bar diameter between bars.

.6 All block cores containing vertical reinforcing and/or anchor bolts shall be solidly filled with non-shrink grout.

.7 Place reinforcement and ties in grout spaces prior to grouting.

.8 Cleanouts: Provide cleanouts in the bottom course of masonry for each grout pour when the grout pour height exceeds 1.5 m.

.9 Construct cleanouts so that the space to be grouted can be cleaned and inspected. In solid grouted masonry, space cleanouts horizontally a maximum of 32 in. (813 mm) on center.

.10 Construct cleanouts with an opening of sufficient size to permit removal of debris. The minimum opening dimension shall be 76 mm.

.11 After cleaning, close cleanouts with closures braced to resist grout pressure.

3.3 Bonding and Tying

.1 Install masonry connectors in accordance with CSA-A370, CSA-A371, CSA-A23.1 and CSA3-S304 unless indicated otherwise.

.2 Bond walls of two or more wythes using seismic connectors and ladder type reinforcement in accordance with NBC CSA-S304, CSA-A371 and as indicated.

.3 Tie masonry veneer to backing in accordance with NBC, CSA-S304, CSA-A371 and as indicated herein.

3.4 Reinforced Lintels and Bond Beams

.1 Reinforce masonry lintels and bond beams as indicated.

.2 Place and grout reinforcement in accordance with CSA-S304.

3.5 Metal Anchors

.1 Do metal anchors as indicated.

3.6 Lateral Support and Anchorage

.1 Do lateral support and anchorage in accordance with CSA-S304 and as indicated.

3.7 Control Joints

.1 Terminate reinforcement 25 mm short of each side of control joints unless otherwise indicated.

3.8 Field Bending

.1 Do not field bend reinforcement and connectors except where indicated or authorized by Consultant.

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure.

.3 Replace bars and connectors which develop cracks or splits.

3.9 Field Touch Up

.1 Touch up damaged and cut ends of galvanized reinforcement steel and connectors with compatible finish to provide continuous coating.

3.10 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 03 10 00 Concrete Forming and Accessories
.2 Section 03 20 00 Concrete Reinforcing
.3 Section 03 30 00 Cast-in-Place Concrete
.4 Section 04 05 19 Masonry Anchorage and Reinforcing
.5 Section 04 27 00 Multiple Wythe Unit Masonry
.6 Section 05 12 23 Structural Steel
.7 Section 05 50 00 Metal Fabrications
.8 Section 07 84 00 Firestopping
.9 Section 07 92 00 Joint Sealants
.10 Section 09 21 16 Gypsum Board
.11 Section 09 91 23 Interior Painting

1.3 References

.1 Ontario Building Code.
.2 Canadian Concrete Masonry Producers Association (CCMPA) Quality Assurance Program.
.3 ASTM International, (ASTM)
  .1 ASTM C90-12 Standard Specification for Loadbearing Concrete Masonry Units.
  .2 ASTM C129-11 Standard Specification for Nonloadbearing Concrete Masonry Units.
  .3 ASTM C150/C150M-12, Standard Specification for Portland Cement
  .4 ASTM C207-06 (2011) Standard Specification for Hydrated Lime for Masonry Purposes.
  .5 ASTM D2240-05(2010) Standard Test Method for Rubber Property—Durometer Hardness.
  .6 ASTM D5249-10 Standard Specification for Backer Material for Use with Cold and Hot Applied Joint Sealants in Portland Cement Concrete and Asphalt Joints.
.4 Canadian Standards Association
  .1 CSA A23.1-09, Concrete Materials and Methods of Concrete Construction.
  .2 CAN/CSA A165 Series-04 (R2009), CSA Standards on Concrete Masonry Units.
  .3 CAN/CSA A179-04 (R2009), Mortar and Grout for Unit Masonry,
  .4 CAN3-A370-04 (2009) Connectors for Masonry.
  .5 CAN/CSA A371-04 (R2009), Masonry Construction for Buildings.
  .6 CSA S304.1-04 (R2010), Masonry Design for Buildings.

1.4 Submittals

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

.2 Data: Submit manufacturer's printed product literature, specifications and data sheets.

.3 Acoustic Block: Submit product literature, certifications and test reports.

.4 Submit the following samples:
  .1 Two (2) of each type of concrete masonry units specified.
  .2 Two (2) of each type of masonry accessory specified.

.5 Submit shop drawings for all masonry reinforcing. Include placing drawings, bar lists and details. Indicate clearly reinforcing bar sizes, spacing, bending details, lap details, dowels to adjacent construction location and quantities of reinforcement and connectors.

.6 Submit engineered temporary bracing design drawings for temporary support of masonry walls. Drawings shall be prepared by, and bear the seal of a Professional Engineer, licensed in the Province of Ontario.

.7 Test reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

.8 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.9 Inspection Reports: Inspection and Testing Company shall submit reports of inspections and tests.
- .1 Distribute inspection reports as follows:
  - .1 2 copies to Consultant.
  - .2 1 copy to Consulting Structural Engineer
  - .3 1 copy to Contractor.

1.5 Quality Assurance

.1 The masonry sub-contractor shall have a minimum of five (5) years of continuous documented Canadian experience in work of the type and quality shown and specified. Proof of experience shall be submitted when requested by the Consultant and shall be subject to the approval of the Consultant.

.2 Mock Up:
- .1 Construct mock-ups in accordance with Section 01 40 00
- .2 Construct a sample panel of acoustic block units, no less than 1200 x 1200 mm, of units of each colour and size to be used in the project.
- .3 Construct a mock-up of a typical exterior wall assembly including interior wythe, air barrier, spray insulation, cavity and facebrick for review by the Consultant. Mock up size minimum 1200 x 1200 mm.

.3 Pre-installation meeting: conduct pre-installation meeting to verify project requirements manufacturer's instructions and manufacturer's warranty requirements.

.4 Field Quality Control:
- .1 Inspection and testing will be carried out by Testing Laboratory designated by Owner.
- .2 Payment for specified Work performed by Inspection and Testing Company will be made from Cash Allowance.
- .3 Inspection and Testing Company shall perform sampling, inspection and testing of masonry work at site, in accordance with referenced standards, including but not limited to the following:
  - .1 Masonry Placement Inspection
  - .2 Reinforcing Steel Placement
  - .3 Grout and Mortar Testing
  - .4 CMU Testing
  - .5 Brick Sheer Testing
- .4 Review provided by Inspection and Testing Company does not relieve Contractor of his sole

responsibility for quality control over Work. Performance or non-performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of the Specification.

.5 Provide access to Work for inspectors.

1.6 Cold Weather Requirements

.1 Provide heat enclosures and heat as required.

.2 Work to be undertaken shall be carried out according to CAN3-A371, Clause 5.15.2.

.3 Maintain temperature of mortar between 5^{O}C and 50^{O}C until batch is used.

1.7 Hot Weather Requirements

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

1.8 Protection

.1 Keep masonry dry using secure waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven snow, rain and dirt, until masonry work is completed and protected by flashings or other permanent construction.

.2 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

1.9 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

.3 Materials shall be kept clean and dry.

.4 Deliver cement, lime and mortar ingredients with manufacturer's seal and labels intact.

.5 Cementitious material and aggregates shall be stored in accordance with the requirements of CAN A23.1-09.

.6 Exposed units which become stained or chipped, surface marked or scratched, and materials which are affected by inadequate protection shall be replaced, at no additional expense to the Consultant.

.7 Masonry units shall be delivered to site in protective film and shall be stored without contact with ground or ground water.

1.10 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

.1 Masonry Units: Concrete Block: Modular, conforming to CCMPA requirements and CAN/CSA A165.1.
- .1 H/20/A/M concrete masonry units to be used at all load bearing masonry walls.
- .2 H/15/A/M concrete, masonry units, at all other locations unless noted otherwise.
- .3 Refer to drawings for Fire Resistance Ratings. Type of concrete and block to conform to Table 5.0, Fire Resistance Rating of Concrete Block in Hours, of the Canadian Concrete Masonry Producers Association Handbook.
- .4 Special shapes: provide special shapes indicated or required. Provide purpose made shapes for lintels and bond beams.
- .5 Exposed block shall all be made by one manufacturer and shall be uniform in colour, shade and texture.

.2 Acoustic Block:
- .1 To ASTM C90, Soundblox Type RSC sound-absorbing masonry units as manufactured by Permacon Group.
- .2 Units shall be produced with special mold parts. Production shall be monitored so that the top of the units shall be completely closed and edges of slots and ends of blocks shall be straight and clean.
- .3 Type RSC shall include filler elements installed in the cavities of the block at the time of manufacture. The fillers shall be of specially fabricated incombustible fibrous material and shall have a metal septum laminated to one side facing away from the slotted face.
- .4 Acoustic block shall be metric modular size to the wall thickness indicated on the drawings.
- .5 Provide corner units where required.

.3 Masonry Reinforcement and Connectors:
- .1 Bar Reinforcement, wire reinforcement, connectors and ties: as specified in Section 04 05 19 - Masonry Anchorage and Reinforcing.

.4 Control Joint Filler: to ASTM D5249-10, Type 1, Round, flexible, continuous-length, nonabsorbent, nongassing, nonstaining, and nonshrinking. Extruded from a cross-linked polyethylene. Flexibile foam, heat-Resistant Backer Rod. 9.5 mm thick by width of wall.

.5 Pre-manufactured Masonry Control Joint: Pre-manufactured polyvinylchloride control joints may be used in lieu of the specified built-up type of joint.

.6 Mortar and Grout: Conforming to CAN/CSA A179-04 (R2009).
- .1 Use same brand of material and source of aggregate for entire project.
- .2 Aggregate: CAN/CSA A179-04 (R2009), fine grain aggregates.
- .3 Cement: normal Portland to ASTM C150/C150M-12, Type 10.
- .4 Water shall be clean, potable and free of deleterious amounts of acid, alkalies, or organic materials.
- .5 Hydrated Lime: Type ‘S’ to ASTM C207-06 (2011).
- .6 Type 'S' mortar shall be used for all concrete block masonry work.
- .7 Proprietary Mortar Mixes: conform to mix requirements specified
- .8 Mortar colour for concrete unit masonry work shall be grey.
- .9 Admixtures of any kind are not allowed.

.7 Grout: to CAN/CSA A179-04 (R2009), Table 3:
.1 Premixed, non-shrink non-metallic grout.

.8 Other Materials: all other materials not specifically described but required for a complete and proper installation of masonry, shall be as selected by the Contractor subject to approval by the Consultant

2.2 Mixes

.1 Mixing: Prepare and mix mortar materials under strict supervision, and in small batches only for immediate use.

.2 Mix proprietary mortars in strict accordance with manufacturer's instructions to produce the specified mortar types in accordance with CAN/CSA A179-04 (R2009). Do not use re-tempered mortars.

.3 Take representative samples for testing consistency of strength and colour according to CAN/CSA A179-04 (R2009).

2.3 Accessories

.1 Mechanical Fasteners: As recommended by manufacturer of material to be fastened, and in accordance with the reference standards, corrosion resistant.

2.4 Fabrication

.1 Lintels in non-load-bearing walls shall be constructed with special bond or lintel block units unless shown otherwise on plans. Lintels shall bear 150 mm minimum and bearing shall be isolated with two layers of heavy asphalt coated paper.

.2 Reinforcing steel in lintels shall be 2 x 20 M bars minimum specified under Section 04 05 19 - Masonry Anchorage and Reinforcing, or as noted on drawings.

.3 Concrete fill for lintels shall be 25 MPa or as noted on the drawings. Concrete shall be as specified in Section 03 30 00.

PART 3 EXECUTION

3.1 Existing Conditions

.1 Examine work of other trades for defects or discrepancies and report same in writing to Consultant.

.2 Installation of any part of this work shall constitute acceptance of such surfaces as being satisfactory.

3.2 General

.1 Do masonry work in accordance with CAN/CSA A371-04 (R2009) except where specified otherwise.

.2 A competent masonry foreman shall supervise and direct the work and only skilled masons shall execute the work of this Section.

.3 Coordinate work of this Section with others such as, field welding of anchors to steel work, insulation application, and the like. Prepare all items for built-in as the work proceeds, either supplied and installed by other trades or installed under this Section.

3.3 Workmanship

.1 Build masonry plumb, level, and true to line, with vertical joints in alignment.

.2 Lay out coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

.3 Lay block with webs to align plumb over each other with thick ends of webs up. The top course of all partitions which do not pass through a ceiling or up to the underside of a roof deck shall have the open cells filled solid.

.4 Cut exposed block with power driven abrasive cutting disc or diamond cutting wheel for flush mounted electrical outlets, grilles, pipes, conduits, leaving 3 mm maximum clearance.

.5 Fill all vertical and bed joints, including plain end faces, through the entire wall thickness solidly with mortar.

.6 Do not break bond of exposed walls where partitions intersect and if bond would show through on exposed face of walls. Bond these partitions to walls they intersect with prefabricated intersection masonry reinforcement in each course.

.7 Bond intersecting block walls in alternate courses.

.8 Terminate non load bearing walls within 20 mm of structure above unless indicated otherwise.

.9 Where walls are pierced by structural members, ducts, pipes, fill voids with mortar to within 20 mm of such members.

.10 Buttering corners of units, throwing mortar droppings into joints, deep or excessive furrowing of bed joints, is not permitted. Do not shift or tap units after mortar has taken initial set. Where adjustment must be made after mortar has started to set, remove mortar and replace with fresh supply.

.11 Do not wet concrete masonry before or during laying in wall.

.12 Bed and vertical joints shall be evenly and solidly filled with mortar.

.13 Provide reinforced bond beams where indicated on structural drawings.

.14 Provide vertical reinforcement as indicated on structural drawings.

3.4 Exposed Masonry

.1 Do not use chipped, cracked or stained, and otherwise damaged units or unsatisfactory material in exposed and load bearing masonry walls.

.2 Lay all joints 10 mm thick (uniform). All joints shall be full of mortar except where specifically designated to be left open.

.3 All joints shall be slightly concave. Use sufficient force to press mortar tight against masonry units on both sides of joints. Remove excess material or burrs left after jointing by means of a trowel or rubbing with burlap bag.

3.5 Acoustic Block

.1 Acoustic block units shall be laid in a full horizontal bed of mortar and laid with the closed tops up. The slots should face toward the noise source. Slots must be kept free of mortar. The exposed mortar at the bottom of each slot should be neatly tooled and all debris removed. No rake joints are permitted.

.2 Coordinate installation of acoustic block with steel reinforcing to ensure continuity of vertical wall reinforcement without affecting acoustical properties of masonry. Vertical reinforcement shall not be installed in acoustical cavities.

3.6 Tolerances

.1 Tolerances in notes to Clause 5.3 of CAN/CSA A371-04 (R2009) apply.

3.7 Reinforcement

.1 Refer to Section 04 05 19 - Masonry Anchorage and Reinforcing.

3.8 Connectors

.1 Refer to Section 04 05 19 - Masonry Anchorage and Reinforcing.

3.9 Concrete Masonry Lintels

.1 Install reinforced concrete block lintels over openings in masonry walls where steel lintels are not indicated.
.2 End bearing: not less than 200 mm.

.3 Refer to Section 04 05 19 - Masonry Anchorage and Reinforcing.

3.10 Loose Steel Lintels

.1 Install loose steel lintels. Centre over opening width.

.2 Lintels supplied under Section 05 50 00 – Metal Fabrications.

3.11 Control Joints

.1 Provide continuous joints as indicted and at spacing not to exceed 6000 mm c/c unless noted otherwise on drawings.

.2 Break vertical mortar bond with extruded neoprene gasket or building paper.

.3 Prime control joint to prevent drying out of caulking material.

3.12 Support of Loads

.1 Use 25 MPa concrete unless specified otherwise on the Drawings, where concrete fill is used in lieu of solid units.

.2 Use grout to CAN/CSA A179-04 (R2009) where grout is used in lieu of solid units.

.3 Install building paper below voids to be filled with grout. Keep paper 25 mm back from face of units.

3.13 Lateral Support and Anchorage

.1 Do lateral support and anchorage of masonry in accordance with CSA S304.1-04 (R2010) and as indicated.

3.14 Grouting

.1 Grout masonry in accordance with CSA S304.1-04 (R2010) and as indicated.

3.15 Temporary Wall Bracing

.1 Design and provide all required temporary engineered wall bracing.

.2 Brace masonry walls to resist wind pressure and other lateral loads during construction period.

.3 Provide temporary bracing of masonry work during and after erection until mortar has cured and permanent lateral support is in place.

3.16 Built-ins

.1 Build in items required to be built into masonry and provided by other Sections, including bearing plates, door frames, anchor bolts, sleeves and inserts. Build in items to present a neat, rigid, true and plumb installation. Leave wall openings required for ducts, grilles, pipes and other items.

.2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.

.3 Brace door jambs to maintain plumb. Fill voids between masonry and metal frames with masonry mortar or insulation, as indicated on drawings or as required to provide a neat finished appearance.

.4 Set wall plates on masonry in non-shrink grout in accordance with manufacturer's instructions.

.5 Do all cutting, fitting, drilling, patching and making good for other trades in masonry work.

3.17 Protection

.1 Protect masonry units from damage resulting from subsequent construction operations.

.2 Use protection materials and methods which will not stain or damage masonry units.

.3 Remove protection materials upon Substantial Performance, or when risk of damage is no longer present.

3.18 Cleaning

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

.2 Allow mortar droppings on unglazed concrete masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block and finally by brushing.

.3 Remove mortar from concrete floor slabs and leave entire area vacuum clean.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 03 30 00 Cast-in-Place Concrete
.2 Section 04 22 00 Concrete Unit Masonry
.3 Section 05 21 00 Steel Joists
.4 Section 05 50 00 Metal Fabrications
.5 Section 09 91 23 Interior Painting

1.3 References

.1 The National Building Code of Canada
.2 ASTM International, (ASTM)
  .1 ASTM A108-07 Specifications for Steel Bars, Carbon, Cold Finished, Standard Quality.
  .2 ASTM A123/A123M-13 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  .3 ASTM A153/A153M-09 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  .4 ASTM A1011/A1011M - 12a 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 A307-10 Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
  .6 ASTM A325-10 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
  .7 ASTM A490-12 Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
  .8 ASTM A653/A653M-11, Specification for Steel Sheet, Zinc-Coated (Galvanized), or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.3 Canadian Standards Association (CSA)
  .1 CSA G40.20-04/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  .2 CAN/CSA G164-M92 (R2003) Hot Dip Galvanizing of Irregularly Shaped Articles.
  .3 CSA-S16-09, Design of Steel Structures.
  .4 CSA S136-07 North American Specification for the Design of Cold Formed Steel Structural Members, Includes Update No. 1 (2009), Update No. 2 (2010).
  .5 CSA-W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
  .6 CSA W48-06 (R2011), Filler Metals and Allied Materials for Metal Arc Welding.
  .7 CSA-W55.3-08, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
  .8 CSA W59-03 (R2008) Welded Steel Construction (Metal Arc Welding).
  .9 CSA W178.1-08 Certification of Welding Inspection Organizations.
  .10 CSA W178.2-08 Certification of Welding Inspectors.
.4 Structural Steel Painting Council
  .1 SSPC-SP 6-91, Commercial Blast Cleaning.

.5 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA)
  .1 CISC/CPMA 2-75, Quick-Drying, Primer for Use on Structural Steel.
  .2 CISC/CPMA 1-73a, Quick-Drying, One-Coat Paint for Use on Structural Steel.
.6 American Institute of Steel Construction (AISC)
  .1 Code of Standard Practice for Steel Buildings and Bridges, Section 10, Architectural Exposed Structural Steel, latest edition.

1.4 Submittals

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

.2 Submit proof of connection design engineer's professional liability insurance when requested by the Consultant.

.3 Submit shop and erection drawings. Submit typical details of connections and any special connections for review before preparation of shop drawings. Assume responsibility for the accuracy of Work. Review of submitted shop drawings is to ensure only that the Contract Documents are being correctly interpreted.

.4 Professional Engineer responsible for connection design shall sign and seal each shop drawing. Each submission of the shop drawings shall bear the seal of the Engineer.

.5 Show on shop drawings the size, spacing, and the location of structural steel members; connections; attachments; reinforcing; anchorage and required inserts; and all necessary plans, elevations and details.

.6 Show splice locations and details.

.7 Welded connections shall be designated by welding symbols in compliance with American Welding Society, AWS 2.068, Welding Symbols, and indicate clearly net weld lengths.

.8 Submit design calculations if requested by the Consultant.

.9 Submit to the Consultant for review, diagrams showing methods of erection.

.10 Field Work Drawings shall be submitted as shop drawings.

.11 Notify Consultant in writing of any deviations in shop drawings from the requirements of the Contract Documents.

.12 Submit a schedule of fabrication to the Consultant and the Testing Agency, prior to commencement of fabrication.

1.5 Qualifications

.1 Undertake welding and/or welding inspection by welders fully approved to one or more of the reference codes and standards where applicable.

1.6 Quality Assurance

.1 Connections:
  .1 Connections designed by Engineer: Submission of shop drawings for connection which have been detailed on Drawings shall represent acceptance by Contractor that connection can be executed successfully.
  .2 Design of other connections which cannot be selected from standard designs tabulated in CISC Handbook of Steel Construction shall be by a Professional Engineer, licensed in the Province of Ontario, experienced in structural steel connection design.
  .3 Consultant will review connection arrangement to verify general conformance with overall design concept of structure.
  .4 Connection design engineer shall be insured for professional liability in accordance with section 74 subsection (1) of Regulation 941 of the Ontario Professional Engineers Act. The alternative of compliance with subsection (2) is not acceptable.
  .5 Provide connections adequate to resist reaction of beam, when beam is loaded to maximum flexural capacity under uniformly distributed load, unless reaction or connection detail is shown on Drawings.
    .1 Provide flexible beam connections for unrestrained members in accordance with CSA S16.1, unless shown otherwise on Drawings.
    .2 Select connections, wherever possible, from standard designs tabulated in current edition of CISC Handbook of Steel Construction, except that length of beam web angles shall not be less than half the depth of beam, and single angles shall not be used.
    .3 Provide direct connections to flanges of spandrel beams (exterior perimeter beams) to restrain twisting.

.2 Design:
  .1 Connections:
    .1 Provide bolted or welded connections, unless shown otherwise on Drawings.
    .2 Use high strength bolts to ASTM A325-10 or ASTM A490-12 for all connections.
    .3 Use slip resistant (friction-type) connections for bolted joints designed to resist reversible forces.
    .4 Provide tension adjustment hardware at rod type bracing and at flat bar type bracing.
    .5 Do not permit connections to encroach on clearance lines required for installation of Work of other Sections.

.3 Random Splicing: Obtain in writing from Consultant, prior to commencement of shop drawings, special requirements that will be imposed as a necessary condition of acceptance of members with randomly located butt welded splices.

.4 All edge perimeter angles and bent plates installed at roof framing level shall be joined by butt weld splices designed for full tension capacity of members being joined.

1.7 Tolerances

.1 In addition to tolerances specified in CSA-S16-09, erect shelf angles and sash angles attached to steel frame within a tolerance of 3 mm plus or minus, with abutting ends of members at the same level.

1.8 Inspection and Testing

.1 Refer to Section 01 45 00 – Quality Control.
.2 Inspection and testing of materials and shop fabrication of Work of this Section, and field quality control, will be performed by an Inspection and Testing Company appointed by the Consultant.

.3 The Inspection and Testing Company shall meet qualification requirements of CSA W178.1-08, and shall be certified by the Canadian Welding Bureau in Category 1 Buildings.

.4 Welding Inspectors and supervisors shall be certified by Canadian Welding Bureau to CSA W178.2-08, to minimum level 2 certification.

.5 Provide free access for inspectors to all places work is being performed, whether on site or off.

.6 Mill inspection shall ensure that materials conform to specified requirements. Mill test reports, properly correlated to the materials, will be accepted in lieu of physical tests.

.7 Shop inspection shall ensure that structural steel is fabricated in accordance with the shop drawings, and the specified fabrication and welding procedures.

.8 The cost of inspection and testing of splices introduced by the fabricator and not required on the Contract Documents will be paid by the Contractor.

.9 Inspection and Testing Company when appointed shall carry out shop inspection to verify:
  .1 Structural materials and paint conform to Specifications. Mill test reports, properly correlated to the materials, will be accepted in lieu of physical tests of structural materials.
  .2 Fabrication and welding conforms to Specifications and dimensioned shop drawings.
  .3 Shop cleaning and preparation and prime painting to conform to specified requirements.
  .4 Surfaces inaccessible for cleaning and painting after assembly are treated before assembly.
  .5 For surfaces painted with zinc rich paint or zinc primer, specified surface preparation is followed and specified paint thickness is applied.

.10 Non-destructive Testing of Welded Connections: Carry out non-destructive testing of welded connections chosen at random as follows:
  .1 Check and record steel member sizes for 20% of columns, beams and girders.
  .2 Check 5% of all welds by magnetic particle inspection.
  .3 Check 25% of moment connections and all connections subject to direct tension involving use of full penetration groove welds by ultrasonic testing.
  .4 Check 10% (minimum 2 per connection) in accordance with Section 23 of CAN/CSA S16-01 of pretensioned connections including main building bracing connections.

.11 More frequent testing and inspection shall be completed in random tests described above are not satisfactory. These costs are to be paid by the Contractor.

1.9 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver products that are only supplied under work of this Section to those who are responsible for their installation, to the work site as directed and to meet construction schedule.

.3 Handle and store structural steel in such a manner that no damage, including corrosion, is caused to the stored or erected work, or to other property.

.4 Store structural steel off of ground on timber supports.

1.10 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

.1 Rolled shapes, hollow structural sections, plates and rods: new steel, in compliance with CSA and/or ASTM Standards indicated on Structural Drawings.

.2 Welding Electrodes: to meet the requirements set forth in the applicable standard of the CSA W48 Series on welding electrodes. (Any process which produces deposited weld metal meeting the requirements of the applicable W48 Series Standard for any grade of arc welding electrodes shall be accepted as equivalent to the use of such electrodes.)

.3 High Strength Bolts: to meet specified requirements of ASTM A325-10.

.4 Machine Bolts: to meet specified requirements of ASTM A307-10.

.5 Anchor Bolts: to meet specified requirements of ASTM A307-10.

.6 Shop Coat Paint:
.1 Interior structural steel: To meet specified requirements of CISC/CPMA Standard 1-73a, Quick Drying One Coat Paint for Use on Structural Steel and compatible with Master Painters Institute INT 5.1S Institutional low odour/low VOC semi-gloss finish. Colour to be grey.

.7 Galvanizing: hot dipped with zinc coating to CAN/CSA G164-M92 (R2003), ASTM A123/A123M-13 or ASTM A153/A153M-09.

PART 3 EXECUTION

3.1 Fabrication

.1 Fabricate work of this Section in compliance with CSA-S16-09, and as specified following.

.2 Connections:
.1 Make bolted or welded connections.
.2 Use high strength bolts unless otherwise noted on Drawings.
.3 Use friction type high strength bolts for the connections of bracing members (diagonal kickers) resisting the effects of applied lateral loads. Provide tension adjustment at flat bar and rod type lateral bracing.
.4 Do not permit connections to encroach on the clearance lines required for the installation of work of this Section.

.3 Beam Connections:
.1 Provide beam connections adequate to resist the reactions produced by the framing or load conditions.
.2 Provide beam to column connections that apply vertical reaction with negligible eccentricity at the connecting face of the column, such as single or double beam web connections, end plate connections or un-stiffened seats, unless otherwise shown on Drawings. Submit for review, in advance of the preparation of shop drawings, connections which do not meet these requirements.
.3 Provide connections complying with the requirements of the CISC Handbook of Steel Construction, except that the length of beam web angles shall not be less than half the depth of the beam and single angles shall not be used.
.4 Provide direct connections to flanges of spandrel beams to restrain twisting.

.4 Holes in Structural Members:
.1 Punch holes 11 mm to 27 mm in diameter as required for attaching the work of other Sections to structural steel members. Locate holes so that no appreciable reduction of the strength of members is caused.
.2 Provide holes for pipes and ducts, and reinforce openings as indicated on drawings. Cutting of holes in structural members in the field will not be permitted except with written approval of the Consultant.
.3 Provide effective drainage holes to prevent the accumulation of water in tubular members.

.5 Member Separators: Provide separators at approximate spacing of 1200 mm o.c. for double beams and channels as follows:
.1 For beams and channels 225 mm or less in depth: one or two rows of pipe separators.
.2 For beams and channels over 225 mm in depth: channel separators, unless otherwise detailed on Drawings.

.6 Built up Compression Members General Requirements: Comply with the requirements of CSA-S16-09, for all built up compression members.

.7 Column Bearing Plates: Mill column bearing plates under column bearing unless plate is sufficiently flat to give adequate contact bearing between column and plate.

.8 Structural Steel Painting: All prime painting shall be shop applied and the responsibility of the steel fabricator. Refer to specific priming requirements specified in Section 09 91 23 - Interior Painting.
.1 Paint in accordance with manufacturer’s published directions. Paint steel in the shop under cover. Keep painted members under cover until the paint has dried.
.2 Clean and prepare surfaces, as appropriate for paint specified, in accordance with CISC/CPMA Standard 2-75 or clean steel in compliance with SSPC SP6, Society for Protective Coatings Standard for Commercial Blast Cleaning, where zinc rich paint is shop applied.
.3 Where paint is applied adjacent to welded joints, remove it to bare metal for a distance of at least 50 mm beyond sides of joints.
.4 Do not paint surfaces and edges to be field welded, contact surfaces of friction type connections assembled by high strength bolts, surfaces encased in or in contact with concrete.
.5 Do not paint surfaces to receive cementitious fireproofing.

.9 Galvanizing: Galvanize members as indicated and in accordance with reference standards, after shop welding is complete.
  .1 Steel members, fabrications, and assemblies shall be galvanized after fabrication by the hot dip process in accordance with CSA G164 or ASTM A123.
  .2 Bolts, nuts, washers, iron, and steel hardware components shall be galvanized in accordance with CSA G164 or ASTM A153.
  .3 Coating Requirements:
    .1 Weight: the weight of the galvanized coating shall conform to Table 1 of CSA G164 or paragraph 6.1 of ASTM A123 and Table 1 of ASTM A153 (as appropriate).
    .2 Surface Finish: The galvanized coating shall be continuous, adherent, as smooth and evenly distributed as possible and free from any defect that is detrimental to the stated end use of the coated article.
  .4 The integrity of the coating shall be determined by visual inspection and coating thickness measurements.
  .5 Adhesion: the galvanized coating shall be sufficiently adherent to withstand normal handling.

3.2 Examination

.1 Verify, before delivery of structural steel, that work of other Sections on which work of this Section is dependent is correctly installed and located.

3.3 Preparation

.1 Supply anchor bolts, base and bearing plates and other members to be built in under work of other Sections as the work progresses. Cooperate with installers of this work and provide instructions for setting items to be built in.

3.4 Erection

.1 Comply with CSA S16-09 and work site safety plans in erection of work of this Section.

.2 Make adequate provision for horizontal and vertical erection loads and for sufficient temporary bracing to keep structural frame plumb and in true alignment until the completion of erection, and the installation of masonry, concrete work, and floor and roof decks which provide the necessary permanent bracing.

.3 Provide temporary steel members as may be required for erection purposes and remove them when no longer required.

.4 Installation of Bearing and Column Base Plates: Install bearing plates and standard wall anchors for beams bearing on masonry or concrete.
  .1 Set loose beam bearing plates and column base plates, at proper elevation, true and level, with steel shims, ready for grouting as specified under work of other Sections.
  .2 Set loose bearing plates and/or levelling plates to be cast into concrete.

3.5 Coating Touch-Up

.1 Clean welds with wire brushes and wash down with clean water to ensure no residue from electrodes is present.

.2 After erection, give one coat of prime coat or zinc rich paint as applicable and specified for shop coat to field bolts, field connections, burnt areas, and abrasions or damage to shop coats.

.3 Touch up all areas with a specified paint film thickness.

.4 Give areas of bare metal on galvanized members two coats of zinc-rich paint. Repair coating on architecturally exposed galvanized metals in accordance with reference standards and as directed by the Consultant. Replace any materials where damage cannot be repaired to the satisfaction of the Consultant.

3.6 Field Quality Control

.1 Inspection and Testing Company, when appointed as specified in Source Quality Control elsewhere in this Section, shall perform:
- .1 Inspection of erection and fit-up, including placing, plumbing, levelling and temporary bracing and conformance with specified tolerances.
- .2 Inspection of bolted connections, including verification that ASTM A307-10, ASTM A325-10 snug tight only bolts, and ASTM A325-10 or ASTM A490-12 pre-tensioned bolts have been installed and used appropriately, and that threads are excluded from shear plane where required.
- .3 Inspection of welded joints, including slag removal.
- .4 General inspection of field cutting and alterations; report immediately to Consultant, any alterations or cutting not shown on reviewed shop drawings.
- .5 General inspection of shop coating touch-up.
- .6 Inspection of zinc primer and zinc-rich paint, including surface preparation and coating thickness.

3.7 Defective Work

.1 Variations in excess of specified tolerances, and failure of materials or workmanship to meet requirements of this specification, and which cannot be repaired by approved methods, will be considered defective Work performed by this Section.

.2 Replace defective Work, as directed by Consultant.

.3 Pay for additional inspection and testing, redesign, corrective measures, and related expenses if Work has proven to be deficient.

3.8 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 03 30 00 Cast-in-Place Concrete
.2 Section 04 05 19 Masonry Anchorage and Reinforcing
.3 Section 04 22 00 Concrete Unit Masonry
.4 Section 05 12 23 Structural Steel

1.3 References

.1 The Ontario Building Code.
  .1 MMAH Supplementary Standard SB-8, September 14, 2012. Design, Construction and Installation of Anchorage Systems for Fixed Access Ladders.
.2 ASTM International, (ASTM)
  .1 ASTM A53/A53M-12 Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.
  .2 ASTM A123/A123M-12 Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
  .3 ASTM A153/A153M-09 Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
  .4 ASTM A307-10 Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
  .5 ASTM A325-10 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
  .6 ASTM A385/A385M-11 Standard Practice for Providing High Quality Zinc Coatings (Hot Dip).
  .7 ASTM A570, Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality.
  .8 ASTM A1008/A1008M-12 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High Strength Low Alloy, High Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
  .9 ASTM A1011/A1011M-12a 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
  .10 ASTM D6386-10 Standard Practice for Preparation of Zinc (Hot Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting
.3 Canadian Standards Association (CSA International)
  .1 CSA G40.20-04/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
  .2 CSA-S16-09, Design of Steel Structures
  .3 CAN/CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
  .4 CSA-W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
  .5 CSA W48-06 (R2011), Filler Metals and Allied Materials for Metal Arc Welding
  .6 CSA W59-03 (R2008) Welded Steel Construction (Metal-Arc Welding)

.4 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB 1.40-97, Anticorrosive Structural Steel Alkyd Primer
  .2 CAN/CGSB 1.108-M89, Bituminous Solvent Type Paint
  .3 CAN/CGSB 1.181-99, Ready Mixed, Organic Zinc Rich Coating.
.5 Canadian Sheet Steel Building Institute (CSSBI)

.6 Steel Structures Painting Council, Systems and Specifications Manual.
.1 CISC/CPMA 1-73a, A Quick drying One-coat Paint for Use on Structural Steel.
.2 CISC/CPMA 2-75, A Quick drying Primer for Use on Structural Steel.

1.4 Submittals

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

.2 Shop Drawings:
.1 Submit Shop and Erection Drawings for review.
.2 Verify site dimensions before proceeding with shop fabrication and to suit field conditions and field openings.
.3 Show and describe in detail all the work of this Section including large scale detail of members and materials, of connection and jointing details, and of anchorage devices, dimensions, gauges, thicknesses, description of materials, metal finishing, as well as all other pertinent data and information, including type, size and description of all fasteners and anchors.
.4 Indicate connections to building structure.
.5 Shop drawings for all metal fabrications shall be stamped and signed by a Professional Engineer registered in the Province of Ontario. Each submission of the shop drawings shall bear the seal of the Engineer.

1.5 Qualifications

.1 Work of this Section shall be executed by a firm thoroughly conversant with laws, bylaws and regulations which govern and capable of workmanship of best grade of modern shop and field practice known to recognized manufacturers specializing in this work, and having a minimum ten (10) years proven experience in the fabrication of high quality metal fabrications. Use workmen skilled in work of this Section.

.2 Welding shall be performed by trades persons certified by The Canadian Welding Bureau under CSA Standard W47.1.

1.6 Design Requirements

.1 Design metal stair, handrail, guardrail, landing and ladder construction and connections to OBC vertical and horizontal live load requirements.

.2 Stairs shall be designed and constructed to safely sustain a live load of 4.8 kPa evenly distributed over treads and landings with a maximum deflection of L/360. Furnish all supporting members required to connect to the building.

.3 Design service access ladders, stairs and guards to Ministry of Labour requirements.

All access ladders shall be designed with the minimum requirements from the drawings and Ontario Building Code Supplementary Standard SB-8, whichever is more stringent. This shall include through-bolting anchors at masonry walls.

.4 Except where specified otherwise, and where required by applicable codes, detail and fabricate stairs to NAAMM Metal Stairs Manual.

1.7 Examination

.1 All dimensions shall be taken from the drawings and checked against the building. Be responsible for the correctness of such measurements and report to the Consultant in writing all discrepancies between measurements at building and those shown on drawings prior to commencing work. Verify location of anchor bolts and embedded steel and ensure that work prepared by other trades is at a proper elevation, on line, level and true.

1.8 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Label, tag or otherwise mark work supplied for installation by other Sections to indicate its function, location and shop drawing description.

.3 Protect work from damage and deliver to a location at the site in order to meet the scheduling requirements.

.4 Protect architecturally exposed materials during fabrication, delivery, handling, storage and erection to prevent marring of surfaces exposed to view, by marking, bending, denting or coarse grinding.

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 General: Use materials specified herein. All materials shall be new.

.2 Structural Steel Sections and Steel Plate: CSA G40.20-04/G40.21-04 (R2009), Grade 350W.

.3 Architectural and Miscellaneous Mild Steel: CSA G40.20-04/G40.21-04 (R2009), Grade 300W.

.4 Machine Bolts and Nuts: ASTM Standard A307-10 low carbon steel externally and internally threaded standard fasteners. Dimensions, sizes, thread, strength, quality and type of items shall be designed for the work intended. Exposed fasteners and anchors shall be same material, colour and finish as the metal to which they are applied.

.5 Sheet Steel: (Commercial Quality) ASTM A1008/A1008M-12, stretcher leveled or temper rolled.

.6 Steel Pipe: ASTM A53/A53M-12, Schedule 40, Grade B.

.7 Welding Materials: CSA W59.

.8 Welding Electrodes: CSA W48 Series.

.9 Composite Metal Deck: As specified in Section 05 31 00.

.10 Sulphur: Commercial Grade for setting of steel posts.

.11 Adhesive Anchors: Epoxy Adhesive Anchors sized to suit loading conditions, suitable for substrate.

.12 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

.13 Isolation Coating: alkali resistant bituminous paint to CAN/CGSB 1.108-M89.

.14 Checker plate: steel plate to CAN3-G40.21, Grade 300W, raised checkerboard pattern. Thickness as noted on the drawings or as required to support design loads.

.15 Gaskets: Noprene, minimum 5.00 mm thick x 25 mm wide.

.16 Stair gratings: Welded steel gratings type WB with checkered plate nosing, galvanized finish. Tread depth 283 mm, width shall be as noted on the drawings. Bearing bars shall be 32 x 4.5 mm at 29 mm centres. As manufactured by Borden Metal Products Ltd.

.17 Stair landing gratings: Borden welded steel type WB, galvanized. Bearing bars shall be 38 x 4.5 mm at 29 mm centres. As manufactured by Borden Metal Products (Canada) Ltd.

.18 Ferrous Hinges: Stanley or equivalent, heavy duty gate hinges, suitable to support weight of gates.

.19 Train rails: ASCE 60, 108 mm deep, 60 lb./yd. and rail fasteners by Harmer Steel Ltd. or equivalent.

2.2 Finishes

.1 Primers: All primers for metal fabrications are to be factory applied under the requirements of this Section. Refer to Finish Schedules in Section 09 91 23 for types of primers required for each application.

.2 Pre Paint Finish: For galvanized surfaces to be exposed and finish painted, to ASTM D6386–10.

.3 Galvanizing: hot dipped with zinc coating to CAN/CSA G164-M92 (R2003), or ASTM A153/A153M-09.

.4 Galvanized coatings on products fabricated from rolled, pressed and forged steel shapes, plates, bars and strips. Galvanized after all welding and grinding complete. No welding or grinding of galvanized products allowed.

.5 Zinc Rich Primer: zinc rich, organic, ready mix to CAN/CGSB 1.181-92. Low VOC type.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

.1 General
  .1 Fabricate to reviewed shop drawings and in general to details, sizes and materials indicated on drawings and specified herein.
  .2 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
  .3 Fabricate work complete with all components required for anchoring; bolting or welding to structural frame; standing free or resting in frames or sockets; in a safe and sure manner.

  .4 Where possible fit and shop assemble various sections of the work and deliver to site in largest practicable sections. Where shop fabricating is not possible make trial assembly in shop.
  .5 Ensure exposed welds are continuous for length of each joint.

.6 Grind and fill all welds after inspection and acceptance and leave ready for prime painting.
.7 Fill all open joints, depressions, seams with metallic paste filler or by continuous brazing or welding and grind smooth to true sharp arises and profiles.
.8 Fit joints and intersecting members accurately. Make work in true planes with adequate fastenings.
.9 Supply all fastenings, anchors, accessories required for fabrication and erection of work of this Section. Such items occurring on or in an exterior wall or slab shall be hot dip galvanized. Make thread dimensions such that nuts and bolts will fit without re-threading or chasing threads.

.2 Make exposed metal fastenings and accessories of same material, texture, colour and finish as base metal on which they occur unless otherwise shown or specified. Keep exposed fastenings to an absolute minimum evenly spaced and neatly laid out. Make fastenings of permanent type unless otherwise indicated.

.3 Welding shall be done by the shielded metal arc method in accordance with the requirements CSA W59. Welding operators shall be currently certified under CSA W47.1 for the work they are performing.

.4 Surfaces to be welded shall be free from loose scale, rust, paint, or other foreign matter. Where weld material is deposited in two (2) or more layers, each layer shall be cleaned before the next layer is deposited. Care shall be taken to minimize stresses due to heat expansion, contraction and distortion by using proper sequence in welding and by approved methods.

.5 Appearance, quality of welds made, methods of correcting defective work shall be in accordance with CSA W59.

3.2 Shop Painting

.1 Cleaning Steel:
.1 Clean steel, whether it is to be painted or not, to the degree required by CISC/CPMA 1-73a, except as specified below.
.2 Prepare galvanized items scheduled to be painted in accordance with the requirements of Section 09 91 23, and ASTM D6386-10.
.3 Steel to receive a shop or field paint finish shall be cleaned in accordance with Sections 09 91 23 or SSPC SP6, whichever produces a surface which has less rust and mill scale.
.4 Clean steel which is specified to be painted to CISC/CPMA 2-75 in accordance with that Standard.
.5 Clean steel which is specified to receive an organic zinc-filled epoxy primer, or zinc-rich paint, or inorganic zinc primer, in accordance with SSPC-SP 6, Commercial Blast Cleaning.
.6 Clean welds by wire brushing and wash down with clean water, to remove the chemical residues left by the electrodes, prior to painting.

.2 The following surfaces shall not be painted:
.1 Surfaces and edges to be field welded. If painted, remove paint for field welding for a distance of at least two inches on all sides of the joint, to ensure proper fusion of the metal.
.2 The contact surfaces of friction type connections assembled by high strength bolts.
.3 Portions of steel members which are to be encased in or in contact with concrete or masonry.
.4 Galvanized items not specifically indicated to be painted.

.3 Preparation and priming of all metal work which will be exposed to view and which is scheduled to be finish painted, shall be in accordance with the requirements of Section 09 91 23.

.4 All other concealed or unpainted ferrous metal work shall be given one prime paint coat type CGSB 1.40 and in accordance with CISC/CPMA 2-75. Work paint into all corners and all joints. Metal parts in contact shall be primed before shop assembly. Priming damaged during erection or through lack of protection shall be cleaned and touched up.

.5 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7°C.

.6 Metals in contact with other dissimilar metals, concrete or masonry materials shall be insulated or separated from one another to prevent corrosion, staining or electrolysis by use of bituminous paint.

3.3 Galvanizing

.1 Steel members, fabrications, and assemblies shall be galvanized after fabrication by the hot dip process in accordance with CAN/CSA G164-M92 (R2003) or A123/A123M-12.

.2 Galvanizing of architecturally exposed steel shall be completed by a company recognized in the application of High Quality galvanized finishes and in accordance with ASTM A385.

.3 Prepare metals to be galvanized in accordance with requirements of ASTM D6386.

.4 Bolts, nuts, washers, iron, and steel hardware components shall be galvanized in accordance with CAN/CSA G164-M92 (R2003) or ASTM A153/A153M-09.

.5 Coating Requirements:
.1 Weight: the weight of the galvanized coating shall conform to Table 1 of CAN/CSA G164-M92 (R2003), or paragraph 6.1 of A123/A123M-12 and Table 1 of ASTM A153/A153M-09 (as appropriate).
.2 Surface Finish: The galvanized coating shall be continuous, adherent, as smooth and evenly distributed as possible and free from any defect that is detrimental to the stated end use of the coated article. The integrity of the coating shall be determined by visual inspection and coating thickness measurements.
.3 Adhesion: the galvanized coating shall be sufficiently adherent to withstand normal handling.

3.4 Bollards

.1 Steel pipe bollards schedule 40 standard weight, steel pipe of size shown, complete with anchors and sleeves, install plumb and free of defects detrimental to appearance and performance. Bollards shall be one piece construction no welds allowed.

.2 Concrete supplied and installed under the works of Section 03 30 00.

.3 Finish: prime painted except where cast into concrete.

3.5 Angle Lintels

.1 Provide all loose steel angle lintels required to support openings and recesses in masonry walls, whether indicated on the drawings or not. Refer to Architectural, Structural and Mechanical drawings for locations of openings. Lintels shall be as scheduled on the Structural drawings.
.2 Steel angles: CAN3 G40.21, Grade 300W, sizes indicated for openings. Provide 150 mm minimum bearing at ends unless otherwise indicated.

.3 Weld or bolt back-to-back angles to profiles as indicated.

.4 Supply for installation by Sections 04 22 00 and 04 27 00.

.5 Lintels shall be prime painted unless otherwise indicated.

3.6 Steel Pan Stairs

.1 Form treads and risers from 3.3 mm (10 gauge) steel plate. Secure treads and risers to L 35 x 35 x 5 horizontal and vertical welded to stringers. Sub-treads and risers for concrete filled metal pan stairs shall be 3.3 mm (10 gauge) sheet steel formed as detailed. Treads to be concrete filled, with welded wire mesh reinforcing. Risers to be exposed metal, with a formed 19 mm dust cove.

.2 Form stringers from C250 x 23 unless indicated otherwise or required to meet design requirements. Stringers shall be continuous. Apply continuous welds to cranked joints. All edges shall be ground smooth.

.3 Form stringers as described above, with 6 mm thick plate fascia welded on.

.4 Extend stringers around mid-landings to form steel base. Cope and crank stringers as necessary to line with structural steel framing at floor openings.

.5 Fascias and supporting members throughout shall be of size and weight as shown on drawings.

.6 Provide all necessary angles, channels, clips, plates and anchors as required to support all stair treads and landings and as shown on the drawings.

.7 Fabricate stair landings as detailed on the drawings with 38 mm galvanized composite metal floor deck specified in Section 05 31 00 and welded wire mesh. Spot weld deck to framing with 19 mm diameter puddle welds at 150 mm c/c along entire length of all framing members. Place reinforcing mesh.

.8 Provide clip angles for fastening of furring channels, where applied finish is indicated for underside of stairs and landings.

.9 Close ends of stringers where exposed.

.10 Make provisions for support of metal furring around perimeter of areas where gypsum board soffits are to be installed.

3.7 Metal Grating Stairs

.1 Form stringers from C250 x 23 unless indicated otherwise or required to meet design requirements.

.2 Continue stringers at landings with minimum 127 mm high kickplates.

.3 Treads and landings shall be prefabricated bar gratings with checkered plate nosings welded to stringers.

.4 Provide landing support framing where not indicated on structural drawings.
.5 Provide minimum 125 mm high kickplates at landings.

.6 Provide all necessary angles, channels, clips, plates and anchors as required to support all stair

treads and landings and as shown on the drawings.

3.8 Railings

.1 Definition: the term railing shall be taken to mean balustrades, guards, rails and handrails.

.2 Design and fabricate railings to conform to all applicable Ontario Building Code requirements.

.3 Unless otherwise indicated, fabricate railings as follows:
- .1 Fabricate handrails and guardrails as detailed.
- .2 Pipe rails shall have an outside diameter of not more than 38 mm. Close open ends of tubular members with welded steel plugs.
- .3 Extend handrails horizontally at top and bottom of each flight of stairs as shown on the drawings but not less than 305 mm beyond stair nosing at top of stair and 610 mm at bottom of stair.
- .4 Turn handrails down at exposed ends or turn into wall as detailed.
- .5 Support railings at each end, and at maximum 1070 mm centres unless indicated otherwise or required to meet loading requirements of the Ontario Building Code.
- .6 Minimum wall thicknesses of tubular railings: 2.5 mm.
- .7 At corners, angles and intersections, cope or mitre railings, weld and grind smooth.
- .8 Pickets shall be minimum 13 mm diameter solid steel bars at 100 mm centres.

.4 Exterior railings as detailed, galvanized.

3.9 Ladders

.1 Conform to Ministry of Labour and Ontario Building Code requirements where applicable.

.2 Unless otherwise detailed, construct ladders as follows:
- .1 Stringers shall be minimum 19 x 38 mm steel bar extending from 150 mm above floor or roof, to minimum 1220 mm above top rung.
- .2 Rungs shall be 19 mm solid steel bars, 400 mm long, spaced at 300 mm o.c. vertically and welded to stringers.
- .3 Attach stringers to walls with 10 mm x 38 mm steel bar yokes, U-shaped, spaced at maximum 1220 mm o.c. vertically. Locate centre line of rungs not less than 150 mm from face of walls.
- .4 Provide safety cages to Ministry of Labour standard details where indicated.
- .5 Where indicated, provide horizontal and vertical returns or stringers.
- .6 Exterior ladders shall be galvanized.

.3 Provide elevator pit access ladder to meet requirements of Elevator supplier. Prime paint.

3.10 Vanity Support Brackets

.1 Provide supports to vanities and shelves where indicated, constructed of 3.0 mm steel plate with 38 mm wide horizontal and vertical legs formed to profile indicated. Locate supports at end of vanity, as detailed.

.2 Finish: Shop coat primer. Fabrications in wet areas to be shot blasted and painted with zinc rich primer.

3.11 Bench Support Brackets

.1 Provide steel angle and steel post bench support framing and anchors as detailed. All rough edges

to be ground smooth.

.2 Predrill bench support assemblies for anchor bolts and screws.

3.12 Cabinet Work

.1 Provide 50 mm diameter steel posts with top and botton plates predrilled for anchors as indicated on cabinetwork details.

.2 Provide display case support angle predrilled for anchors as indicated.

.3 Steel to be prime painted.

.4 Supply posts and angles to Section 06 40 00 for installation with cabinetwork.

3.13 Support Framing for Stage Curtains and Operable Partitions

.1 Where indicated, provide hanger and track support framing for stage curtains.

.2 Pre-Drill flanges of track support framing in accordance with templates provided by stage curtain supplier.

.3 Install at locations and within tolerances indicated. Brace support assemblies.

3.14 Metal Ornaments

.1 Where indicated and bolted to canopy structural framing.

.2 All items to be hot dipped galvanized.

.3 Refer to electrical drawings for lighting fixtures.

3.15 Canopies

.1 Provide sections as detailed.

.2 All exposed steel items to be hot dipped galvanized for architecturally exposed finish.

3.16 Installation

.1 Supervise the setting of bases, anchor bolts, and other steel to concrete connections. Cutting of base plates to accommodate anchor bolts is cause for rejection of base plates.

.2 Provide all bracing and shoring required to support the work of this Section during installation.

.3 Work shall be fabricated and erected square, plumb and true, straight, level and accurately fitted to size detailed on reviewed Shop Drawings. All joints shall be welded unless otherwise indicated. Exposed welds shall be ground smooth and/or flush. Exposed work shall be finished smooth and even, close joints and neat connections. Exposed welds continuous for full length of joints.

.4 Where anchors or fastenings, sleeves, have to be built in by other trades, supply all necessary templates, instructions and supervision to ensure satisfactory installation.

.5 Do all drilling, cutting and fitting necessary to attach this work to adjoining work and make it complete.

.6 Provide all components required for anchoring. Make anchoring in concealed manner where possible. Exposed anchors shall be approved by the Consultant, shall be neat, and of the same material, colour, texture and finish of base metal on which they occur. Exposed fastenings shall be evenly spaced.

.7 Securely anchor components in place. Unless otherwise indicated, anchor components as follows:
- .1 To concrete and solid masonry with expansion or epoxy adhesive type anchors.
- .2 To hollow construction with toggle bolts.
- .3 To thin metal with screws or bolts.
- .4 To thick metal with bolts or by welding.
- .5 Fill space between railing members and sleeves with non-shrink grout.

.8 Grind all field welds smooth.

.9 Touch up shop coat of prime paint where damaged by field erection.

.10 Touch up galvanized finishes with zinc rich paint.

3.17 Schedule

.1 General:
- .1 Supply and install all metal fabrications indicated on Drawings, and not included in the work of other Sections.
- .2 Coordinate and sequence the work to ensure timely delivery to the site, of all items to be built in.
- .3 Coordinate miscellaneous metal framing support structures for stage curtains with Section 11 61 43.
- .4 Where items are required to be built into masonry, concrete or other work supply such items to respective Sections with all anchors and accessories for building in.
- .5 All items shall be of sizes and as detailed on drawings.
- .6 Coordinate with Section 09 91 13 and 09 91 23 for preparation of exposed metal items required to have finish coatings applied in the field.
- .7 Review all coordination drawings prior to installation of materials, to ensure that no interferences with the work of other Sections will occur.

3.18 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 03 10 00 Concrete Forming and Accessories
.2 Section 03 30 00 Cast-In-Place Concrete
.3 Section 04 22 00 Concrete Unit Masonry
.4 Section 05 50 00 Metal Fabrications
.5 Section 06 20 00 Finish Carpentry
.6 Section 07 26 00 Vapour Retarders
.7 Section 08 11 00 Metal Doors and Frames

1.3 References

.1 Canadian Standards Association (CSA)
  .1 CSA C22.1-12 Canadian Electrical Code
  .2 CSA-080-M Wood Preservation
  .3 CSA-080.1 Preservative Treatment of all Timber Products by Pressure Processes.
  .4 CSA 080.9 Preservative Treatment of Plywood by Pressure Processes.
  .5 CSA 086.1 Engineering Design in Wood (Limit States Design).
  .6 CSA 0121-M Douglas Fir Plywood.
  .7 CSA 0141 Softwood Lumber.
  .8 CSA 0151-M Canadian Softwood Plywood
  .9 CAN3-0437.0-M85 Waferboard and Strandboard
  .10 CSA B111 Wire Nails, Spikes and Staples.
  .11 CSA G164 Hot Dip Galvanizing of Irregularly Shaped Articles.
.2 Canadian General Services Board (CGSB)
  .1 CAN/CGSB 71.26 Adhesive for Field Glueing Plywood to Lumber Framing for Floor Systems.
.3 Underwriters Laboratories Canada (ULC)
  .1 CAN/ULC-S102 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.

1.4 Submittals

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

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.

.2 Plywood identification shall be by grade mark in accordance with applicable CSA Standards.
.3 Pressure treated and fire retardant treated materials shall conform to CAN/CSA-080.1.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Materials shall not be delivered before they are required for proper conduct of the work.

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

.4 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.

.5 Protect work from damage during storage, handling, installation and until the building is turned over to the Owner. Make good damage and loss without additional expense to the Owner.

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

.7 Deliver anchor bolts for setting into concrete foundation walls and masonry walls by others.

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 Material shall be Grade Stamped.

.2 Construction Lumber: To CAN/CSA 0141 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 All wood curbs, copings, cants, and blocking on roof shall be No. 2 Pine or better pressure treated as herein specified.
   .2 Nailing strips, furring and strapping: No. 4 S-P-F.
   .3 Fitment framing: No. 1 S-P-F.
   .4 Glue end jointed (finger jointed) material is not acceptable.

.3 Lumber for landscape elements: Pressure treated timber or cedar as detailed.

.4 Soffit Materials: Exterior Grade, Tongue and Grove, Clear Grade Eastern White Cedar slats, minimum 89 mm wide x 19 mm thick. Beveled edge.

.5 Railway Ties: Cedar.

.6 Lumber for Exterior Fences and Enclosures: Select Grade Eastern White Cedar.

.7 Panel Materials: Type, grade and thickness as specified in accordance with the following standards:
   .1 Canadian Softwood Plywood: to CSA 0151-M, standard construction, good one or both sides as required, thickness as shown or specified.

.2 Douglas Fir Plywood: to CSA 0121-M, standard construction, good one side, thickness as shown on the drawings.
.3 Poplar Plywood: to CSA 0153, standard construction.
.4 Plywood used for exposed interior work shall have select grade veneer, one or both faces where exposed, with fire retardant finish. Fire retardant shall be in accordance with CAN/CSA-080.1, and all treated materials shall bear a ULC approval stamp.
.5 Mat formed structural panel board (oriented strand board): to CAN3-0437.0, square edge, 12.7 mm thickness.

.8 Rough Hardware: Nails, screws, anchors and special fastening devices required for the erection of rough carpentry shall be galvanized and conform to CSA B111. Use common spiral nails and spiral spikes except where indicated otherwise. Use hot dip galvanized finished steel for exposed exterior work, highly humid interior areas and for pressure preservative and fire retardant treated lumber.

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

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

.11 Gate Hardware: Hinges, latches, gate frames and cane bolts: Hot dipped galvanized, heavy duty as indicated on the drawings and as required. Hinges tested to 1,360 kg. Gate frames shall be welded tubular steel as detailed. Provide adjustable anti-sag truss cable braces and turnbuckles.

.12 Wood Preservative to CAN/CSA-080-M.

.13 Adhesive: contractor's gun grade cartridge loaded wood adhesive, general purpose, to CSA 0112 Series and CAN/CGSB-71.26.

.14 Vapour Retardant: 0.152 mm polyethylene film to CAN/CGSB 51.34 Type 1.

.15 Galvanizing: to CAN/CSA-G164. Use galvanized fasteners, and hardware for exterior work, preservative treated lumber, and materials in contact with concrete or masonry.

.16 Sealant: As specified in Section 07 92 00.

PART 3 EXECUTION

3.1 Installation

.1 Workmanship
.1 Execute work using skilled mechanics according to best practice, as specified herein and indicated on drawings.
.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
.1 Work shall include rough hardware such as nails, bolts, nuts, washers, screws, clips, hangers, connectors, strap iron, and operating hardware for temporary enclosures.

.2 Fasten rough hardware; to hollow masonry units with adequate size toggle bolts; to solid masonry or concrete surfaces with expansion shields and lag screws. Where screws are

required, use lead or inorganic fibre plugs. Wood or organic plugs are not permitted. Do not ramset fastenings into concrete floor or concrete block or structural steel sections.

.3 Blocking:
- .1 Provide solid wood or plywood backing to walls to support cabinetwork, vanities, accessories, specialty items and the like. Install blocking continuous between metal studs and of sufficient height to support fitments.
- .2 Provide solid wood blocking, shims and nailers as required to provide substrate for window stools.
- .3 Provide wood strapping and blocking where required to support fitments, equipment, window blinds, projection screens, and the like.
- .4 Provide wood strapping lagged to walls and as required to support metal lockers. Coordinate with Section 10 51 13.
- .5 Provide continuous wood blocking as required and where detailed in walls and partitions at door, window and louvre jambs. Blocking in exterior cavity walls shall be pressure treated.

.4 Electrical Equipment Backboard: provide fire rated plywood backboards for mounting electrical equipment and data/communications equipment. Use fire labelled 19 mm thick fir face veneer fire retardant softwood plywood or as required by the Ontario Building Code and the Electrical Code, on 19 mm x 38 mm furring around perimeter and at maximum of 305 mm intermediate spacing. Plywood shall be painted with two coats of non-conductive, white in colour, fire retardant paint. All joints screw and nail holes are to be caulked and / or covered.

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 06 40 00 Architectural Woodwork
.3 Section 07 92 00 Joint Sealants
.4 Section 08 11 00 Metal Doors and Frames
.5 Section 08 71 10 Door Hardware
.6 Section 09 21 16 Gypsum Board
.7 Section 09 91 23 Interior Painting
.8 Section 10 28 10 Toilet and Bath Accessories.

1.3 References

.1 American National Standards Institute (ANSI)
  .1 ANSI A208.1-99, Particleboard.
  .2 ANSI A208.2-02, Medium Density Fibreboard (MDF).
  .3 ANSI/HPVA HP-1-2004, Standard for Hardwood and Decorative Plywood.
.2 ASTM International, (ASTM)
  .1 ASTM E 1333-96(2002), Standard Test Method for Determining Formaldehyde Concentrations in Air and Emissions Rates from Wood Products Using a Large Chamber.
.3 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
  .1 Architectural Woodwork Quality Standards Illustrated.
.4 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-11.3-M87, Hardboard.
.5 Canadian Plywood Association (CanPly)
  .1 The Plywood Handbook 2005.
.6 Canadian Standards Association (CSA International)
  .1 CSA B111-74(R2003), Wire Nails, Spikes and Staples.
  .2 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
  .3 CSA O121-M89 (R2003), Douglas Fir Plywood.
  .4 CAN/CSA O141-91(R1999), Softwood Lumber.
  .5 CSA O151-04, Canadian Softwood Plywood.
  .6 CSA O153-M1980 (R2003), Poplar Plywood.
  .7 CSA Z760-94, Life Cycle Assessment
.7 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.
.8 National Hardwood Lumber Association (NHLA)
  .1 Rules for the Measurement and Inspection of Hardwood and Cypress 1998.
.9 National Lumber Grades Authority (NLGA)
  .1 Standard Grading Rules for Canadian Lumber 2005.
.10 South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)
  .1 SCAQMD Rule 1168-03, Adhesives and Sealants Applications

1.4 Submittals

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

.2 Submit duplicate 300 mm long samples of each type of solid wood or 300 x 300 mm square type of plywood to receive stain or natural finish.

.3 Submit samples of plastic laminate materials.

1.5 Quality Assurance

.1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.

.3 Wood materials certified by Forestry Stewardship Council.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Protect materials against dampness during and after delivery.

.3 Store materials in ventilated areas, protected from extreme changes of temperature or humidity.

1.7 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Lumber Materials

.1 Softwood lumber: unless specified otherwise, S4S, moisture content 19% or less in accordance with following standards:
  .1 CAN/CSA- O141-91(R1999).
  .2 NLGA Standard Grading Rules for Canadian Lumber.
  .3 AWMAC custom premium grade, moisture content as specified.
  .4 Machine stress-rated lumber is acceptable.

.2 Hardwood Lumber: To NHLA requirements, moisture content of 6% maximum, maple species, AWMA Custom Grade.
  .1 Bench Slats: Select Grade Maple.

2.2 Panel Materials

.1 Douglas fir plywood (DFP): to CSA O121-M89 (R2003), standard construction.
  .1 Forestry Stewardship Council (FSC) certified.
  .2 Urea-formaldehyde free.

.2 Canadian softwood plywood (CSP): to CSA O151-04, standard construction.
  .1 Forestry Stewardship Council (FSC) certified.

.2 Urea-formaldehyde free.

.3 Hardwood Veneered Plywood: To CSA 0115, of thickness indicated, Clear Birch Veneer on exposed faces and interior faces of cabinets. Good two sides for work with two sides exposed to view; good one side for work with one side exposed to view. Use particle board core with Type I bond.

.4 Particleboard: to ANSI A208.1-99.
.1 Forestry Stewardship Council (FSC) certified.
.2 Urea-formaldehyde free.

.5 Medium density fibreboard (MDF): to ANSI A208.2-02, density 640-800 kg/m³.
.1 Forestry Stewardship Council (FSC) certified.
.2 Urea-formaldehyde free.

2.3 Plastic Laminate Components

.1 Plastic laminate facing sheet: CSA CAN3-A172-M, PF-S and GP-S; colours, gloss and texture will be selected by Consultant from full range of products by one of the following:
.1 Formica,
.2 Arborite,
.3 Pionite,
.4 Nevamar
.5 Wilsonart.

.2 Backing sheet: BK Grade by manufacturer of facing sheet.

.3 Core: CAN3-0188.1M, Grade R.

.4 Laminating adhesive: CAN3-0112 Series M.

.5 Core sealer: clear water resistant synthetic resin sealer.

2.4 Accessories

.1 Rough Hardware: Bolts, lag screws, anchors, nails and expansion shields required to secure this portion of work. Rough hardware hot dip galvanized conforming to latest edition of CAN/CSA-G164. All fasteners used in damp or wet areas to be suitable for use in corrosive environment. Use hot dipped galvanized or other material approved by the Consultant.

.2 Nails and staples: to CSA B111-74(R2003), galvanized to CAN/CSA- G164-M92 (R2003).

.3 Wood screws: to CSA B 35.4 plain type and size to suit application.

.4 Stainless Steel hardware: Type 316 Stainless steel for exposed or wet locations, tamper proof.

.5 Splines: wood or metal to suit application.

.6 Adhesive: recommended by manufacturer, waterproof type, maximum VOC limit 30 g/L SCAQMD Rule 1168 - Adhesives and Sealants Applications.

PART 3 EXECUTION

3.1 Construction

.1 Fastening:
- .1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
- .2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
- .3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round smooth cut hole and plug with wood plug to match material being secured.
- .4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

.2 Interior and exterior frames:
- .1 Set frames with plumb sides, level heads and sills, and secure.

3.2 Fabrication

.1 General:
- .1 Field measure all dimensions.
- .2 Fabricate all finish carpentry items to AWMAC premium grade, and in accordance with the reviewed shop drawings.
- .3 Set nails and screws, apply stained plain wood filler to indentations, sand smooth and leave ready to receive finish.
- .4 Provide 10 mm thick solid matching wood strip on plywood and particle board edges 13 mm or thicker, exposed in final assembly.
- .5 Ease edges of solid lumber components to 1.6 mm radius.

.2 Plastic Laminate Components
- .1 Fabricate plastic laminate window stools as detailed. Stools shall be minimum 19 mm thick plastic laminate plywood, with edge banding on all exposed faces. Fabricate in one piece, without joins, wherever as possible. Where necessary, joins shall be centred on window mullions and tightly butted together with concealed splines.
- .2 Fabricate vanities and change room shelving units as detailed.
- .3 Unless otherwise specified herein, comply with requirements of CAN3-A172-M Appendix 'A'.
- .4 Assembly: Bond plastic laminate to core with adhesive, under pressure.
- .5 Core: unless otherwise indicated: 19 mm thick.
- .6 Balanced construction: plastic laminate covered components shall be of balanced construction, with plastic laminate on both faces of core. Seal core edges not covered with plastic laminate.
- .7 Use largest practicable plastic laminate sheet size.
- .8 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.
- .9 Openings and cutouts:
  - .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.

3.3 Installation

.1 Do finish carpentry to Quality Standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC), except where specified otherwise.

.2 All fastenings shall be concealed.

.3 Provide heavy duty grounds as necessary for secure installation of finish carpentry work.

.4 All wood surfaces shall be sanded smooth, ready to receive finish.

.5 Scribe and cut as required, fit to abutting walls and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.

.6 Form joints to conceal shrinkage.

.7 Set and secure materials and components in place, rigid plumb and square.

.8 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.

.9 Set finishing nails to receive filler. Where screws are used to secure members, countersink screws in round, cleanly cut hole and plug with wood plug to match material being secured.

.10 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

.11 Install plastic laminate components using concealed fastening devices.

.12 Install window stools with wood levelling shims, after installation of windows and interior finishing is complete. Screw levelling shims to metal stud framing with self-tapping sheet metal screws. Bond stools to shims with waterproof adhesive. Tightly butt all joints and bond together with adhesive and concealed splines. Cut to fit tight to all penetrations.

.13 Apply mildew resistant clear silicone sealant to perimeter of all vanity tops and window stools as specified in Section 07 92 00.

3.4 Benches

.1 Coordinate benches in dressing rooms with Section 05 50 00.

.2 Install solid maple bench seats as detailed with stainless steel carriage bolts. Use longest practical pieces. Excessive joints will not be accepted.

3.5 Wood Trim at Stage and Chair Dollies

.1 Install solid maple trim at edge of floor on gym side of stage.

.2 Install maple veneer plywood c/w solid maple edging at stage surrounds and proscenium arches. Use concealed fasteners.

.3 Install maple veneer door with matching wood edging at fronts of chair dollies.

3.6 Door Installation

.1 Install doors in accordance with instructions in Section 08 11 00 and Section 08 14 16 and manufacturer’s printed instructions.

3.7 Finish Hardware Installation

.1 Finish hardware will be supplied for installation under this Section.

.2 Prepare doors and frames in accordance with manufacturer's instructions and templates. Install finish hardware complete in all respects, hang doors and make adjustments necessary.

.3 Doors shall swing freely. Where thresholds are to be used, door bottom shall be finished to suit thresholds as required.

.4 Where indicated on door schedules or drawings, under-cut doors.

3.8 Miscellaneous

.1 Install Toilet and Bath Accessories as specified in Section 10 28 10, including accessories supplied by Owner.

3.9 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 03 30 00 Cast-in-Place Concrete
.2 Section 04 22 00 Concrete Unit Masonry
.3 Section 06 10 00 Rough Carpentry
.4 Section 07 92 00 Joint Sealants
.5 Section 08 11 00 Metal Doors and Frames
.6 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

.1 Underwriters Laboratories Canada (ULC)
  .1 CAN/ULC S701, Thermal Insulation, Polystyrene, Boards and Pipe Covering
  .2 CAN/ULC-S702 Thermal Insulation Mineral Fibre for Buildings
  .3 CAN/ULC S704 Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced.
.2 Canadian General Services Board (CGSB)
  .1 CGSB 71-GP-24M Adhesive, Flexible, for Bonding to Cellular Polystyrene Insulation.
  .2 CAN 2-51.32 Sheathing, Membrane, Breather Type.
.3 Canadian Standards Association (CSA)
  .1 CSA B111 Wire Nails, Spikes and Staples
.4 ASTM International (ASTM)
  .1 ASTM C612-00 Standard Specification for Mineral Fiber Block and Board Thermal Insulation
  .2 ASTM C665, Mineral-Fibre Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
  .3 ASTM D1621 Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
  .4 ASTM D1623 Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
  .5 ASTM E1677 Standard Specification for an Air Retarder (AR) Material or System for Low-Rise Framed Building Walls.
  .6 ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials

1.4 Submittals

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

.2 Submit manufacturer's printed data sheets for each type of insulation specified.

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 Deliver material to the site in the original unbroken packages bearing the name of manufacturer.

.4 Store materials in an approved manner at the site preceding application and protect from damage at all times.

.5 Remove damaged or deteriorated materials from site.

1.6 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Batt Insulation

.1 Fibreglass friction fit batts to CSA A101-M, Type 1 or mineral fibre to CAN/ULC-S702 Type 1 for wall application, width and thickness as shown on details:
.1 Owens Corning Fibreglass Batt Insulation, unfaced.
.2 Roxul Batt Insulation.

2.2 Accessories

.1 Sealing Tape: minimum 65 mm width, polypropylene sheathing tape with acrylic adhesive.

.2 Rough Hardware: Nails and staples as required for installation of insulation and membrane materials, galvanized to CSA B111 and B34.

.3 Mechanical Fastening: galvanized screw type fasteners with 25 mm galvanized plate washers. Screws shall be 13 mm longer than the combined thickness of the insulation and sheathing.

PART 3 EXECUTION

3.1 Installation – General

.1 Install insulation of types indicated, or, where not indicated, as appropriate, to provide a continuously un-interrupted building envelope in accordance with the requirements of the reference standards.

.2 Install insulation after building substrate materials are dry.

.3 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.4 Fit insulation tightly around all structural angles, penetrations and other protrusions.

.5 Cut and trim insulation neatly to fit spaces. Butt joints tightly; offset vertical joints. Use only

.6 Sizes of materials shall be consistent with the module of the system.

.7 Do not enclose or conceal insulation until it has been inspected by the Consultant.

3.2 Batt Insulation

.1 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.2 Install batt insulation in spaces as shown on drawings.

.3 Pack loose fibreglass insulation in crevices between exterior masonry and door and window frames and about lintels, frames, beams around ducts at holes and other places where shown or required to eliminate air infiltration.

.4 Pack loose fibreglass into voids around mechanical and electrical pipes and ducts where they pass through walls and slabs.

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 04 22 00 Concrete Unit Masonry
.2 Section 07 92 00 Joint Sealants
.3 Section 09 21 16 Gypsum Board

1.3 References

.1 Ontario Building Code
.2 Underwriter's Laboratories of Canada (ULC)
  .1 CAN/ULC S101-07, Standard Methods of Fire Endurance Tests of Building Construction and Materials
  .2 CAN/ULC S102.2-10, Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies
  .3 CAN/ULC S115-11, Standard Method of Fire Tests of Firestop Systems
.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).
.4 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 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
  .2 Submit two (2) copies of WHMIS MSDS - Material Safety Data Sheets.

.3 Shop Drawings:
  .1 Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation.
  .2 Construction details should accurately reflect actual job conditions.

.4 Samples:
  .1 Submit duplicate 300 x 300 mm samples showing actual fire stop material proposed for project.

.5 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.
  .1 Test reports: in accordance with CAN/ULC-S101-07 for fire endurance and CAN/ULC-S102-10 for surface burning characteristics.
  .2 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties
  .3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.4 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

1.5 Definitions

.1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.

.2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.

.3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.

1.6 Quality Assurance

.1 One installer shall install all firestopping on the project. Each trade shall not firestop their own service penetrations. Installer shall be certified by fire stopping manufacturer.

.2 Qualifications:
.1 Qualified Installer: specializing in fire stopping installations with 5 years documented experience approved and trained by manufacturer.

.3 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and Consultant to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review manufacturer's installation instructions and warranty requirements.

.4 Site Meetings:
.1 As part of Manufacturer's Services described in 3.5- Field Quality Control, schedule site visits, to review Work, at stages listed.
.2 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
.3 Twice during progress of Work at 25% and 60% complete.
.4 Upon completion of Work, after cleaning is carried out.
.5 Single Source Responsibility: Obtain through-penetration fire-stop systems for each kind of penetration and construction condition indicated from a single manufacturer.

.5 Field-Constructed Mockup: Prior to installing fire-stopping, erect mockups for each different through-penetration fire-stop system indicated to verify selections made and to demonstrate qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final installations.
.1 Locate mockups on site in locations indicated or, if not indicated, as directed by Consultant.
.2 Notify Consultant one (1) week in advance of the dates and times when mockups will be erected.
.3 Obtain Consultant’s acceptance of mockups before start of final unit of Work.
.4 Retain and maintain mockups during construction in an undisturbed condition as a standard for judging completed unit of Work.

.5 Accepted mockups in an undisturbed condition at time of Substantial Performance may become part of completed unit of Work.

1.7 Sustainable Requirements

.1 Materials shall be Low VOC type conforming to SCAQMD Rule 1168-03. Maximum VOC level of firestopping materials shall be 250 g/l.

1.8 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

.3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.

.4 Storage and Protection:
.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

1.9 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

.1 All fire stopping shall consist of ULC listed firestop system.

.2 All firestopping material shall be:
.1 From one manufacturer;
.2 Intumescent where an appropriate system exists.

.3 Fire stopping and smoke seal systems: ULC listed in accordance with CAN/ULC S115-11.
.1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN/ULC-S115-11 and not to exceed opening sizes for which they are intended.

.4 Service penetration assemblies: ULC listed systems tested to CAN/ULC-S115-11.

.5 Service penetration fire stop components: ULC listed and certified by test laboratory to CAN/ULC-S115-11.

.6 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.

.7 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.8 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

.9 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.10 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.11 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.12 Sealants for vertical joints: non-sagging.

.13 General: Provide fire-stopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases.

.14 F-Rated Through-Penetration Fire-stop Systems: Provide through-penetration fire-stop systems with F ratings indicated, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.

.15 T-Rated Through-Penetration Fire-stop Systems: Provide through-penetration fire-stop systems with T ratings, in addition to F ratings, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupy-able floor areas. T-rated assemblies are required where the following conditions exist:
.1 Where fire-stop systems protect penetrations located outside of wall cavities.
.2 Where fire-stop systems protect penetrations located outside fire-resistive shaft enclosures.
.3 Where fire-stop systems protect penetrations located in construction containing doors required to have a temperature-rise rating.
.4 Where fire-stop systems protect penetrating items larger than a 100 mm diameter nominal pipe or 10,000 mm² in overall cross-sectional area.

.16 Fire-Resistive Joint Sealants: Provide joint sealants with fire-resistance ratings indicated, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.

.17 For fire-stopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
.1 For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration fire-stop systems.
.2 For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed to possible loading and traffic, provide fire-stop systems capable of supporting the floor loads involved either by installing floor plates or by other means.
.3 For penetrations involving insulated piping, provide through-penetration fire-stop systems not requiring removal of insulation.

.18 For firestopping exposed to view, provide products with flame-spread values of less than 25 and smoke-developed values of less than 450.

.19 Compatibility: Provide fire-stopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by fire-stopping manufacturer based on testing and field experience.

.20 Accessories: Provide components for each fire-stopping system that are needed to install fill materials and to comply with "System Performance Requirements". Use only components

specified by the fire-stopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire resistance-rated systems. Accessories include but are not limited to the following items:

.1 Permanent forming/damming/backing materials including the following:
  .1 Semi-refractory fibre (mineral wool) insulation.
  .2 Ceramic fibre.
  .3 Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
  .4 Fire-rated formboard.
  .5 Joint fillers for joint sealants.
.2 Temporary forming materials.
.3 Substrate primers.
.4 Collars.
.5 Steel sleeves.

.21 Applications: Provide fire-stopping systems composed of materials specified in this Section that comply with system performance and other requirements.

.22 Environmental Conditions: Do not install fire-stopping when ambient or substrate temperatures are outside limits permitted by fire-stopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

.23 Ventilation: Ventilate fire-stopping per fire-stopping manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.

.24 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials and regarding labeling and provision of Material Safety Data Sheets (MSDS).

PART 3 EXECUTION

3.1 Manufacturer’s Instructions

.1 Compliance: comply with manufacturer's written recommendations or specifications.

3.2 Preparation

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.

.2 Ensure that substrates and surfaces are clean, dry and frost free.

.3 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.4 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour retarder

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

3.3 Installation

.1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing and as necessary to maintain fire resistance ratings of floor and wall assemblies.

.2 Provide fire stopping for all disciplines.

.3 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.4 Fill spaces between openings, ducts, pipes and unused sleeves passing through fire separations with firestop material and install firestopping systems in accordance with the appropriate ULC system number for the products and type of penetration.

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

.6 Tool or trowel exposed surfaces to neat finish.

.7 Remove excess compound promptly as work progresses and upon completion.

3.4 Sequences of Operation

.1 Proceed only when submittals have been reviewed by Consultant.

.2 Mechanical pipe insulation: certified fire stop system component.
.1 Ensure pipe insulation installation precedes fire stopping.

3.5 Field Quality Control

.1 Inspections: notify Consultant when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

.2 Employ a ULC accredited Designated Responsible Individual (DRI) to inspect and label all fire stop applications on site.

.3 Manufacturer's Field Services:
.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1.4 - SUBMITTALS.
.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
.3 Schedule site visits, to review Work, as directed in PART 1.6 - QUALITY ASSURANCE.

3.6 Commissioning

.1 Employ a ULC accredited Designated Responsible Individual (DRI) to inspect and label all fire stop applications on site. Submit DRI's written reports within 3 days of review, verifying compliance of Work.

.2 Perform a thorough examination of the fire stopping system to determine if the assembly is installed as per its ULC listing.

.3 Allow for destructive testing of installed firestopping. Repair all tested assemblies.

.4 The examination shall take place prior to close-up to confirm assembly components and installation configuration.

.5 Any and all deviations from the ULC listed system shall be considered grounds for rejection and replacement.

3.7 Schedule

.1 Fire stop and smoke seal at:
- .1 Penetrations through fire-resistance rated concrete, masonry, and gypsum board partitions and walls.
- .2 Top of fire-resistance rated partitions.
- .3 Intersection of fire-resistance rated partitions.
- .4 Control and sway joints in fire-resistance rated partitions and walls.
- .5 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
- .6 Around mechanical and electrical assemblies penetrating fire separations.
- .7 Rigid ducts: greater than 129 cm^2: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.
- .8 All electrical outlet boxes installed in fire rated gypsum board assemblies.
- .9 All locations required by the Ontario Building Code.
- .10 Any other locations indicated

3.8 Cleaning

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

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

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

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 03 30 00 Cast-in-Place Concrete
.2 Section 04 22 00 Concrete Unit Masonry
.3 Section 07 84 00 Firestopping
.4 Section 09 21 16 Gypsum Board

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C834-14 Standard Specification for Latex Sealants
  .2 ASTM C920-14a Standard Specification for Elastomeric Joint Sealants
  .3 ASTM C1184-14 Standard Specification for Structural Silicone Sealants
  .4 ASTM C1193-13 Standard Guide for Use of Joint Sealants
  .5 ASTM C1311-14 Standard Specification for Solvent Release Sealants
.2 Canadian General Standards Board (CGSB)
  .1 CGSB 19-GP-SM, Sealing compound, one component, acrylic base, solvent curing.
  .2 CGSB 19.13-M, Sealing compound, one component, elastomeric chemical curing.
  .3 CGSB 19-GP-14M Sealing compound, one component, butyl-polyisobutylene, polymer base, solvent curing.
  .4 CGSB 19-22-M, Mildew resistant sealing compound for tubs and tile.
  .5 CGSB 19-24-M, Multi component, chemical curing sealing compound.

1.4 Submittals

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

.2 Submit MSDS Data Sheets for review and acceptance by the Owner prior to delivery to the project site. Obtain written approval from the Owner and do not deliver any materials to the Owner's property, prior to receipt of such approval.

1.5 Quality Assurance

.1 Installation of caulking shall be performed only by workmen thoroughly skilled and specially trained in the techniques of caulking.

.2 Caulking work shall be carried out in strict accordance with manufacturer's printed directions.

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 Use all means necessary to protect caulking materials before, during and after installation and to protect the installed work and materials of all other trades.

.4 In the event of damage, immediately make all repairs and replacements necessary to the approval of the Consultant and at no additional cost to the Owner.

.5 Store all caulking materials and equipment under conditions recommended by its manufacturer.

.6 Do not use materials stored for a period exceeding the maximum recommended shelf-life of the material.

.7 Materials shall be delivered to the job in their original containers or wrapping with the manufacturer's seal and labels intact.

1.7 Environmental Considerations

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials, and regarding labelling and provision of material safety data sheets.

.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.3 Ventilate area of work by use of approved portable supply and exhaust fans.

1.8 Waste Management and Disposal

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

1.9 Warranty

.1 Warrant that caulking and sealant work will not leak, crack, crumble, melt, shrink, run, lose adhesion or stain adjacent surfaces for three years from the date of Substantial Performance.

PART 2 PRODUCTS

2.1 Manufacturer

.1 Products of the following manufacturers are approved for use subject to meeting the specifications for the particular product listed below:
- .1 Canadian General Electric
- .2 Dow Corning
- .3 Nuco Inc.
- .4 Sika Canada Limited
- .5 Tremco Manufacturing Company (Canada) Ltd.
- .6 W.R. Grace and Company.
- .7 CR Laurence.

2.2 Materials

.1 Primers: Type recommended by sealant manufacturer. Low VOC type

.2 Joint Fillers:
- .1 General: Compatible with primers and sealants, outsized 30 to 50%.
- .2 Vertical Joints: Polyethylene, Urethane, Neoprene or Vinyl:
  - .1 Extruded closed cell foam, Shore A hardness 20, tensile strength 140 to 200 kPa.

.2 Sealtight-Etha Foam Backer Rod, W. R. Meadows Canada Ltd.

.3 Horizontal Joints: Neoprene or Butyl Rubber (Horizontal Joints): Round solid rod, Shore A hardness 70.

.4 Premoulded Joint Filler: Unifoam R1009, Goodco Limited

.3 Sealants:

.1 All sealants shall be Low VOC Type.

.2 For Exterior Locations: To ASTM C920-14a, two component LP polysulphide base sealant Type 2 where subjected to foot traffic and Type 1 where not subjected to foot traffic (20-35 Shore A) Class B, bearing seal of approval of Thiokol Chemical Corporation:

.1 DOW Corning 790/795

.2 Tremco Dymeric 240FC

.3 For Interior Locations: To CAN3-11.13-M, one component polysulphide base sealant bearing seal of approval of Thiokol Chemical Corporation.

.1 Mono 555 - Tremco

.2 Vulkem 116 - Tremco

.3 Acrylic Latex: Siliconized acrylic latex to ASTM C834.

.1 Tremflex 834 - Tremco

.4 Mildew Resistant Sealant: Silicone to CAN/CGSB-19.22-M and ASTM C920.

.5 Vapour Barrier Sealant: CAN/CGSB 19.21-M.

.4 Colour of sealants to be selected by Consultant.

.4 Bond Breaker Tape: Polyethylene bond breaker tape which will not bond to sealant.

.5 Joint Cleaner: Xylol, methylethyleketon or non-corrosive type recommended by sealant manufacturer and compatible with joint forming materials.

PART 3 EXECUTION

3.1 Inspection

.1 Inspect conditions and substrates upon which work of this Section is dependent. Report to Consultant in writing any defects that may jeopardize the performance of this work.

.2 Commencement of work implies acceptance of conditions.

3.2 Preparation

.1 Remove dust, paint, loose mortar and other foreign matter. Ensure joint surfaces are dry and free of frost.

.2 Remove rust, mill scale and coatings from ferrous metals by wire brush, grinding or sandblasting.

.3 Remove oil, grease and other coatings from non-ferrous metals with joint cleaner.

.4 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.5 Prepare concrete, masonry glazed and vitreous surfaces to sealant manufacturer's instructions.

.6 Examine joint sizes and conditions to achieve correct depth ratio ½ of joint width with minimum width and depth of 6 mm, maximum width 25 mm.

.7 Install joint filler to achieve correct joint depth.

.8 Where necessary to prevent staining, mask adjacent surface prior to priming and caulking.

.9 Apply bond breaker tape where required to ensure performance of sealant.

.10 Prime sides of joints when required and as recommended by sealant manufacturer to ensure performance of sealant immediately prior to caulking.

3.3 Application

.1 Apply sealants in accordance with manufacturer's instructions, in continuous beads, to provide watertight joint. Apply sealant using gun with proper size nozzle. Use sufficient pressure to fill voids and joints solid. Superficial pointing with skin bead is not acceptable.

.2 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities. Neatly tool surface to a slight concave joint.

.3 Clean adjacent surfaces immediately and leave work neat and clean. Remove excess sealant and droppings using recommended cleaners as work progresses. Remove masking after tooling of joints.

.4 Apply sealant to joints between window or door frames to adjacent building components, around perimeter of every external opening, to control joints in masonry walls where shown.

.5 Caulk joints in surfaces to be painted before surfaces are painted. Where surfaces to be caulked are primed in shop before caulking, check to make sure prime paint and caulking are compatible. If they are incompatible, inform Consultant and change caulking to compatible type approved by Consultant.

3.4 Schedule

.1 Provide sealants at the following locations
- .1 Where required to protect interior from exterior air and water infiltration.
- .2 Joints between all dissimilar materials.
- .3 Construction and control joints.
- .4 Junction of masonry and other types of partitions.
- .5 At intersecting masonry wall.
- .6 Joints between gypsum board and masonry or concrete.
- .7 Joints in metal frames.
- .8 Base of metal frames at resilient flooring.
- .9 Joints between window stools and adjacent surfaces.
- .10 Exterior thresholds (set in 2 full beads).
- .11 Joints between cabinetwork and adjoining surfaces (mildew resistant latex, white/clear).
- .12 Joints in ceramic tile.
- .13 Window and curtain wall frames (inside and outside).
- .14 Door frames (inside and outside).
- .15 Joints between stair stringers and walls.
- .16 Junction of toilet fixtures with walls and floors (mildew resistant).

.17 Junction between vanities and walls or backsplashes (mildew resistant).
.18 Caulk the entire perimeter of all mechanical and electrical material or piping extending through or occurring in masonry walls unless indicated to be firestopped.
.19 Other locations where caulking or sealant is required to provide a neat clean junction

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 04 22 00 Concrete Unit Masonry
.2 Section 06 10 00 Rough Carpentry
.3 Section 07 92 00 Joint Sealants
.4 Section 08 71 10 Door Hardware
.5 Section 09 91 23 Interior Painting

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM A653/A653M-11, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  .2 ASTM B29 - 03(2009) Standard Specification for Refined Lead
  .3 ASTM B749-03 (2009), Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate Products.
  .4 ASTM E90-09 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
  .5 ASTM E413 Classification for Rating Sound Insulation.
.2 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
  .2 CGSB 41-GP-19M, Rigid Vinyl Extrusions for Windows and Doors.
.3 Canadian Standards Association (CSA International)
  .1 CSA-G40.20-04/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  .2 CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding).
.4 Canadian Steel Door Manufacturers' Association (CSDMA)
  .1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2000.
  .2 CSDMA, Selection and Usage Guide for Commercial Steel Doors, 1990.
.5 Underwriters Laboratories Canada (ULC)
  .1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
  .2 CAN/ULC-S702-09-AM1, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
  .3 CAN/ULC-S704-11, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
.6 National Fire Protection Association(NFPA)
  .1 ANSI/NFPA 252 Standard Methods of Fire Tests of Door Assemblies.
  .2 ANSI/UL10B Fire Tests of Door Assemblies.
  .3 ANSI/UL10C Standard for Positive Pressure Fire Tests of Door Assemblies.

1.4 Submittals

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
.2 Provide shop drawings
  .1 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed louvred, arrangement of hardware, and finishes.
  .2 Indicate each type frame material, core thickness, reinforcements, location of anchors and

exposed fastenings, reinforcing, fire rating and finishes.

.3 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

1.5 System Description

.1 Design Requirements

.1 Design exterior frame assembly to accommodate expansion and contraction when subjected to minimum and maximum surface temperature of -35^{O} C to 35^{O} C.

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 Requirements of Regulatory Agencies

.1 Steel fire rated doors and frames: labeled and installed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104M (NFPA 252) for ratings specified or indicated.

.2 Provide fire labeled frame products for those openings requiring fire protection ratings, as scheduled. Test products in strict conformance with CAN4-S104, ASTM E 152 or NFPA 252 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

1.8 Testing and Performance

.1 Fire labeled products shall be provided for those openings requiring fire protection ratings as scheduled on the drawings. Products shall be tested in strict conformance with CAN4-S104 and listed by Underwriters Laboratory of Canada Ltd. or Warnock Hersey under an active Factory Inspection Program.

.2 Product quality shall meet the standards established by the Canadian Steel Door Manufacturer's Association.

.3 Door construction shall meet acceptance criteria of ANSI A224.1 and shall be certified as meeting Level A (1,000,000 cycles) and Twist Test Acceptance Criteria deflection not to exceed 6.4 mm/13.6 kg force, total deflection at 136.1 kg force not to exceed 64 mm and permanent deflection not to exceed 3.0 mm when tested in strict conformance with ANSI A250.4. Test shall be conducted by an independent nationally recognized accredited laboratory.

.4 Core materials for insulated doors shall attain a thermal resistance rating of RSI 2.17 when tested in accordance with ASTM C177 or ASTM C518.

1.9 Waste Management and Disposal

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

1.10 Warranty

.1 Provide a written warranty for work of this section from manufacturer for failure due to defective materials and from contractor for failure due to defective installation workmanship, for one (1) year respectively from the date of Substantial Performance.

PART 2 PRODUCTS

2.1 Materials

.1 Hot dipped galvanized steel sheet: to ASTM A 653M, ZF75, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.

.2 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A 653M, ZF75.

2.2 Door Core Material

Interior Doors: Structural small cell, 24.5mm maximum kraft paper 'honeycomb', weight 36.3 kg per ream minimum, density: 16.5 kg/m³ minimum sanded to required thickness. ULC approved.

2.3 Primer

.1 Touch-up prime CAN/CGSB-1.181, organic zinc rich, rust inhibitive.
.1 Maximum VOC limit 50 g/L to GC-03.

2.4 Adhesives

.1 Adhesive: maximum VOC content 50 g/L to SCAQMD Rule 1168.

.2 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.

.3 Polyisocyanurate: heat resistant, epoxy resin based, low viscosity, contact cement.

.4 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, low VOC sealant/adhesive or U.L.C. approved equivalent.

2.5 Accessories

.1 Door silencers: single stud rubber/neoprene type, to CGSB-60-GP6 Type 6/180.

.2 Glazing Stops: Minimum 20 gauge (0.9 mm) base thickness sheet steel with wipe zinc finish to ASTM A525-80a. Fasteners to be #6 x 32 mm cadmium plated oval head scrulox (self-drilling) type screws. Tamper proof screws.
.3 Exterior top caps: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.

.4 Metallic paste filler: to manufacturer's standard.

.5 Sealant: As specified in Section 07 92 00.

.6 Fiberglass: to CAN/ULC-S702-09-AM1, loose batt type, minimum density of 24 kg/m³.

2.6 Frame Fabrication- General

.1 Fabricate frames in accordance with CSDMA specifications.

.2 Fabricate frames to profiles and maximum face sizes as indicated.

.3 Frames: 1.6 mm welded type construction.

.4 Blank, reinforce, drill and tap frames for mortised, templated hardware, and electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.

.5 Protect mortised cutouts with steel guard boxes.

.6 Prepare frame for door silencers, 3 for single door, 2 at head for double door.

.7 .Manufacturer's nameplates on frames and screens are not permitted.

.8 Conceal fastenings except where exposed fastenings are indicated.

.9 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

.10 Prepare frames to receive electrical conduit for door operators where indicated and required.

.11 Thermally broken frames shall be fabricated with integrated PVC thermal break.

2.7 Frame Anchorage

.1 Provide appropriate anchorage to floor and wall construction.

.2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.

.3 Provide 2 anchors for rebate opening heights up to 1520 mm and 1 additional anchor for each additional 760 mm of height or fraction thereof.

.4 Locate anchors for frames in existing openings not more than 150 mm from top and bottom of each jambs and intermediate at 660 mm on centre maximum.

2.8 Frames – Welded Type

.1 Welding in accordance with CSA W59.

.2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.

.3 Cope accurately and securely weld butt joints of mullions, bars, centre rails and sills.

.4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.

.5 Securely attach floor anchors to inside of each jamb profile.

.6 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

2.9 Door Fabrication - General

.1 Doors: swing type, flush.

.2 All interior doors: insulated steel construction with honeycomb core laminated to face sheets under pressure.

.3 All exterior doors: insulated steel construction with polyisocyanurate core laminated to face sheets under pressure.

.4 Fabricate doors with longitudinal edges locked seam locked seamed, adhesive assisted welded. Seams: visible grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.

.5 Doors: manufacturers' proprietary construction, tested and/or engineered as part of a fully operable assembly, including door, frame, gasketting and hardware in accordance with ASTM E330.

.6 Blank, reinforce, drill doors and tap for mortised, templated hardware and electronic hardware.

.7 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.

.8 Reinforce doors where required, for surface mounted hardware.

.9 Provide inverted, recessed, spot welded channels to top and bottom of interior doors.

.10 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.

.11 Manufacturer's nameplates on doors are not permitted.

2.10 Hollow Steel Construction

.1 Form face sheets for exterior doors from 1.6 mm sheet steel.

.2 Form face sheets for interior doors from 1.2 sheet steel.

.3 Reinforce doors with vertical stiffeners, securely welded to face sheets at 150 mm on centre maximum.

.4 Fill voids between stiffeners of exterior doors with polyisocyanurate core.
.5 Fill voids between stiffeners of interior doors with temperature rise rated core.

2.11 Glazing Stops

.1 Glazing stops shall be accurately fitted, butted at corners with removable stops located on push side of door.

.2 Provide tamper proof screws on all doors and screens.

2.12 Finishes

.1 Doors and frames shall wipe coat zinc, ready for painting.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Installation – General

.1 Install doors and frames to CSDMA Installation Guide.

3.3 Frame Installation

.1 Set frames plumb, square, level and at correct elevation.

.2 Secure anchorages and connections to adjacent construction.

.3 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.4 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.

.5 Caulk perimeter of frames.

3.4 Door Installation

.1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 - Door Hardware.

.2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows:
   .1 Hinge side: 1.0 mm.
   .2 Latchside and head: 1.5 mm.
   .3 Finished floor and thresholds: 13 mm.
   .4 Adjust operable parts for correct function.

.3 Coordinate with Section 08 71 10 for preparation and installation of automatic door operators.

3.5 Finish Repairs

.1 Touch up with primer finishes damaged during installation.

.2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

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 06 20 00 Finish Carpentry
.2 Section 08 11 00 Metal Doors and Frames
.3 Section 08 71 10 Door Hardware
.4 Section 09 91 23 Interior Painting

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM D1761-12 Standard Test Methods for Mechanical Fasteners in Wood
  .2 ASTM D5456-17e1 Standard Specification for Evaluation of Structural Composite Lumber Products
  .3 ASTM E90-09(2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
  .4 ASM E413-16 Classification for Rating Sound Insulation
  .5 ASTM E1332-16 Standard Classification for Rating Outdoor-Indoor Sound Attenuation
  .6 ASTM E2235-04(2012) Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods
.2 American National Standards Institute (ANSI):
  .1 ANSI A208.1 - Standard for Particleboard.
.3 Canadian Standards Association (CSA)
  .1 CSA O115 Hardwood and Decorative Plywood.
  .2 CAN/CSA O132.2 Series, Wood Flush Doors
.4 Canadian General Services Board (CGSB)
  .1 CAN/CGSB-71.19, Adhesive, Contact, Sprayable
  .2 CAN/CGSB-71.20, Adhesive, Contact, Brushable
.5 Underwriters Laboratories Canada (ULC)
  .1 CAN 4-S104 - Fire Tests of Door Assemblies.
.6 National Fire Protection Association (NFPA)
  .1 NFPA 80, Standard for Fire Doors and Other Opening Protectives.
  .2 NFPA 252 Standard Method of Fire Test for Door Assemblies.
.7 Architectural Woodwork Manufacturers Association of Canada (AWMAC): Quality Standards for Architectural Woodwork
.8 Window and Door Manufacturer's Association (WDMA)
  .1 ANSI/WDMA I.S. 1A-13 Interior Architectural Wood Flush Doors
.9 South Coast Air Quality Management District (SCAQMD), California State
  .1 SCAQMD Rule 1113-06, Architectural Coatings.
  .2 SCAQMD Rule 1168-03, Adhesives and Sealants Applications.
.10 Green Seal Environmental Standards
  .1 Standard GS-11-97, Architectural Paints.

1.4 Submittals

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

.2 Submit shop drawings and door schedules.
.1 Indicate door types, sizes, thicknesses, and details of construction.

1.5 Quality Assurance

.1 The "Quality Standards" of the Architectural Woodwork Manufacturers Association of Canada (AWMAC), 1991 Edition, together with authorized additions and amendments, shall be used as a reference standard and shall form part of this project specification.

.2 Where modifications to the AWMAC Quality Standards contained within the Manual are included in this project specification, then such modifications shall govern in case of conflict.

.3 Any reference to Custom or Premium grade in this specification shall be as defined in the AWMAC Quality Standards.

.4 Any item not given a specific quality grade shall be Custom grade as defined in the AWMAC Quality Standards.

.5 References in this specification to part and item numbers mean those parts and items contained within the AWMAC Quality Standards Manual.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 16 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

.3 Wood door delivery, storage and handling shall be in accordance with Part 6, Item 3, of the AWMAC Quality Standards.

.4 Do not deliver wood doors until the building and storage areas are sufficiently dry so that the wood doors will not be damaged by excessive changes in moisture content.

.5 Delivered materials which are damaged in any way or do not comply with these specifications will be rejected by the Consultant and shall be removed from the job site and replaced with acceptable materials.

1.7 Waste Management and Disposal

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

1.8 Warranty

.1 Warrant the work of this Section against defects of workmanship and material, for a period of two (2) 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 PRODUCTS

2.1 Manufacturers

.1 Acceptable Manufacturers: Member in good standing of the Architectural Woodwork Manufacturers Association of Canada (AWMAC) with minimum 5 years of production experience similar to this project, whose qualifications indicate ability to comply with requirements of this Section.

2.2 Materials

.1 All door materials to conform to CSA 0132.2-M.

.2 Doors and transoms shall be constructed with solid particle core (non-labeled) or noncombustible mineral core (labeled doors), 114mm (4-1/2") wide stiles and 70mm (2-3/4") top and bottom rails. Stiles to have 16mm (5/8") wide facing strips of birch. Provide extra blocking where required to suit each type of hardware item. Provide wood grounds around glazed and louvre openings.

.3 Particle board core shall conform to C.S.A. Standard 0188 and shall be 32 pounds per cu. Ft. density.

.4 Mineral core: manufacturer's standard, ULC approved for use in fire labeled doors.

.5 Doors and transoms to be 44mm (1-3/4") thick.

.6 Plastic laminate shall be 1.1mm (0.045") thick decorative, melamine surface, high pressure laminated plastic sheeting conforming to NEMA Specifications, and having a suede finish. Edge strips shall be cut from the same sheet as facing. Bond the plastic laminate to the core, stiles, rails, and facing strips, under pressure to provide a smooth surface. Laminate colour and texture shall be "sliced red oak."

.7 Provide rabbeted joints between doors and transom panels. Rabbett to be 22mm x 22mm.

.8 Adhesive: To CSA 0132.2, Type II, water resistant, for interior use.

PART 3 EXECUTION

3.1 Fabrication

.1 Fabricate doors in accordance with CSA 0132.2.

.2 Fabricate fire labeled doors in accordance with NFPA 80. Factory install Underwriters of Canada Limited or Warnock-Hersey fire label on stile of each fire rated door.

.3 Provide No. 3 vertical edge strips to match face veneer.

.4 Bevel vertical edges of single acting doors 3.0 mm on lock side and 1.6 mm on hinge side.

.5 Prepare doors for hardware.

.6 Fabricate doors with reinforced openings for door grilles and glazed lites. Provide manufacturer's standard trim and stops.

.7 Sand and prepare doors to receive clear urethane finish as indicated on the Room Finish and Door Schedules.

3.2 Installation

.1 Unwrap and protect doors in accordance with CAN/CSA-O132.2 Series, Appendix A.

.2 Install doors and hardware in accordance with manufacturer's printed instructions and CAN/CSA-0132.2 Series, Appendix A.

.3 Adjust hardware for correct function.

.4 Doors to receive clear urethane finish as specified in Section 09 91 23.

3.3 Final Adjustment

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

3.4 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 20 00 Finish Carpentry
.2 Section 08 11 00 Metal Doors and Frames
.3 Section 08 71 13 Automatic Door Operators

1.3 References

.1 The National Building Code of Canada.
.2 American National Standards Institute (ANSI)
  .1 ANSI/DHI A115.1G, Installation Guide for Doors and Hardware
.3 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).
  .1 CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction): standard hardware location dimensions.
.4 Canadian General Standards Board (CGSB).
  .1 CAN/CGSB-69.17-M86, Bored and Preassembled Locks and Latches
  .2 CAN/CGSB 69.18-M90/ANSI/BHMA A156.1-1981, Butts and Hinges.
  .3 CAN/CGSB 69.18-M90/ANSI/BHMA A156.1-1981, Butts and Hinges.
  .4 CAN/CGSB 69.19-93/ANSI/BHMA A156.3-1989, Exit Devices.
  .5 CAN/CGSB 69.20-M90/ANSI/BHMA A156.4-1986, Door Controls (Closers).
  .6 CAN/CGSB 69.21-M90/ANSI/BHMA A156.5-1984, Auxiliary Locks and Associated Products.
  .7 CAN/CGSB 69.22-M90/ANSI/BHMA A156.6-1986, Architectural Door Trim.
  .8 CAN/CGSB 69.24-M90/ANSI/BHMA A156.8-1982, Door Controls - Overhead Holders.
  .9 CAN/CGSB 69.26-96/ANSI/BHMA A156.10-1991, Power-operated Pedestrian Doors.
  .10 CAN/CGSB 69.28-M90/ANSI/BHMA A156.12-1986 Interconnected Locks and Latches.
  .11 CAN/CGSB 69.29-93/ANSI/BHMA A156.13-1987, Mortise Locks and Latches.
  .12 CAN/CGSB 69.31-M89/ANSI/BHMA A156.15-1981, Closer/Holder Release Device.
  .13 CAN/CGSB 69.32-M90/ANSI/BHMA A156.16-1981, Auxiliary Hardware.
  .14 CAN/CGSB 69.33-M90/ANSI/BHMA A156.17-1987, Self-closing Hinges and Pivots.
  .15 CAN/CGSB 69.34-93/ANSI/BHMA A156.18-1987, Materials and Finishes.
  .16 CAN/CGSB 69.35-M89/ANSI/BHMA A156.19-1984, Power Assist and Low Energy Power Operated Doors.
.5 Accessibility for Ontarians with Disabilities Act (AODA)

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 data sheets.

.3 Samples:
  .1 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.
  .2 After approval samples will be returned for incorporation in the Work.

.4 Hardware List:

.1 Submit contract hardware list.
.2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.

.5 Manufacturer's Instructions:
.1 Submit manufacturer's installation instructions.

.6 Closeout Submittals
.1 Provide operation and maintenance data for door hardware for incorporation into Operations and Maintenance manuals specified in Section 01 78 00 - Closeout Submittals.

1.5 Quality Assurance

.1 Regulatory Requirements:
.1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.
.2 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.

.2 Pre-installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

.3 Package each item of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.4 Receive the delivery of the Finishing Hardware and identify all items against the Finishing Hardware Schedule. Ensure each hardware item is accompanied by the correct template, installation instructions, special tools, fastening devices and other loose items. Advise the finish hardware supplier and Consultant in writing of errors or omissions.

.5 Storage and Protection: Store finishing hardware in locked, clean and dry area.

.6 Remove all hardware from doors and frames prior to painting. After painting is complete and dry, reinstall all hardware to manufacturer’s recommendations.

1.7 Waste Management and Disposal

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

1.8 Maintenance

.1 Provide maintenance materials in accordance with Section 01 78 00 – Closeout Submittals.

1.9 Warranty

.1 Warranty all hardware for a period of one (1) year except for door closers which shall be warranted for ten (10) years from the date of Substantial Performance from defects in materials, workmanship and improper installation.

PART 2 PRODUCTS

2.1 Materials

.1 All hardware shall be supplied as specified in the Finishing Hardware Schedule supplied by the Owner and attached to this specification.

.2 All finishes shall be as indicated in the Finishing Hardware Schedule by international codes.

.3 All door handles shall be lever type meeting requirements of the Ontario Building Code.

.2 Power Door Operators and controls shall be CSA approved and shall meet the requirements of the Ontario Building Code and the Accessibility for Ontarians with Disabilities Act (AODA).

.3 Automatic door operators for interior doors are included in the hardware schedule where noted. All other electric door operators not specified in the hardware schedule are specified under section 08 71 13 – Automatic Door Operators.

2.2 Fastenings

.1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.

.2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.3 Exposed fastening devices to match finish of hardware.

.4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.

.5 Use fasteners compatible with material through which they pass.

2.3 Keying

.1 New buildings locksets must be by one manufacturer and the master key system documentation must be supplied as part of the Operations and Maintenance manual specified in Section 01 78 00.

.2 Keying shall be to Owners Master Key system.

.3 Provide construction cores which will be removed at Substantial Performance.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

.2 Furnish metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

.3 Furnish manufacturers' instructions for proper installation of each hardware component.

3.2 Examination

.1 Before installing any hardware, carefully check all architectural drawings of the work requiring hardware, verify door swings, door and frame materials and operating conditions, and assure that all hardware will fit the work to which it is to be attached.

.2 Check all shop drawings and frame and door lists affecting hardware type and installation, and certify to the correctness thereof, or advise the hardware supplier and Consultant in writing of required revisions.

3.3 Templates

.1 Check the hardware schedule, drawings and specifications, and furnish promptly to the applicable trades any patterns, templates, template information and manufacturer's literature required for the proper preparation for and application of hardware, in ample time to facilitate the progress of the work.

3.4 Installation

.1 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers' Association.

.2 Installation of hardware shall be in accordance with ANSI A115.1G, manufacturer's templates and instructions.

.3 Coordinate installation of electric door strikes, keypad locks and door operators with Electrical contractor.

.4 All hardware shall be installed by carpenters, skilled in the application of architectural hardware and satisfactory to the hardware supplier. Refer to Section 06 20 00 - Finish Carpentry. Instruction sheets, details and templates shall be read and understood before installation.

.5 Install all materials as listed in the Finishing Hardware Schedule on the doors and frames listed. Interchanging of hardware will not be allowed.

.6 Use only manufacturer's supplied fasteners. Failure to comply may void manufacturer's warranties and applicable licensed labels. Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

.7 Where door stop contacts door pulls, mount stop to strike bottom of pull.

.8 Remove construction cores when directed by Owner's Representative.

.9 After installation, templates, installation instructions and details shall be put in a file and turned over to the Owner, when building is Substantially Performed.

3.5 Adjusting

.1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.

.2 Lubricate hardware, operating equipment and other moving parts.

.3 Adjust door hardware to provide tight fit at contact points with frames.

3.6 Inspection

.1 After installation of all hardware and before building is accepted, inspect the installation of all hardware and certify in writing to the Consultant that the hardware is properly installed and supplied in accordance with the manufacturer's recommendations, and finishing hardware schedule.

3.7 Demonstration

.1 Maintenance Staff Briefing:
  .1 Brief maintenance staff regarding:
    .1 Proper care, cleaning, and general maintenance of projects complete hardware.
    .2 Description, use, handling, and storage of keys.
    .3 Use, application and storage of wrenches.
  .2 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.8 Cleaning

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

.2 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.

.4 Remove protective material from hardware items where present.

.5 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 06 40 00 Architectural Woodwork
.2 Section 07 92 00 Joint Sealants
.3 Section 08 11 00 Metal Doors and Frames
.4 Section 08 44 13 Glazed Aluminum Curtain walls
.5 Section 08 50 00 Aluminum Doors, Windows and Screens
.6 Section 10 28 10 Toilet and Bath Accessories

1.3 References

.1 American National Standards Institute (ANSI).
  .1 ANSI/ASTM E330-02, Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
  .2 ANSI Z97.1 - American National Standard for Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
.2 ASTM International (ASTM).
  .1 ASTM C162-05 (2010), Standard Terminology of Glass and Glass Products.
  .2 ASTM C 542-94 (1999), Specification for Lock-Strip Gaskets.
  .3 ASTM C1503-08(2013) Standard Specification for Silvered Flat Glass Mirror
  .4 ASTM D 790-02, Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
  .5 ASTM D 1003-00, Test Method for Haze and Luminous Transmittance of Plastics.
  .6 ASTM C1048- 12e1, Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
  .7 ASTM D 1929-96(R2001), Test Method for Determining Ignition Temperature of Plastics.
  .8 ASTM D 2240-02b, Test Method for Rubber Property - Durometer Hardness.
  .9 ASTM E 84-01, Test Method for Surface Burning Characteristics of Building Materials.
  .10 ASTM E1300-12 ae1, Standard Practice for Determining Load Resistance of Glass in Buildings
.3 Canadian General Standards Board (CGSB).
  .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
  .2 CAN/CGSB-12.2-M91, Flat, Clear Sheet Glass.
  .3 CAN/CGSB-12.3-M91, Flat, Clear Float Glass.
  .4 CAN/CGSB-12.8-97, Insulating Glass Units.
  .5 CAN/CGSB-12.9-M91, Spandrel Glass.
  .6 CAN/CGSB-12.11-M90, Wired Safety Glass.
  .7 CAN/CGSB-12.5, Mirror Glass
.4 Canadian Standards Association (CSA International).
  .1 CSA A440-11, NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights, Includes Update No. 1 (2014)
  .2 CSA A440.2-14/A440.3-14 Fenestration Energy Performance/User Guide to CSA A440.2-14, Fenestration Energy Performance
  .3 CSA Certification Program for Windows and Doors 2000.
.5 Consumer Product Safety Commission
  .1 CPSC 16 CFR 1201, - Safety Standard for Architectural Glazing Materials.
.6 Environmental Choice Program (ECP).
  .1 CCD-045-95, Sealants and Caulking.
.7 Flat Glass Manufacturers Association (FGMA).
  .1 FGMA Glazing Manual - 1997.

.8 Laminators Safety Glass Association (LSGA).
.1 LSGA Laminated Glass Design Guide 2000.
.9 Glass Association of North America (GANA)
.1 GANA Glazing Manual
.2 GANA Sealant Manual
.3 GANA Laminated Glass Design Guide.
.10 National Fire Protection Association (NFPA)
.1 NFPA 80 Fire Doors and Windows
.2 NFPA 252 Fire Tests of Door Assemblies
.3 NFPA 257 Fire Tests of Window Assemblies
.11 Underwriters Laboratories of Canada (ULC)
.1 ULC CAN4-S104 - Fire Tests of Door Assemblies
.2 ULC CAN4-S106 - Fire Tests of Window Assemblies
.12 South Coast Air Quality Management District, California State (SCAQMD)
.1 SCAQMD Rule 1168-03, Adhesives and Sealants Applications.

1.4 Submittals

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

.2 Product Data: Submit manufacturer's printed product literature, specifications and data sheets.

.3 Samples: Submit duplicate 300 x 300 mm size samples of glass and sealant material.

.4 Manufacturer's Instructions: Submit manufacturer's installation instructions.

.5 Closeout Submittals: Provide maintenance data including cleaning instructions for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 Quality Assurance

.1 Perform work in accordance with FGMA Glazing Manual and Laminators Safety Glass Association Standards Manual for glazing installation methods.

.2 Installer: Company specializing in the installation of structural glazing with five (5) years proven experience and approved by the manufacturer for installation of their products.

.3 Safety glass products shall comply with the testing requirements of CAN/CGSB-12.1-M, Type 1 for Laminated Glass and Type 2 for Tempered Glass.

.4 Comply with published recommendations of glass product manufacturers and organizations below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this section or referenced standards.
.1 GANA Publications
.2 AAMA Publications
.3 IGMA/IGMAC Publications

.5 Provide safety glass permanently marked with the company name or logo and CAN/CGSB-12.1-M if the product meets categories 1 and 2, or mark as CAN/CGSB 12.1-M-1 if the product meets the requirements of Category 1 only.

.6 Insulating Glass products are to be permanently marked either on spacers or at least one insulating unit component with appropriate certification label of the Insulating Glass Manufacturers Alliance (IGMA) or Insulating Glass Manufacturers Association of Canada (IGMAC)

.7 Single-source fabrication responsibility: All glass fabricated for each type shall be processed and supplied by a single fabricator.

.8 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.9 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 System Description

.1 Performance Requirements: Provide continuity of building enclosure vapour and air barrier using glass and glazing materials as follows:
.1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.

1.7 Design Requirements

.1 Design glass, glazing channels, connections, attachments and glazing accessories to withstand loads designated by the Ontario Building Code and to accommodate all building deflections.

.2 Size glass to withstand wind loads, dead loads and positive and negative live loads acting normal to plane of glass to a design pressure of 1.2 kPa as measured in accordance with ANSI/ASTM E330.

.3 Limit glass deflection to 1/200 with full recovery of glazing materials.

.4 Glass thicknesses indicated are minimum and are for detailing only. Confirm glass thickness by analyzing project conditions, including in-service conditions and loads. Provide glass lites for various size openings in nominal thicknesses indicated but not less than required to meet performance requirements of referenced standards. Coordinate glass thicknesses with manufacturers of framing systems.

.5 Fire- and safety-rated glass-ceramic, clear and wireless, with a surface-applied film, for use in door lights, transoms or sidelights and windows with fire rating requirements from 20 minutes to 90 minutes (180 minutes in doors) with hose stream test in impact safety-rated locations.

1.8 Environmental Requirements

.1 Install glazing when ambient temperature is 10°C minimum. Maintain ventilated environment for 24 hours after application.

.2 Maintain minimum ambient temperature before, during and for 24 hours after installation of glazing compounds.

1.9 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

.3 Provide glass units with interleaving protection between lites. Keep glass and interleaving dry and store cases in clean, cool, dry areas with temperatures above the dew point. Circulation of cool, dry air in storage areas is essential. Open cases and inspect units periodically for moisture accumulation.

.4 Do not store glass in direct sunlight without an opaque protective covering over same.

1.10 Waste Management and Disposal

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

1.11 Warranty

.1 Warrant insulating glass units for 10 years from date of Substantial Performance against seal failure, interpane dusting, or interpane misting.

.2 Warrant low-emissivity coatings when applied to the second or third surfaces of an insulating glass unit, for ten years against peeling or coating deterioration due to product failure.

.3 Laminated glass shall be warranted for a period of ten (10) years from date Substantial Performance to be free from delamination and discoloration

.4 Glazing sealants shall be warranted for a period of ten (10) years per sealant manufacturer's standard warranty of merchantable quality.

PART 2 PRODUCTS

2.1 Materials-Flat Glass

.1 Float glass: to CAN/CGSB-12.3, glazing quality, 6 mm thick minimum.

.2 Sheet glass: to CAN/CGSB-12.2, selected, 6 mm thick minimum.

.3 Laminated Glass: laminated glass to CAN/CGSB-12.1-M with 0.060 mm polyvinyl butyral (PVB) interlayer between two 3.0 mm layers of heat strengthened glass. Conforming to Laminators Safety Glass Association Standards Manual.

.4 Tempered Safety Glass: To CAN/CGSB-12.1-M, transparent, 10 mm thick unless indicated otherwise.
.1 Type 2-tempered.
.2 Class B-float.
.3 Category 1 11.
.4 Edge treatment: ground, bevel edge.

.5 Wired Glass (GWG): To CAN/CGSB-12.11-M, 6 mm thick minimum, polished both sides, square wire mesh style.

.6 Fire-Rated Glass to be Pyran Platinum F, ceramic with factory-applied impact-safety film, to CAN/ULC S-106 and ANZI-Z.97 Category II for impact-safety. ULC Listing # R22036. Rating required: 45 minutes. Canadian distributor: Glassopolis, div of TecniGlas ph: 416 446 6411.
.1 Thickness: 5mm
.2 Film: surface-applied safety film
.3 Weight: 2.5 lbs/ft^2.
.4 Clear; No amber tint
.5 Visible light transmission: approximately 80% according to test standard DIN EN 410
.6 Fire-rating: Up to 90 minutes (up to 180 minutes in doors) with hose stream test
.7 Impact safety rating: ANSI Z97.1 (Class A) and CPSC 16CFR1201 (Cat. I and II).
.8 Manufactured by a special float process resulting in smooth surface finish
.9 Environmentally friendly glass-ceramic contains no hazardous heavy metals such as Antimony or Arsenic.
.10 Fire Rating: Fire rating tested and listed by UL for fire rating scheduled at opening locations

tested in accordance with NFPA 252, NFPA 257, ULC CAN4-S104 and ULC CAN4-S106.

.11 After cutting, each lite of fire rated glass ceramic shall be permanently labeled according to local building code requirements with product and manufacturer's name, UL certification mark and fire rating.

2.2 Insulating Glass Units

.1 Insulating Glass Units: To CAN/CGSB-12.8-M, sealed units, not less than 25 mm thick or as required to meet code requirements. Minimum 13 mm air space.

.1 Exterior Units: Insulating Glass Type 1:
- .1 Overall Unit Thickness: 25 mm.
- .2 Outboard Lite: 6 mm clear with Solarban 67 low-e coating on second surface.
- .3 13 mm air space, argon filled.
- .4 Inboard Lite: 6mm clear tempered.
- .5 Performance: All performance data shall be calculated according to ASHRAE standard procedures and verified using the LBL "Window 4.1" program:
  - .1 Winter nighttime U value: 0.24
  - .2 Summer Daytime U value: 0.22
  - .3 Shading Coefficient: 0.33
  - .4 Solar Heat Gain Coefficient: 0.29
  - .5 Relative Heat Gain: 68.7
  - .6 LSG: 1.86
  - .7 Visible Light transmittance: 54%
  - .8 Ultraviolet transmittance: 11%
- .6 Product: PPG 6mm Solarban 67 (2) on Clear + 12.7 mm Argon + 6mm Clear

2.3 Spandrel Glass

.1 Spandrel Glass: to CAN/CGSB-12.9, 8 mm thick.
- .1 Type 2 Heat strengthened.
- .2 Class A-Float.
- .3 Style 1 Opacifying coating on the No. 2 (inboard) surface.
- .4 Form M-Monolithic.
- .5 Colour to be selected by the Consultant from full range of manufacturer's standards. Up to two (2) colours will be selected.

2.4 Glazing Products

.1 Select appropriate glazing sealants, tapes, gaskets and other glazing materials of proven compatibility with other materials that they contact. These include glass products, insulating glass unit seals and glazing channel substrates under installation and service conditions, as demonstrated by testing and field experience.

.2 Setting blocks: Neoprene 80-90 Shore A durometer hardness to ASTM D 2240, to suit glazing method, glass light weight and area.

.3 Spacer shims: Neoprene 50-60 Shore A durometer hardness to ASTM D 2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self-adhesive on one face.

.4 Glazing tape:
- .1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D 2240; coiled on release paper; black colour.
- .2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides,

maximum water absorption by volume 2%, designed for compression of 25%, to effect an air and vapour seal.

.5 Glazing splines: resilient polyvinyl chloride, extruded shape to suit glazing channel retaining slot, colour as selected.

.6 Lock-strip gaskets: to ASTM C 542.

.7 Sealant: as specified in Section 07 92 00 – Joint Sealants. Low VOC.

.8 Sliding Glass Hardware for Display Cases: as specified in Section 06 40 00 – Architectural Woodwork.

.9 Sliding Glass Hardware for Pressed Steel Screens: Knape and Vogt Canada Ltd. Roll-Ezy ball bearing aluminum track assembly #P992 and #962KA-440-CH adjustable lock with satin nickel finish, complete with duplicate keys.

.10 Glazing accessories for fire rated glass shall be as recommended by the glass manufacturer.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Examination

.1 Verify that openings for glazing are correctly sized and within tolerance.

.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.3 Preparation

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.4 Installation: Exterior Dry Method- Preformed Glazing

.1 Perform work in accordance with FGMA Glazing Manual IGMAC and Laminators Safety Glass Association - Standards Manual for glazing installation methods.

.2 Cut glazing tape to length; install on glazing light. Seal corners by butting tape and sealing junctions with sealant.

.3 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.

.4 Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

.5 Install removable stops without displacing glazing tape. Exert pressure for full continuous contact.

.6 Trim protruding tape edge.

3.5 Installation: Exterior Wet/Dry Method (Preformed Tape and Sealant)

.1 Perform work in accordance with FGMA Glazing Manual IGMAC and Laminators Safety Glass Association - Standards Manual for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, 6 mm below sight line. Seal corners by butting tape and dabbing with sealant.

.3 Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapour seal.

.4 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.

.5 Rest glazing on setting blocks and push against tape and heel head of sealant with sufficient pressure to attain full contact at perimeter of light or glass unit.

.6 Install removable stops with spacer strips inserted between glazing and applied stops 6 mm below sight line.

.7 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.

.8 Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.6 Installation: Interior - Dry Method

.1 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.

.2 Apply cap bead of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

.3 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.

.4 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.

.5 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.

.6 Place glazing tape on free perimeter of glazing.

.7 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

.8 Knife trim protruding tape.

.9 Glaze hollow metal doors and pressed steel screens. Glass type as indicated.

.10 Install wired glass in fire rated doors and screens to meet requirements of NFPA 80.

3.7 Installation: Fire Rated Glass

.1 Fire rated glass shall only be installed into fire-rated frame and window assemblies carrying the same rating. Each piece of glass shall be carefully inspected before installation, and any pieces with visible edge or surface damage shall be removed from site. All glazing components and the stop height must be chosen according to the manufacturer's UL classification. The glass panel must be placed on calcium silicate or hardwood setting blocks and glazed using PYRAN Platinum F classified glazing tape, such as closed cell PVC, Fiberfrax tape or Pemko FG3000S90. The installation of the framed unit must comply with the frame supplier's instructions.

3.8 Mirrors

.1 Framed mirrors are specified in Section 10 28 10.

3.9 Display Cases

.1 Supply and install tempered glass doors and shelves at display cases. Glass doors to have finger pulls ground into leading edges. All exposed edges to be ground smooth.

.2 Coordinate work with Section 06 40 00 – Architectural Woodwork and field measure all glass prior to fabrication.

3.10 Sliding Glass Window

.1 Fabricate aluminum track assembly and install tempered glass to suit finished interior screens where indicated. Tempered glass to have finger pulls ground into leading edges. Adjust hardware and provide adjustable lock at each location.

3.11 Cleaning

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

.2 Perform cleaning to remove construction and accumulated environmental dirt.

.3 Remove traces of primer, caulking.

.4 Remove glazing materials from finish surfaces.

.5 Remove labels after work is complete.

.6 Clean glass using approved non-abrasive cleaner in accordance with manufacturer's instructions.

.7 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.12 Protection of Finished Work

.1 After installation, mark light with an "X" by using removable plastic tape.

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 22 16 Non-Structural Metal Framing
.3 Section 09 91 23 Interior Painting

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C1396 / C1396M - 14a Standard Specification for Gypsum Board
  .2 ASTM C475/C475M-12e1 Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
  .3 ASTM C514-04(2014) Standard Specification for Nails for the Application of Gypsum Board
  .4 ASTM C840-13 Standard Specification for Application and Finishing of Gypsum Board
  .5 ASTM C954-11 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
  .6 ASTM C1047-14a Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
  .7 ASTM C1177/C1177M-13 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
  .8 ASTM C1178/C1178M-13 Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel
.2 Canadian Standards Association (CSA)
  .1 CSA A82.31-M Gypsum Board Application.
  .2 CSA A82.27-M. Gypsum Board
.3 CAN/ULC-S102, Building Materials and Assemblies, Standard Method of Test for Surface Burning Characteristics of.
.4 Underwriters Laboratories of Canada (ULC)
  .1 ULC List of Equipment and Material, Volume III, Fire Resistance Ratings.

1.4 Submittals

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

.2 Submit WHMIS Material Data Safety Sheets (MSDS) for all products, prior to delivery of products to the site.

1.5 Quality Assurance

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

.3 Use all means necessary to 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 Environmental Requirements

.1 Maintain temperature minimum 10^{O}C, maximum 21^{O}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.

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 CSA A82.27-M and 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.

.3 Water and Moisture Resistant Board: to CSA A82.27 and C1396/C1396M, 12.7 mm thick, 1220 mm wide with tapered edges.

.4 Tile backer Board: to ASTM C1178, Coated Glass Mat Water-Resistant Gypsum Backing Panel, Georgia Pacific DensShield Fireguard. 15.9 mm thickness.

.5 Exterior Gypsum Sheathing: to ASTM C1177, 12.7 mm thick, 1219 mm wide x 2440 mm long, square edge with water repellant glass mat facings.
  .1 CGC Securock
  .2 Georgia Pacific DensGlass
  .3 Certainteed GlasRoc

2.2 Fastening and Adhesives

.1 Drywall Screws: To CSA A82.31-M, and ASTM C 1002, self-drilling, self-tapping, case hardened, length to suit board thickness and provide minimum 12 mm penetration into support.

.2 Sheathing Screws: Pan head Buildex S-12 climaseal polymer coated, corrosion resistant self-tapping sheet metal screws minimum 32 mm long.

.3 Joint Tape: 50 mm perforated with preformed seam, mould and mildew resistant.

.4 Joint Compound: To CSA A82.31-M, asbestos-free.

.5 Joint Filler and Topping: Casein, vinyl or latex base, slow setting.

.6 Joint treatment for Gypsum Sheathing: 50 mm wide, 10 x 10 woven threads per inch, self-adhering fibreglass joint tape and Borden HPPG Elmer's Siliconized Acrylic Latex Caulk.

.7 Laminating Compound: To CSA A82.31-M, asbestos-free.

2.3 Acoustic Insulation

.1 Acoustic Insulation: Mineral or Glass Fibre Acoustic Insulation:
  .1 Mineral Fibre Acoustic Insulation: To ASTM C 665, Mineral fibre blanket insulation, minimum density of 40 kg/m2:
    .1 AFB Acoustical Fire Batts manufactured by Roxul Inc.
  .2 Glass Fibre Acoustic Blanket Insulation: To CAN/ULC-S702, type 1, pre-formed unfaced glass fibre batt acoustic insulation.
    .1 QUIETZONE Acoustic Blanket insulation manufactured by Owens Corning Canada.

  .3 STC contribution and fire resistance (hr): Refer to NBC 1995, tables A-9.10.3.1-A/-B and Product Data Sheet for various assemblies contributing to acoustic performance and fire resistance.

  .4 Surface burning characteristics to CAN/ULC-S102:
    .1 flame spread: 15
    .2 smoke developed: 5
    .3 Smoulder resistance: to ULC S-129.
    .4 Non-combustible: to CAN4-S114.

  .5 Thickness to suit depth of wall framing and as indicated.

.2 Acoustic sealant: To ASTM E-814 and ASTM E-1966, with STC performance rating of 55 to ASTM E 90-99.

2.4 Accessories

.1 Casing Beads, Corner Beads and Edge Trim: To ASTM C 1047, 0.5 mm gauge base thickness commercial grade sheet steel with G90 zinc finish to ASTM A525-80A; perforated flanges; one piece length per location.
.2 Insulating Strip: Rubberized, moisture resistant, 3.0 mm thick, 12 mm wide closed cell neoprene strip, with self-sticking permanent adhesive on one face; lengths as required.

PART 3 EXECUTION

3.1 General

.1 Prior to installation of gypsum wallboard, ensure that all required vapour barriers, air seals, gaskets and the like installed under another Section have been inspected and accepted by Municipal

authorities and the Consultant. Failure to do so will result in removal of all gypsum board installed prior to approval and replacement, at no additional cost to the Owner.

3.2 Acoustic insulation

.1 Install acoustic blankets full width and length, with tight joints, between wall framing and around penetrating electrical service boxes, piping, air ducts and frames.

.2 Place acoustic blankets where indicated on the Drawings and to thickness required to obtain acoustic performance indicated for the assembly.

.3 Place acoustic blankets between studs ensuring friction fit, free of sags, folds or open joints that may let sound pass through.

.4 Install blankets from the bottom up, tightly adjusted and trim accurately with a utility knife.

3.3 Gypsum Board Application

.1 Do application and finishing of gypsum board in accordance with ASTM C 840 except where specified otherwise.

.2 Do not apply gypsum board until bucks, anchors, blocking, electrical, and mechanical work are approved.

.3 Do not apply gypsum board to ceilings until insulation, vapour retarder and air seals have been installed and inspected by others, including consultant, owner and municipal building inspectors.

.4 Apply gypsum board at right angles to framing members or furring using screw fasteners. Maximum spacing of screws 300 mm o.c.

.5 Install fibre gypsum abuse resistant panels at all ceilings and bulkheads except as noted below. Treat joints with fibreglass reinforced joint tape in accordance with manufacturer’s instructions.

.6 Apply water resistant gypsum wallboard where indicated. Apply water resistant sealant to edges, ends and cut outs which expose gypsum core.

.7 Apply tile backer board where indicated and in accordance with manufacturer’s instructions.

3.4 Gypsum Sheathing

.1 Install exterior gypsum sheathing horizontally on all exterior walls where indicated. Stagger joints between adjacent sheets.

.2 Screw-attach gypsum sheathing to each stud with 32 mm self-drilling corrosion resistant sheathing screws spaced 10 mm from ends and edges 200 mm o.c. Drive fasteners to bear tight against and flush with surface of sheathing. Do not countersink. Apply sealant around sheathing perimeter at interface with other materials and install flashing as indicated on the drawings.

.3 Apply fibreglass joint treatment to all joints, overlapping at intersections by the width of the tape. Apply 10 mm bead of sealant along the joint and embed the sealant into the entire surface of the tape with a trowel. Apply enough sealant to each exposed fastener to cover completely when trowelled smooth.

3.5 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.

3.6 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.

3.7 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.

.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.

3.8 Cleaning

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

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 09 21 16 Gypsum Board

1.3 References

.1 ASTM International (ASTM).
  .1 ASTM A 653 M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  .2 ASTM C645-00, Specification for Nonstructural Steel Framing Members.
  .3 ASTM C754-00, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
.2 Canadian General Services Board (CGSB).
  .1 CAN/CGSB-1.40-97, Primer, Structural Steel, Oil Alkyd Type.
.3 Underwriters Laboratories of Canada (ULC)
  .1 ULC List of Equipment and Material, Volume III, Fire Resistance Ratings.
.4 CSSBI Lightweight Steel Framing Manual

1.4 Submittals

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

.2 Submit WHMIS Material Data Safety Sheets (MSDS) for all products, prior to delivery of products to the site.

1.5 Quality Assurance

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

1.7 Waste Management and Disposal

.1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.
.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility.

PART 2 PRODUCTS

2.1 Metal Stud Framing Systems

.1 Non-load bearing channel stud framing: to ASTM C645, stud size as indicated, roll formed from 0.53 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board. Knock-out service holes at 460 mm centres.
.1 Gauge of materials to conform to referenced standards unless noted otherwise.

.2 Floor and ceiling tracks: to ASTM C645, in widths to suit stud sizes, 32 mm flange height.

.3 Metal channel stiffener: 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.

.4 Tie Wire: 0.90 mm, galvanized, soft annealed, steel wire or clip as recommended by the manufacturer of furring channels.

.5 Wind bearing light weight steel stud framing for exterior wall applications is specified in Section 05 41 00.

2.2 Metal Furring and Suspension Systems

.1 Metal Furring Runners, Hangers, Tie Wires, Inserts, Anchors: To CSA A82.30-M, electro-zinc coated steel.

.2 Runner Channels: 38 x 19 x 0.59 mm and 38 x 9.5 x 0.45 mm, hot dip or electro-galvanized sheet steel. Use of various sizes governed by applied loads and applicable spans.

.3 Drywall Furring Channel: Channel shaped furring member for screw attachment of drywall with knurled face. For interior use. Furring masonry or concrete surfaces. Cross furring under steel joist or suspended metal channels in suspended ceiling systems: 70 x 22 x 0.9 mm with knurled face, hot dip or electro-galvanized sheet steel. Bailey D-1001.

.4 Hangers: minimum 4.1 mm diameter (or as required by ULC fire rating design requirements) mild steel rods.

2.3 Fasteners

.1 Powder activated fasteners: to suit structural conditions and fastening requirements and in accordance with manufacturer’s recommendations: Ramset; Hilti; or approved equivalent.

.2 Sheet Metal Screws: To CSA A82.31-M, and ASTM C1002, self-drilling, self-tapping, case hardened, length to suit board thickness and provide minimum 12 mm penetration into support.

2.4 Accessories

.1 Acoustic sealant: To ASTM E814 and ASTM E1966, with STC performance rating of 55 to ASTM E90-99.

.2 Insulating strip: rubberized, moisture resistant 3 mm thick foam strip, 12 mm wide, with self-sticking adhesive on one face, lengths as required.

.3 Zinc Rich Paint: to CGSB 1-GP-181M. Low VOC type meeting requirements of SCAQMD Rule 1113-96.

PART 3 EXECUTION

3.1 Erection

.1 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum.

.2 Install damp proof course under stud shoe tracks of partitions on slabs on grade.

.3 Place studs vertically at 400 mm on centre unless noted otherwise and not more than 50 mm from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.

.4 Erect metal studding to tolerance of 1:1000.

.5 Attach studs to bottom and ceiling track using screws.

.6 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.7 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.

.8 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.

.9 Install heavy gauge single jamb studs at openings.

.10 Erect track at head of door/window openings and sills of window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.

.11 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

.12 Provide 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.

.13 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.14 Extend partitions to minimum 200 mm above ceiling height except where noted otherwise on drawings.

.15 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use 50 mm leg ceiling tracks.

.16 Install continuous insulating strips to isolate studs from un-insulated surfaces.

.17 Install two continuous beads of acoustical sealant under studs and tracks around perimeter of sound control partitions.

3.2 Wall Furring

.1 Install wall furring for gypsum board wall finishes in accordance with CSA A82.31-M, except where specified otherwise and shown on drawings.

.2 Frame openings and around built-in equipment, cabinets, access panels, etc., on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.3 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

3.3 Suspended and Furred Ceilings and Bulkheads

.1 Erect hanger and runner channels for suspended gypsum board ceilings in accordance with CSA A82.31-M except where specified otherwise and indicated on drawings.

.2 Securely anchor hanger to structural supports 1220 mm o.c. maximum along runner channels and not more than 150 mm from ends. Under no circumstances shall hanger wires be secured to or supported from mechanical or electrical materials or equipment or penetrate mechanical ductwork.

.3 Space runner or furring channels as shown on drawings and not more than 610 mm o.c. maximum nor 150 mm from walls. Run channels in long direction of board. Bend hanger sharply under bottom flange of runner and securely wire in place with a saddle tie. Provide channels below mechanical or electrical equipment and mechanical ductwork to maintain maximum spacing.

.4 Install furring channels transversely across runner channels in short direction of wallboard at 610 mm o.c. maximum or 150 mm from walls and interruptions in ceiling continuity. Secure channels to support with furring clips or wire. Where splicing is necessary lap minimum 200 mm and wire tie each end with double loops of 0.90 mm gauge galvanized tie wire, 25 mm from each end of overlap.

.5 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 610 mm around perimeter of fixture. Coordinate with Electrical.

.6 Install work level to tolerance of 1:1200.

.7 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles, etc.

.8 Install furring channels parallel to, and at exact locations of steel stud partition header track.

.9 Furr for gypsum board faced vertical bulkheads within or at termination of ceilings.

3.4 Gypsum Board

.1 Installation of gypsum board is specified in Section 09 21 16

3.5 Cleaning

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

.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 03 30 00 Cast-in-Place Concrete
.2 Section 04 20 00 Concrete Unit Masonry
.3 Section 07 92 00 Joint Sealants
.4 Section 09 65 19 Resilient Flooring
.5 Section 09 91 23 Interior Painting

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C207-06(2011) Standard Specification for Hydrated Lime for Masonry Purposes
.2 American National Standards Institute (ANSI)
  .1 ANSI A118.1 Specifications for Dry-Set Portland Cement Mortar (Included in ANSI A108.1)
  .2 ANSI A137.1-2012 American National Standard Specifications for Ceramic Tile - Version 2013.1
.3 Canadian General Services Board (CGSB)
  .1 CAN/CGSB-51.34-M86 Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
  .2 CGSB 71 GP 22M Adhesive, Organic, for Installation of Ceramic Wall Tile
  .3 CAN/CGSB-75.1M, Tile, Ceramic
  .4 CAN/CSA A5-93, Portland Cement
.4 Terrazzo, Tile and Marble Association of Canada (TTMAC)

1.4 Submittals

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

.2 Submit duplicate samples of tile to the Consultant for approval. Samples to be submitted on 300 x 600 mm sample board for each colour, texture, size and pattern of tile. Grout sample joints for representative sample of final installation.

.3 Trim and Stair Accessories: submit duplicate samples of each trim.

.4 Shop drawings: submit tiling plans giving all details of special fittings. Show joint layout including expansion and control joints.

.5 Maintenance Data: Provide maintenance data for tile work, for incorporation into Maintenance Manuals specified under Section 01 78 00.

1.5 Quality Assurance

.1 Do tile work in accordance with Installation Manual 200, Ceramic Tile, by Terrazzo, Tile and Marble Association of Canada (TTMA), except where this specification is more stringent.

.2 For the actual installation of ceramic wall and floor tile, use only skilled tradesmen who are familiar with the referenced standards and with the requirements for this Work.

.3 The setting material manufacturer's representative shall review the details with the Contractor prior to the start of work. Instruct the Contractor on the proper installation procedures to ensure compliance with the guarantee requirements.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Deliver packaged materials in original unopened containers.

.3 Keep delivered material dry and free from stains. Store cementitious material off damp surfaces.

.4 Use all means necessary to protect floor and wall tile materials, before, during and after installation and to protect the installed work and materials of all other trades.

.5 In the event of damage, immediately make all repairs and replacements necessary to the approval of the Consultant and at no additional cost to the Owner.

.6 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.7 Environmental Conditions

.1 Maintain air temperature and structural base temperature at ceramic tile installation area above 12^{O}C for 48 hours before, during and after installation.

1.8 Qualifications

.1 Installer of ceramic tiles shall have a minimum of 10 years of experience including at least five projects of similar scope and scale. Submit documented proof of experience prior to commencing work of this Section.

1.9 Scheduling

.1 Arrange for production and shipment of the tile in sufficient time to avoid delays. Substitutions will not be considered due to last minute unavailability of the tile. Any extra costs incurred to ensure the timely delivery of the tile will be at the Contractors expense.

1.10 Waste Management and Disposal

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

1.11 Warranty

.1 Provide setting materials manufacturer's 5 year materials and labour guarantee against break down or deterioration of the waterproof membrane and setting materials.

PART 2 PRODUCTS

2.1 Materials

.1 Materials shall be graded and containers grade sealed, delivered to the job site in their original packages or containers with the manufacturer's labels and seals intact.

.2 Tile and grout colour shall be selected by the Consultant from the manufacturer's standard range of colours.

.3 Tile shall conform to CAN/CGSB-75.1 and ANSI A137.1-2012.

.4 Floor tile shall have coefficient of slip resistance conforming to ANSI A137.1-2012.

.5 Provide coves, corners, reveals, surf caps, inners and outers as required to complete the work.

2.2 Ceramic Tile

.1 CT-1: Ceramic Wall Tile: Olympia Tile, Colour & Dimension Collection, bright glazed, 100 x 400 mm up to four (4) colours will be selected (80% field colour, 20% Accent colours).

2.3 Mortar, Grout, Additives and Adhesives

.1 The products of one manufacturer shall be used throughout the project to ensure compatibility of materials. Manufacturers of commercial mortar, grout and adhesive having product considered acceptable for use:
- .1 Laticrete
- .2 Mapei
- .3 Flextile

.2 Water: Fresh, clean, potable, free from deleterious matter, acids or alkalis.

.3 Floors: (thinset) T.T.M.A. Detail #317 SP-2000 “A”.
- .1 Thinset mortar: Laticrete 4237 latex additive plus 211 Crete filler powder or Mapei Kerabond mixed with Keralastic high performance latex admixture or Flextile 52 thin set.
- .2 Levelling Compound (if required): Laticrete 3701 latex or 226 Mapecem mortar mixed with Planicrete 50.
- .3 Grout: Laticrete Latapoxy SP100, solid epoxy grout or Mapei Kerapoxy. Colours to Consultant's selection.

.4 Walls:
- .1 Concrete and Concrete Block: T.T.M.A.C. Detail #303W-2000:
  - .1 Levelling Coat: Laticrete 3701 or Mapei Mapecem mixed with Planicrete 50.
  - .2 Thinset mortar: Laticrete 4237 latex additive plus 211 Crete filler powder or Mapei Kerabond mixed with Keralastic high performance latex admixture.
  - .3 Grout: Laticrete Latapoxy SP100 solid epoxy grout or Kerapoxy. Colours to Consultant's selection.

2.4 Patching and Levelling Compound

.1 Portland cement base, acrylic polymer compound, manufactured specifically for resurfacing and levelling concrete floors. Products containing gypsum are not acceptable.

.2 Have not less than the following physical properties:
- .1 Compressive strength - 25 MPa.
- .2 Tensile strength - 7 MPa.
- .3 Flexural strength - 7 MPa.
- .4 Density - 1.9.

.3 Capable of being applied in layers up to 50 mm thick, being brought to feather edge, and being trowelled to smooth finish.

.4 Ready for use in 48 hours after application.

2.5 Floor Sealer and Protective Coating

.1 To tile and grout manufacturer's recommendations.

2.6 Accessories

.1 Reducers, edge trim, and transition strips: Schluter Systems purpose made aluminum.

.2 Stair Nosing: Schluter TREP-B, Aluminum support with 52mm wide thermoplastic inserts. Thickness to suit tile thickness. Colours to be selected by the Consultant.

.3 CT Edge Protection: Schluter RONDEC, size to suit tile thickness. Satin anodized aluminum. Trim to come with all connectors or end caps required for a complete and finished installation. As a minimum, provide edge protection at the following locations:
.1 Top of porcelain ceramic tile base;
.2 Top of ceramic wall tile;
.3 All outside corners of wall tile or porcelain ceramic tile base.

.4 Transition Strip: (Porcelain ceramic tile to resilient flooring): Schluter RENO.V, satin anodized aluminum transition strips.

.5 Cleavage plane: polyethylene film to CAN/CGSB-51.34-M86.

.6 Sealant: as specified in Section 07 92 00.

PART 3 EXECUTION

3.1 Surface Conditions

.1 Surfaces on which wall and floor tile is to be applied, shall be thoroughly cleaned down.

.2 Concrete must be cured a minimum of 35 days before installation of ceramic tile.

.3 Drywall surfaces on which wall and floor tile is to be applied, shall be free from dust, excess plaster and shall be plain and true without any irregularities.

.4 Concrete floor slabs, concrete and masonry walls on which floor and wall tile are to be applied, shall be thoroughly cleaned down and all dust, efflorescence, dirt, etc. removed. Concrete and masonry wall surfaces to which wall tile is to be applied shall be levelled off as required with mortar adhesive to produce true flat surfaces.

.5 In the event of discrepancies, immediately notify the Consultant and do not proceed with installation in such areas until all such discrepancies have been fully resolved.

.6 Install transition strips, reducers and edge trim at exposed edges of all tiled walls and floors in accordance with manufacturer's instructions.

.7 Ensure that conditions are suitable to receive membrane and tile. Report any adverse conditions to the Consultant. Commencement of the work will indicate acceptance of the surfaces to receive the tile.

.8 Remove from the job site all damaged or broken items caused by improper handling or storage.

.9 Ensure that all materials are fresh before starting work by recommended tests on site to ensure proper, permanent bonds.

.10 Check that conditions of temperature, humidity, traffic and usage are suitable as required by Installation Manual specifications. Minimum temperature to be not less than 10^0C.

.11 Check that surfaces ready to receive tiling are cured, level and/or graded, plumb, smooth, firm, free from loose particles, droppings, projection, grease, solvent, paint and other foreign matter and from other unsuitable conditions.

3.2 Installation

.1 Expansion joints which are required for structural reasons must be continued to the same width in the bedding mortar and tile cladding. Clean out joint when dry and apply a pore sealed backfill material and fill with sealant. Refer to Section 07 92 00.

.2 Setting materials shall be installed in strict accordance with manufacturer's instructions.

.3 Fit tile around corners, fitments, fixtures, and other built-in objects to maintain uniform joint appearance. Utilize appropriate accessory tiles at corners and junctions. Cut edges smooth, even and free from chipping. Edges resulting from splitting not acceptable.

.4 Joints between tiles shall be uniform in width, plumb, straight, evenly spaced with adjacent tile flush and planeness in accordance with surface tolerance specified.

.5 Install tile on substrates as noted on drawings and specified herein utilizing specified setting materials in strict accordance with manufacturers written instructions. Follow T.T.M.A.C. guidelines for expansion and control joints.

.6 Locate and install control joints utilizing colour matched sealant at all corners and where recommended by substrate and tile manufacturers and where indicated on drawings and approved by the Consultant.

.7 Unless specifically noted otherwise, all tile wall base is to be constructed using special trim shapes such as mosaic coves and mosaic bull nose tiles as part of a tile mosaic cove base (with TMCB designation) and cove where continuous with wall tile (with–C designation). Use special inside and outside trim shapes for all edges and corners. Install pre-manufactured trim where indicated.

.8 Refer to room finish schedule for additional information.

.9 Unless specifically noted otherwise, in areas where ceramic tile is indicated, provide ceramic tile base. Base to be 100 mm high with additional cut tiles to allow for slope in floor.

.10 All materials to be installed as per manufacturer’s instructions.

.11 Seal ceramic tile prior to grouting with penetrating sealer when required or recommended by tile

manufacturer.

3.3 Grouting

.1 Grout all tile using specified grout in strict accordance with manufacturers written instructions all to give a flush, hard joint.

.2 Joints in tile floor and base shall be filled solid and flush with grout.

.3 Joints in wall tile shall be filled solid and flush with grout.

.4 Prepare joints and mix grout in accordance with manufacturer's printed instructions. Force maximum amount of grout into joints, avoiding air traps or voids.

.5 Remove all excess grout by washing diagonally across the joints. Check for voids, air pockets and gaps and fill same. Remove all discoloured grout and replace with new.

.6 Cure all joints.

3.4 Extra Stock

.1 Upon completion of the installation and as a condition of acceptance, deliver to the Owner 1% of tile and accessory tiles in each colour and pattern of ceramic tiles installed under this section for the Owners maintenance program. Identify each carton for location and installation date. Submission must be made all at one time and prior to Substantial Performance.

3.5 Cleaning

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

.2 On completion, check work and replace defective, upset or misaligned tile. Make good skips, voids or excess grouting to the Consultant's approval.

.3 Immediately following removal of grout from surface of ceramic tile, remove dust and wipe clean.

.4 Thoroughly clean and polish all exposed surfaces of ceramic wall tile.

.5 Leave tiles clean, free of any apparent cement or epoxy film. Any epoxy film shall be removed with epoxy film remover within 24 hours maximum from commencement of grouting. Ensure compatibility of epoxy film remover with grout materials.

.6 Protect tiling during the works and until completion of the work with recommended methods and materials.

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 Assemblies
.2 Section 09 53 00 Acoustical Suspension

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C 423-02a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
  .2 ASTM E 1264-98, Standard Classification for Acoustical Ceiling Products
  .3 ASTM E 1477-98a (2003), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
.2 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.
.3 Canadian Standards Association (CSA International)
  .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
.4 Underwriters Laboratories Of Canada (ULC)
  .1 CAN/ULC S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
.5 Department of Justice Canada (Jus)
  .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
.6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).
.7 Underwriters Laboratories of Canada (ULC)
  .1 CAN/ULC-S102-2003, Surface Burning Characteristics of Building Materials and Assemblies.

1.4 Submittals

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

.2 Submit duplicate 300 x 300 mm samples of each type of acoustical units.

1.5 Quality Assurance

.1 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 Environmental Requirements

.1 Permit wet work to dry before beginning to install.

.2 Maintain uniform minimum temperature of 15^{O} C and humidity of 20-40% before and during installation.

.3 Store materials in work area 48 hours prior to installation

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 on site stored or installed absorptive material from moisture damage.

1.8 Waste Management and Disposal

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

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan (WMP).

1.9 Extra Materials

.1 Provide extra materials of acoustic units in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide acoustical units amounting to 2% of gross ceiling area for each pattern and type required for project.

.3 Ensure extra materials are from same production run as installed materials.

.4 Deliver to Owner upon completion of the work of this section.

PART 2 PRODUCTS

2.1 Materials

.1 Acoustic units for suspended ceiling system: to CAN/CGSB-92.1-M89 and ASTM E 1264-98.

.2 Panel Type 1: General use. Classrooms, corridors, offices, etc.

.1 CGC Radar ClimaPlus #2410
.2 Class A
.3 Composition: Wet Formed Mineral Fiber with Durabrite acoustically transparent membrane and Acrylic Latex Paint Finish.
.4 Pattern: Fissured.
.5 Texture: Fine

.6 Flame spread: ASTM E1264-98, Class A (U.L.C.), 25 or less.
.7 Smoke developed 50 or less in accordance with CAN/ULC-S102-10.
.8 Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label, 0.55
.9 Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label, 35
.10 Light Reflectance (LR) range of 0.84 to ASTM E 1477-98a (2003).
.11 Dimensional Stability: Standard
.12 Edge Profile: Square Lay-In
.13 Colour: White.
.14 Size: 610 x 1219 x 16 mm thick.
.15 Shape flat.
.16 Surface treatment: Broad spectrum antimicrobial treatment on face & back.
Recycled Content: 28-44%.

.3 Alternate manufacturer: Products as manufactured by Armstrong Industries or Certainteed are acceptable, subject to Consultants approval of style, finish, performance characteristics and texture.

.4 Staples, nails and screws: to CSA B111 non-corrosive finish as recommended by acoustic unit manufacturer.

.5 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 Install acoustical panels and tiles in ceiling suspension system.

3.3 Application

.1 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.

.2 Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding

3.4 Interface with Other Work

.1 Co-ordinate with Section 09 53 00 - Acoustical Suspension.

.2 Co-ordinate ceiling work to accommodate components of other sections to be built into acoustical ceiling including mechanical and electrical work.

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 05 12 23 Structural Steel
.2 Section 09 21 16 Gypsum Board Assemblies
.3 Section 09 51 13 Acoustic Panel Ceilings
.4 Division 23 Mechanical
.5 Division 26 Electrical

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C635/C635M-07 Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay in Panel Ceilings
  .2 ASTM C636/C636M-08, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

1.4 Submittals

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

.2 Submit when requested, 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 Maximum deflection: 1/360th of span to ASTM C 635 deflection test.

1.6 Quality Assurance

.1 Where required, provide fire-resistance rated suspension system: certified by a Canadian Certification Organization accredited by Standards Council of Canada.

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.

1.8 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

.1 Components: All main beams and cross tees shall be commercial quality hot-dipped galvanized steel as per ASTM C635/C635M-07. Main beams and cross tees shall be double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.

.2 Face width: 23.8 mm

.3 Edge Moldings and Trim: Hemmed angle moulding to match main beams and cross tees.

.4 Structural Classification: Intermediate Duty System, ASTM C635/C635M-07.

.5 Colour: White and match the actual colour of the specified ceiling tile.

.6 Standard of Acceptance:
- .1 Armstrong Prelude XL
- .2 Donn DXT
- .3 Certainteed Classic Environmental Stab.

PART 3 EXECUTION

3.1 Manufacturer’s Instructions

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

3.2 Installation

.1 Installation: in accordance with ASTM C636/C636M-08 except where specified otherwise.

.2 Install suspension system to manufacturer's instructions and Certification Organizations tested design requirements.

.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 plumbing lines, conduit, or duct work.

.5 Install hangers spaced at maximum 1200 mm centres and within 150 mm from ends of main tees. Install hanger wires plumb and straight.

.6 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.

.7 Ensure suspension system is coordinated with location of related components.

.8 Install wall moulding to provide correct ceiling height.

.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 600 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

3.3 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 03 30 00 Cast-in-Place Concrete

1.3 References

.1 ASTM International (ASTM)
.2 ASTM F 1066, Specification for Vinyl Composition Floor Tile.
  .1 ASTM F 1344, Specification for Rubber Tile.
  .2 ASTM F710: Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
  .3 ASTM F1861 Standard Specification for Resilient Wall Base
.3 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-25.20, Surface Sealer for Floors.
  .2 CAN/CGSB-25.21, Detergent-Resistant Floor Polish.
.4 Underwriters Laboratories of Canada (ULC)
  .1 CAN/ULC-S102.2, Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.
.5 ADA Americans with Disabilities Act.
.6 South Coast Air Quality Management District (SCAQMD), California State
  .1 SCAQMD Rule 1168-03, Adhesives and Sealants Applications.

1.4 Submittals

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

.2 Submit duplicate samples of manufacturer’s full range of colours for specified products for selection of colours by the Consultant.

.3 Before any resilient flooring materials are delivered to the job site, submit to the Consultant, a complete list of all materials proposed to be furnished and installed under this portion of the Work, stating manufacturer's name and catalogue number for each item, and product samples in colours specified.

.4 Accompanying the materials list, submit two copies of the manufacturer's current recommended method of installation for each item.

.5 Provide maintenance data for resilient flooring for incorporation into Operation and Maintenance Manual 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 Use all means necessary to protect resilient flooring materials before, during and after installation and to protect the installed work and materials of all other trades.

.4 In the event of damage, immediately make all repairs and replacements necessary to the approval of the Consultant and at no additional cost to the Owner.

1.6 Extra Materials

.1 Provide extra stock materials of resilient flooring, base and adhesives in accordance with Section 01 78 00 – Closeout Submittals.

.2 Provide one carton of each colour, pattern and type flooring material required for this project for maintenance use.

.3 Provide one container of adhesive.

.4 Extra materials to be from same production run as installed materials.

.5 Clearly identify each container of floor tile and each container of adhesive.

1.7 Environmental Requirements

.1 Maintain air temperature and structural base temperature at floor installation area above 20° C for 48 hours before, during and after installation.

1.8 Waste Management and Disposal

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

1.9 Warranty

.1 Warranty period for resilient flooring shall be 10 years commencing on date of Substantial Performance.

PART 2 PRODUCTS

2.1 Materials

.1 Vinyl Composition Tile: to CSA A126.1 or ASTM F 1066, 305 x 305 x 3.0 mm thick, non-asbestos, Class 2 through pattern tile with static load of not less than 517 kPa and U.L.C. flame spread rating of 75 or less.
  .1 Armstrong: Standard Excelon, Imperial Texture, 51899 Cool White. Install with staggered joints.

.2 Resilient Base: 100 mm high thermoplastic rubber, not less than 3.0 mm gauge with preformed internal and external corners. Base at resilient tile shall have standard toe.
  .1 Johnsonite DuraCove DC Rubber Wall Base, colour: black to match existing.
  .2 Roppe Pinnacle Rubber Base.
  .3 Amtico Marathon.
  .4 Burke Mercer BurkeBase.

.3 Primers, Adhesives and Caulking: non-flammable, solvent free, waterproof, recommended by flooring manufacturer for specific material on applicable substrate, above, at or below grade.

.4 Sub-floor filler and leveler shall be white premixed latex compatible with flooring products and adhesive as recommended by flooring manufacturer for specific flooring types.

.5 Metal edge strips: aluminum extruded, smooth, mill finish with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.

.6 Transition strips, mouldings and adaptors shall be rubber or vinyl, manufactured by Johnsonite, Roppe or Burke Mercer with lip to extend under floor tile with tapered edge, colour matched to flooring.

.7 Sealer: to CAN/CGSB25.20, Type 2-water based, type recommended by flooring manufacturer.

.8 Wax: to CAN/CGSB-25.21, type recommended by flooring manufacturer.

.9 All colours and patterns shall be as selected by the Consultant from the complete range of manufacturer's colours and patterns.

.10 At Elevator cab, provide linoleum sheet flooring on ¾" fire rated plywood. Use Forbo Marmoleum, Real Series, Colour: 2629 Eiger. Install as per manufacturer's written instructions. Contact Phil Nolan at Forbo at 1-416-434-1317.

PART 3 EXECUTION

3.1 Surface Conditions

.1 Conform to requirements of ASTM F710.

.2 Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

.3 Confirm that resilient flooring may be installed in accordance with the original design and the manufacturer's recommendations.

.4 Ensure concrete floors are dry, by using test methods recommended by tile manufacturer. Concrete must be cured a minimum of 35 days prior to commencement of resilient flooring application.

.5 In the event of discrepancy, immediately notify the Consultant.

.6 Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 Sub Floor Treatment

.1 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

.2 Install sub floor to manufacturer's recommended standard limits and deviations.

.3 Remove all substance and materials affecting adhesive bond.

.4 Vacuum clean floors.

.5 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler is cured and dry.

.6 Prime or seal substrates to flooring and adhesive manufacturer’s instructions.

.7 Allow for excessive leveling of existing slabs.

3.3 Application

.1 Provide a high ventilation rate, with maximum outside air, during installation, and for 48 hours after installation. Whenever possible, ventilate directly to outside. Do not allow contaminated air to re-circulate through the building ventilation system.

.2 Install all resilient flooring in strict accordance with the manufacturer's printed instructions and recommendations.

.3 Do not lay floor coverings and base until all trades, except painter, have completed their work and just prior to completion of the building.

.4 Apply adhesive uniformly with recommended trowels, at coverage as recommended by the manufacturer. Do not spread more adhesive than can be covered before initial set takes place.

.5 Lay flooring with joints parallel to building lines unless otherwise indicated, to produce symmetrical tile pattern. Patterns shall be as directed by the consultant. Allow for one field tile and one accent tile in each room or space. Border tiles shall be minimum ½ tile width.

.6 Install flooring to square grid pattern with all joints aligned unless otherwise indicated.

.7 As installation progresses, and after installation, roll flooring in 2 directions with a 45 kg roller to ensure full adhesion.

.8 Cut and fit tile neatly around fixed objects.

.9 Install feature strips or feature tiles where directed. Fit joints tightly.

.10 Continue flooring throughout areas to receive movable type partitions or fitments without interrupting floor pattern.

.11 Install flooring full depth of closets, toe spaces, and recesses.

.12 Terminate flooring at centre line of door in openings where adjacent floor finish or colour is dissimilar.

.13 Install transition strips at unprotected or exposed edges where flooring terminates. Locate transition strip at centre line of door where a door occurs.

3.4 Base Application

.1 Lay out base to keep number of joints to a minimum. Locate joints at maximum available spacing or at internal or pre moulded corners.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base.

.4 Set base against wall and floor surfaces tightly by using a 3 kg hand roller.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions. Use pre-moulded end pieces at flush door frames.

.7 Cope internal corners. Use pre moulded corner units for right angle external corners. Use formed straight base materials for external corners of other angles, minimum 300 mm each leg.

.8 Provide rubber base at all locations specified, regardless of floor finish.

3.5 Stair Tread Application

.1 Install stair treads full width and height of stairs and risers in accordance with manufacturer's printed instructions. Adhere over entire surface and fit accurately.

.2 Caulk edges of nosings with epoxy caulking.

3.6 Cleaning

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

.2 Remove excess adhesive from resilient floor coverings, base and adjacent finished surfaces as the work progresses.

.3 Clean, seal and wax floor and base surfaces to manufacturer's instructions. In carpeted areas, clean base before installation of carpet.

3.7 Protection

.1 Protect new floors until time of final inspection.

.2 Prohibit traffic on floors for 48 hours after installation.

.3 Immediately prior to final inspection, remove protection, clean, dry or damp mop resilient flooring and apply one additional coat of wax.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 03 30 00 Cast-in-Place Concrete
.2 Section 07 92 00 Joint Sealants

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C150/C150M-17 Standard Specification for Portland Cement
  .2 ASTM C171-16 Standard Specification for Sheet Materials for Curing Concrete
  .3 ASTM C241/C241M-15e1 Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic
  .4 ASTM C309-11 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
  .5 ASTM C33/C33M-16e1 Standard Specification for Concrete Aggregates
.2 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB 51.34-M86 Vapour Barrier, Polyethylene Sheet for Use in Building Construction
.3 Canadian Standards Association (CSA)
  .1 CAN/CSA-A8/A5/A362, Portland Cement / Masonry Cement / Blended Hydraulic Cement.
  .2 CSA A23.1-04/A23.2-04 Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
.4 Terrazzo Tile and Marble Association of Canada (TTMAC)
  .1 TTMAC 09 66 00 Terrazzo Installation Manual 2009/2010 Edition.
  .2 TTMAC Colour Plates.

1.4 Submittals

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

.2 Submit shop drawings indicating the type, size, and layout of divider strips and control joint strips and colour of floor areas.

.3 Submit product data for divider strips, control joint strips and expansion joints.

.4 Samples
  .1 Submit two samples 300 x 300 mm in size illustrating colour, chip size and variation, mortar colour, and ground top surface of divider strip. All samples shall be prepared to match existing terrazzo flooring.

.5 Maintenance Data
  .1 Submit cleaning and maintenance data, including procedures for stain removal, stripping, sealing and finishing in accordance with TTMAC Maintenance Guide.
  .2 Submit four (4) copies of the latest edition of the TTMAC Maintenance Guide for inclusion in the Operations and Maintenance manuals specified in Section 01 78 00 – Closeout Submittals. Give specific warning of any maintenance practice or materials that may damage

or disfigure the finished work, or alter the coefficient of friction (slip resistance) of the finished surface.

1.5 Quality Control

.1 Provide mockup of one (1) m^2 of terrazzo flooring and one (1) lineal metre of base.

.2 Install mock up in area designated by the Consultant.

.3 When accepted, mock up shall demonstrate minimum standard for work of this Section. Accepted mock up may remain as part of the Work.

1.6 Quality Assurance

.1 Installer: employ skilled mechanics/applicators, trained and experienced in terrazzo work with a minimum of three years proven experience. If requested by Consultant, submit a listing of at least three previously completed projects of similar size and scope.

1.7 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Materials shall be delivered in the manufacturer's unopened containers marked with the brand name. Materials shall be delivered, handled, and stored in accordance with manufacturer’s instructions in a manner that will prevent deterioration and contamination.

1.8 Environmental Requirements

.1 Areas to receive terrazzo shall be maintained at a temperature above 10°C.

.2 Maintain this temperature range for 24 hours before, during and 72 hours after installation of terrazzo.

1.9 Waste Management and Disposal

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

1.10 Warranty

.1 One year from date of Substantial Performance.

PART 2 PRODUCTS

2.1 General

.1 Portland Cement: ASTM C150, Type I or CAN/CSA A5 93 Type 10 Normal, white colour for topping mix or as required to match selected TTMAC colour plate, grey colour for underbed, modified to higher compressive strength requirements of 27.5 MPa, obtained from single source.

.2 Sand: Sand shall conform to ASTM C33 for fine aggregate.

.3 Colourants shall be alkali-resistant and nonfading. Pigments shall be of colours required to match selected TTMAC colour plate.

.4 Marble chips shall be of domestic origin of sizes and colours required to match TTMAC colour plate selected. Marble chips shall have an abrasive hardness of not less than 10 when tested in accordance with ASTM C241/C241M; shall contain no deleterious or foreign matter; and the dust content shall be less than one percent by weight.

.5 Epoxy Bonding Agent: Two component epoxy, bond strength of 2 MPa to failure with 20 MPa concrete.

.6 Water: Potable.

2.2 Accessories

.1 Reinforcing Mesh: CSA G30.5 50 x 50 x 1.5 mm, galvanized.

.2 Divider Strips: In accordance with TTMAC Guides, inverted T shape, zinc coated steel or stainless steel, depth to suit, with anchoring features. Colour and thickness to match existing.

.3 Control Joint Strips: 3 mm nominal width, zinc top strips, zinc coated steel bottom strip, 3 mm wide neoprene filler strip between side strips, with anchoring features.

.4 Base Caps, Base Divider Strips, and Separator Strips: Match divider strips.

.5 Foam Filler: Closed cell urethane foam, capable of compression to 50% of its thickness with full recovery.

.6 Curing material shall be either liquid membrane-forming compound, wet sand, polyethylene sheeting, or water. Liquid membrane-forming compound shall conform to ASTM C309, Type I. Polyethylene sheeting shall conform to ASTM C171.

.7 Terrazzo Cleaner: TTMAC 1001, 1002, 1003, or 1104 as applicable. Terrazzo cleaner shall be biodegradable, phosphate free and shall have a pH factor between 7 and 10 and be of a type specially prepared for use on terrazzo. Submit maintenance instructions for bonded terrazzo.

.8 Sealer: Colourless, liquid, penetrating type to completely seal cementitious matrix surface, specially prepared for use on terrazzo and not detrimental to terrazzo components. Sealer must be UL listed as slip resistant.

PART 3 EXECUTION

3.1 Inspection

.1 Examine the areas in which the work of this section is to be installed and verify that substrates are ready to receive terrazzo work.

.2 Do not begin terrazzo work until concrete substrate has cured 28 days, minimum.

.3 Do not proceed with installation of terrazzo topping until improper conditions have been corrected.

.4 Protect work during installation and protect finished surfaces while other work is being executed in the area.

.5 Check for appropriate heating facilities and required working conditions.

3.2 Terrazzo Proportions

.1 Underbed shall be composed of one part Portland cement to 4 parts sand. Water shall be added to provide workability at as low a slump as possible. Spread to a level 13 mm below the finished floor, to a thickness of approximately 30 mm

.2 Terrazzo Topping shall be composed of one 43 kg bag of Portland cement per 91 kg of marble chips and approximately 20 L of water. Colour pigment shall be added as needed but not to exceed 1 kg per bag of cement. Water shall be added in sufficient quantity to provide workability at as low a slump as possible.

3.3 Installation

.1 Install terrazzo flooring, base and all accessories in accordance with TTMAC guidelines and recommendations.

.2 Underbed Placement: Surfaces of concrete subfloor shall be cleaned and saturated with water in accordance with TTMAC Installation Manual. Do not treat concrete substrate to receive bonded terrazzo with curing agent or additives which would preclude bonding. Excess water shall be removed from the subfloor before slushing and brooming with neat cement paste. The underbed shall be placed on the concrete subfloor and shall be screeded to an elevation 13 mm below the finished floor. Divider strips shall be installed in the semi-plastic underbed. The underbed shall be firmly troweled along the edges to insure positive anchorage of the divider strips. Control joint strips shall be installed over subfloor expansion joints and shall extend the full depth of the underbed.

.3 Set divider strips in accordance with layout indicated while underbed is still plastic. Set strips to straight lines and to the proper level to ensure that tops of strips will show uniformly after completing grinding and finishing operations. Fit joints and intersections tight. Where divisions in field work are not shown, divide field work into squares or rectangles of uniform size and not more than 1800 mm on a side. Divide borders by strips to coincide with the layout of division strips in the field of floors. Place edging strips at doorways between terrazzo and other types of flooring and along the edges of terrazzo borders adjoining other types of floor finishes or floor coverings. Place expansion strips over control joints, construction joints, and expansion joints.

.4 Placing Terrazzo Topping: The underbed shall be slushed and broomed in accordance with TTMAC Installation Manual with neat cement paste of the same colour as required for the topping. The topping shall be placed in panels formed by divider strips and shall be troweled level with the top of the strips. The troweled surface shall be seeded with chips in the same colour proportions as contained in the terrazzo mix, troweled and rolled with heavy rollers until excess water has been extracted. The terrazzo shall be troweled to a uniform surface disclosing the lines of the divider strips.

3.4 Curing

.1 The terrazzo shall be cured until the topping develops sufficient strength to prevent lifting or pulling of terrazzo chips during grinding. Keep the completed terrazzo continuously moist and free of traffic during the curing period. Cure by covering with a liquid membrane-forming compound, sheet materials, wet sand, or sprinkling with water.

3.5 Finishing

.1 Finish terrazzo to TTMAC instructions.

.2 After curing the grout coat for a minimum of 72 hours, grind the floor using a No. 80 or finer grit stone. In the latter stages of grinding, use grit stones or other abrasive in the grinding machine of a grain or fineness that will give the surface a honed finish. Grind and rub by hand small areas, inaccessible portions, and corners that cannot be reached by the grinding machine. The honed surface of finished terrazzo shall show not less than 70 percent of the area as exposed aggregate evenly distributed, and shall conform in appearance to the approved samples. Finished thickness of terrazzo topping shall be a minimum of 13 mm.

3.6 Allowable Tolerances

.1 Maximum Variation from Flat Surface: 3 mm in 1 m.

.2 Maximum Variation from Level: 3 mm, in 3 m.

3.7 Rough Grinding

.1 After topping has cured, the terrazzo shall be machine ground using the wet method, to a true even surface using No. 24 or finer grit followed by No. 80 grit or finer grit stone. Finish floor surface shall not vary by more than 2 mm/meter.

3.8 Grouting

.1 After rough grinding, the floor shall be cleansed with clean water and rinsed. After removing excess rinse water, the floor shall be grouted using identical Portland cement, colour and pigments as used in the topping taking care to fill voids. After the grout has attained its initial set, the surface shall be cured for a minimum of 72 hours.

3.9 Fine Grinding

.1 After grout has cured, the surface shall be ground with fine grit stones until all grout is removed from the surface. Upon completion of grinding, the terrazzo flooring shall show a minimum of 70 percent of marble chips.

3.10 Protection

.1 The terrazzo work shall be covered and protected from damage until completion of the work of all other trades.

3.11 Cleaning

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

.2 Cleaning and Sealing: Refer to latest edition of TTMAC Maintenance Guide. Sealers should be ULC listed as slip resistant. sealer shall be applied in accordance with the manufacturer's directions

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 12 23 Structural Steel
.3 Section 05 21 00 Steel Joists
.4 Section 05 50 00 Metal Fabrications
.5 Section 09 21 16 Gypsum Board

1.3 References

.1 Department of Justice Canada (Jus)
  .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33
.2 Environmental Protection Agency (EPA)
  .1 EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 - 1995, (for Surface Coatings).
.3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).
.4 Master Painters Institute (MPI)
  .1 MPI Architectural Painting Specifications Manual, 2004.
.5 National Fire Code of Canada - 1995
.6 Society for Protective Coatings (SSPC)
  .1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.
.7 South Coast Air Quality Management District, California State (SCAQMD)
  .1 SCAQMD Rule 1113-96, Architectural Coatings.
.8 Green Seal GS-11 Green Seal Environmental Standard for Paints and Coatings, January 1997.
.9 CAN/ULC-S102-10, 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:
  .1 Submit product data and instructions for each paint and coating product to be used.
  .2 Submit product data for the use and application of paint thinner.
  .3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS). Indicate VOCs during application and curing.

.3 Samples:
  .1 Submit full range colour sample chips to indicate where colour availability is restricted.
  .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 Closeout Submittals: submit maintenance data for incorporation into manual 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: minimum of five years proven satisfactory experience.
.2 Journeymen: qualified journeymen who have "Tradesman Qualification Certificate of Proficiency" engaged in painting work.
.3 Apprentices: working under direct supervision of qualified tradesperson in accordance with trade regulations.

.2 Mock-Ups:
.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
.2 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.
.3 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.
.4 Locate where directed.
.5 Allow 24 hours for inspection of mock-up before proceeding with work.
.6 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, handle and store materials in accordance with manufacturer’s printed instructions.

.3 Acceptance at Site:
.1 Identify products and materials with labels indicating:
.1 Manufacturer's name and address.
.2 Type of paint or coating.
.3 Compliance with applicable standard.
.4 Colour number in accordance with established colour schedule.

.4 Remove damaged, opened and rejected materials from site.

.5 Storage and Protection:
.1 Provide and maintain dry, temperature controlled, secure storage.
.2 Store materials and supplies away from heat generating devices.
.3 Store materials and equipment in well-ventilated area with temperature range 7^0 C to 30^0 C.

.6 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.7 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.

.8 Remove paint materials from storage only in quantities required for same day use.

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 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan (WMP).

.4 Separate for reuse and recycling and place in designated containers waste in accordance with Waste Management Plan (WMP).

.5 Place materials defined as hazardous or toxic in designated containers.

.6 Handle and dispose of hazardous materials in accordance with Municipal regulations.

.7 Ensure emptied containers are sealed and stored safely.

.8 Unused materials must be disposed of at official hazardous material collections site as approved by Owner.

.9 Paint, stain and wood preservative finishes and related materials (thinners, and solvents) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.

.10 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.

.11 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

.12 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into ground follow these procedures:
.1 Retain cleaning water for water-based materials to allow sediments to be filtered out.

.2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
.3 Return solvent and oil soaked rags used during painting operations for contaminant recovery,

proper disposal, or appropriate cleaning and laundering.

.4 Dispose of contaminants in approved legal manner in accordance with hazardous waste regulations.

.5 Empty paint cans are to be dry prior to disposal or recycling (where available).

.13 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.

1.9 Maintenance

.1 Extra Materials:

.1 Deliver to extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 00 - Closeout Submittals.

.2 Quantity: provide one four litre can of each type and colour of primer stain finish coating. Identify colour and paint type in relation to established colour schedule and finish system.

.3 Delivery, storage and protection: comply with Consultant's requirements for delivery and storage of extra materials.

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 10^0 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 written approval by Specifying body Paint Inspection Agency Authority and product manufacturer, perform no painting when:

.1 Ambient air and substrate temperatures are below 10^0 C.

.2 Substrate temperature is above 32^0 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 3^0 C variance between the air/surface temperatures. Paint should not be applied if the dew point is less than 3^0 C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.

.5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

.6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.

.2 Perform painting work when maximum moisture content of the substrate is below:

.1 Allow new concrete to cure minimum of 28 days.

.2 15% for wood.

.3 12% for plaster and gypsum board.

.3 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".

.4 Test concrete and plaster surfaces for alkalinity as required.

.5 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.

.6 Additional interior application requirements:
.1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

PART 2 PRODUCTS

2.1 Materials

.1 Products to meet requirements of GS-03, GS-11 or SCAQMD Rule 1113-96

.2 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

.3 Provide paint materials for paint systems from single manufacturer.

.4 Only qualified products with E2 or E3 "Environmentally Friendly" rating are acceptable for use on this project.

.5 Conform to latest MPI requirements for interior painting work including preparation and priming.

.6 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.

.7 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.

.8 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids:
.1 Water-based, Water clean-up.
.2 Non-flammable, biodegradable.
.3 Manufactured without compounds which contribute to ozone depletion in the upper atmosphere.
.4 Manufactured without compounds which contribute to smog in the lower atmosphere.
.5 Do not contain methylene chloride, chlorinated hydrocarbons or toxic metal pigments.
.6 Recycled content of 15% post-consumer and ½ post-industrial waste.

.9 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.

.10 Flash point: 61^0C or greater for water-borne surface coatings and recycled water-borne surface coatings.
.11 Ensure manufacture and process of both water-borne surface coatings and recycled water-borne surface coatings does not release:
.1 Matter in undiluted production plant effluent generating 'Biochemical Oxygen Demand' (BOD)

in excess of 15 mg/L to natural watercourse or sewage treatment facility lacking secondary treatment.

.2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to natural watercourse or a sewage treatment facility lacking secondary treatment.

.12 Recycled water-borne surface coatings to contain 50% post-consumer material by volume.

.13 Recycled water-borne surface coatings must not contain:
- .1 Lead in excess of 600.0 ppm weight/weight total solids.
- .2 Mercury in excess of 50.0 ppm weight/weight total product.
- .3 Cadmium in excess of 1.0 ppm weight/weight total product.
- .4 Hexavelant chromium in excess of 3.0 ppm weight/weight total product.
- .5 Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.

2.2 Colours

.1 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 based on limited range.

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

2.3 Mixing and Tinting

.1 Perform colour tinting operations prior to delivery of paint to site.

.2 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.

.3 Thin paint for spraying in accordance with paint manufacturer's instructions.

.4 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 Gloss/Sheen Ratings

.1 Paint gloss: defined as sheen rating of applied paint, in accordance with following values:

Gloss Level Category/	Units @ 60 Degrees	Units @ 85 Degrees
G1 – matte finish	0 to 5	Max. 10
G2 – velvet finish	0 to 10	10 to 35
G3 – eggshell finish	10 to 25	10 to 35
G4 – satin finish	20 to 35	Min. 35
G5 – semi-gloss finish	35 to 70	
G6 – gloss finish	70 to 85	
G7 – high gloss finish	> 85	

.2 Gloss level ratings of painted surfaces as specified and as noted on Finish Schedule.

2.5 Interior Painting Systems

.1 Concrete Masonry Units:
  .1 INT 4.2D high performance architectural latex G5 semi-gloss finish.

.2 Concrete Masonry Units at wet areas and change rooms:
  .1 INT 4.2G Epoxy (semi-gloss) finish.

.3 Structural Steel:
  .1 INT 5.1X Latex semi-gloss finish (over quick dry shop primer). [for dry locations only]

.4 Metal Fabrications:
  .1 INT 5.3A Latex G5 semi-gloss finish

.5 Galvanized Metal: interior doors, frames, pipes, and ducts.
  .1 INT 5.3A Latex G5 semi-gloss finish

.6 Wood Paint Finish:
  .1 INT 6.3A high performance architectural latex G5 semi-gloss finish.

.7 Wood Clear Polyurethane Finish:
  .1 INT 6.3K Polyurethane varnish G6 gloss finish.
  .2 Fire Protective Clear finish for wood “Safe Coat Clear” fire retardant coating or equal. Wood wall or ceiling.

.8 Gypsum Board: walls and bulkheads.
  .1 INT 9.2A Latex G3 eggshell finish over latex sealer.

.9 Gypsum Board: Ceilings and bulkheads (wet areas and change rooms)
  .1 INT 9.2E Epoxy (tile like) finish

.10 Gypsum Board: Ceilings and Bulkheads:
  .1 INT 9.2A Latex G2 velvet finish over latex sealer.

.11 All other surfaces not noted above: high performance finish suitable for wet and institutional environment and in accordance with MPI painting manual.

PART 3 EXECUTION

3.1 Manufacturer’s Instructions

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

3.2 General

.1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 Examination

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 Maximum moisture content as follows:
.1 Plaster and gypsum board: 12%.
.2 Concrete: 12%.
.3 Wood: 15%.

3.4 Preparation

.1 Protection:
.1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by 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 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-install after painting is completed.
.2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
.3 Place "WET PAINT" signs in occupied areas as painting operations progress.

.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 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

.7 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes blowing with clean dry compressed air or vacuum cleaning.

.8 Touch up of shop primers with primer as specified.

.9 Do not apply paint until prepared surfaces have been accepted by Consultant.

3.5 Application

.1 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.

.2 Spray application:
  .1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
  .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
  .3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.
  .4 Brush out immediately all runs and sags.
  .5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.

.3 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.

.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.

3.6 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 disconnect switches for fire alarm system and exit light systems in red enamel.

.10 Paint natural gas piping yellow.

.11 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.

.12 Do not paint interior transformers and substation equipment.

3.7 Site Tolerances

.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.

3.8 Field Quality Control

.1 Interior painting and decorating work shall be inspected by the Consultant.
.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 Advise Consultant when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.4 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Consultant.

3.9 Restoration

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 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.

3.10 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

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C1583/C1583M-13 Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)
  .2 ASTM D570-98(2010)e1 Standard Test Method for Water Absorption of Plastics
  .3 ASTM D638-14 Standard Test Method for Tensile Properties of Plastics
  .4 ASTM D695-15 Standard Test Method for Compressive Properties of Rigid Plastics
  .5 ASTM D790-17 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
  .6 ASTM D2240-15e1 Standard Test Method for Rubber Property - Durometer Hardness
  .7 ASTM D4541-17 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
.2 NSF International (NSF)
  .1 NSF/ANSI 61: Drinking Water System Components
.3 International Concrete Repair Institute (ICRI),
  .1 ICRI Technical Guideline No. 310.2R-2013 Selecting and Specifying Concrete Surface. Preparation for Sealers, Coatings, Polymer Over- lays, and Concrete Repair
.4 The Society for Protective Coatings (SSPC)
  .1 SSPC-SP 10/NACE No. 2, Near-White Blast Cleaning

1.4 Submittals

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

.2 Submit manufacturer's technical literature and application instructions.

.3 Submit manufacturer's recommended termination and drain details.

.4 Submit MSDS.

1.5 Quality Assurance

.1 Obtain primary potable water epoxy coating materials, including primers, base coats, seal coats and top coats from one single coating manufacturer. Obtain secondary materials including aggregates, sheet flashings, joint sealants, and substrate repair materials of type and from source recommended by epoxy coating manufacturer.

.2 Epoxy coating manufacturer shall have ISO 9001 Quality Certification.

.3 Epoxy Coating Mock-Up:
  .1 Prior to commencing potable water epoxy coating application, prepare a minimum 1.0 M^2 full

scale, reference mock-up of for approval by Owner. Reference mock-up shall be constructed in location designated by Consultant, using the same equipment, tools, personnel and methods for installing all materials as will be used for the remaining work to be performed.

.2 Once accepted by owner or owner's representative, mock-up is to remain, and is to be protected from damage. It shall become the standard for acceptance of the epoxy coating application.

.3 When Consultant determines that mockup does not meet requirements, demolish and remove it from the site and cast another until the mockup is accepted

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 Environmental Limitations: Apply epoxy coating within the range of ambient and substrate temperatures recommended in writing by manufacturer. Do not apply epoxy coating to damp or wet substrates. Apply when temperatures are between 10° C and 32° C. Do not apply when temperatures are less than -15° C above dew point.

.1 Coordinate coating work with other trades to ensure adequate illumination, ventilation, and dust free environment during application and curing of coating.

.2 Conditions for Concrete

.1 New concrete shall be in place a minimum 28 days before proceeding.

.2 Any cementitious repair mortars must have a full 7-day cure prior to coating unless otherwise approved in writing by Consultant.

.3 Do not apply epoxy coatings if there is excessive moisture in the concrete or if the moisture vapor emission rate (MVER) is high.

.1 Test concrete in accordance with ASTM D4263 to assure that no moisture is present. Where moisture is present concrete shall be tested in accordance with ASTM F1869. Contact manufacturer if results indicate a moisture emission rate greater than 3 lbs. per 1000 sf in 24 hours.

.4 Examination:

.1 Prior to commencement of epoxy coating system application examine substrates, with Applicator present, for compliance with requirements and for other conditions affecting performance of epoxy coating.

.2 For the record, prepare written report, endorsed by Applicator, listing conditions detrimental to performance.

.3 Verify compatibility with and suitability of substrates.

.4 Contractor must report, in writing, surfaces left in improper condition by other trades. Application of coating indicates acceptance of surfaces and conditions.

1.8 Waste Management and Disposal

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

1.9 Warranty

.1 Warrant the work of this Section against defects of workmanship and material, for a period of two (2) 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 PRODUCTS

2.1 Epoxy Coating System

.1 System : 2 component, 100% solids, high build, NSF/ANSI 61 compliant epoxy coating resin with the following characteristics:
- .1 Mixed Viscosity: 3,500 cps @ 24° C.
- .2 Tensile Strength 1,850 psi per ASTM D638-14.
- .3 Tensile Elongation 2% to 5% at break per ASTM D638-14
- .4 Compressive Strength: 5,900 psi per ASTM D695-15
- .5 Shore D Hardness of 75 per ASTM D2240-15e1
- .6 Water Absorption: 0.09% per ASTM D570-98 (2010)e1
- .7 Colour: Gray
- .8 Product:
  - .1 Euclid Chemical Company (The); DuralKote 61, www.euclidchemical.com

.2 Repair Compound: DuralFlex Fast Patch 100% solids fast setting epoxy repair mortar.

.3 Sealant: single-component, low-modulus, moisture-cure, self-leveling, polyurethane joint sealant as recommended by coating manufacturer.

.4 Crack Repair/Injection: Dural 452 LV, Dural Fast Set Epoxy Gel two-component, 100% solids, moisture insensitive, rapid-setting epoxy adhesive and binder.

.5 Architectural Coatings: protective, decorative, flexible coating, formulated from high-performance elastomeric acrylic resins as recommended by the manufacturer. Colour to be selected by the Consultant from full range of manufacturer's standards.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

.1 Comply with manufacturer's written preparation and application instructions.

3.2 Surface Preparation

.1 Clean and mechanically prepare substrates according to manufacturer's written recommendations to produce clean, sound, dust-free, dry, absorptive substrate free of grease, oils, curing compounds, surface laitance, soil and other contaminants which may interfere with bond of epoxy coating. Surface profile should be equal to CSP 2 to 4 in accordance with ICRI Guideline 310.2. Steel surfaces should be blasted in accordance with SSPC-SP10 to a "NEAR WHITE" finish using clean dry blasting media.

.2 Prepare vertical and horizontal surfaces at terminations and penetrations through epoxy coating and at expansion joints, drains, and sleeves according to manufacturer's written recommendations.

.3 Mask adjoining surfaces not receiving epoxy coating, drains, and other substrate penetrations to prevent spillage, leaking, and migration of coatings.

3.3 Epoxy Coating System Application

.1 Mechanical Mixing- Epoxy coating shall be thoroughly mixed utilizing a mechanical drill with a manufacturer approved mixing blade. Premix individual components separately per manufacturer's recommendations then combine materials and mix per manufacturers recommendations. Bottom and sides of container may be scraped during mixing but shall not be scraped once mixing has ceased. Do not aerate material.

.2 First Coat Application: Roller apply properly mixed epoxy coating material at manufacturer's recommended coverage rate of 100 to 160 square feet per gallon.

.3 Second Coat Application: Once the first coat is tack free, but no later than 36 hours after application of the first coat, apply second application of properly mixed epoxy coating at a rate of 100 to 160 square feet per gallon per manufacturer's written recommendations.

.4 Provide terminations and drains in accordance with manufacturer's recommended details.

.5 Apply architectural coating in selected colour and in accordance with manufacturer's recommendations. Install in two coats at rate of 1.96 m2/L minimum, each.

3.4 Protection

.1 Prevent contamination and damage during application and curing stages.

.2 Protect epoxy coating from damage and wear during remainder of construction period.

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

1.3 References

.1 Ontario Building Code
.2 CAN/ULC S102-10, 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 Submit shop drawings to the Consultant for review.
.1 Shop drawings shall show dimensions, layout and details for fabrication and installation of whiteboards, tackboards, aluminum trim and anchorage.

.3 Maintenance Procedures: On completion of the project submit three copies of manufacturer's cleaning and maintenance procedures for whiteboards and tackboards for inclusion in maintenance manuals specified under Section 01 78 00.

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 Use all means necessary to protect whiteboards, tackboards, aluminum trim, during and after installation and to protect the installed work and materials of all other trades.

.4 In the event of damage, immediately make all repairs and replacements necessary to the approval of the Consultant and at no additional cost to the Owner.

1.6 Waste Management and Disposal

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

1.7 Requirements of Regulatory Agencies

.1 Surface burning characteristics of materials: to CAN/ULC S102-10.

1.8 Warranty

.1 Whiteboards and tackboards shall be guaranteed for a period of 5 years from the date of Substantial Performance against defects due to normal usage and wear.

PART 2 PRODUCTS

2.1 General

.1 The following manufacturers have been approved for the work of this Section:
- .1 Architectural School Products Ltd.
- .2 Broome Porcelain Company.
- .3 Global School Products
- .4 Martack Specialties
- .5 Steelcase Inc.

.2 Whiteboards and tackboards shall be supplied by one manufacturer.

2.2 Whiteboards

.1 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. or equivalent.

.2 Sizes as indicated.

.3 Provide one package of companion writing pens (3 each red, blue, green and black) for each whiteboard.

2.3 Tackboards

.1 Tackboards shall be 13 mm factory pre-laminated consisting of 6.4 mm thick natural fine grained cork laminated to 6.4 mm particle board or masonite substrate under mechanical pressure in maximum panel sizes of 1220 x 2440 mm. Bonding of materials by a waterproof adhesive that will not delaminate or rupture at the contact surfaces.

.2 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. or equivalent.

.3 Sizes as indicated.

.4 All tackboards shall meet the minimum requirements of the applicable building code and/or Ontario Fire Marshal's Office and shall have a flame spread rating of under 150 when tested in accordance with CAN/ULC S102.

2.4 Trim

.1 Aluminum trim and chalk trays shall be 6063 T5 aluminum alloy with satin finish clear etched and anodized .05 mm satin finish free from extruding draw marks and surface scratches.

.2 Perimeter - No. 205 trim - 19 mm exposed face and weight of approximately 0.372 kg/m.

.3 Divider Bar - No. 207 trim for adjacent panels of elevations greater than 2440 mm - 13 mm exposed face and weight of approximately 0.372 kg/m.

.4 Maprail - No. 206 trim for whiteboard elevation only complete with integral natural fine grained cork insert, end stops and two (2) combination roller maphooks per 1.2 lineal metre or portion thereof, - 50 mm exposed face and weight of approximately 0.520 kg/m.

.5 Tray - No. 212 triangular box section for whiteboard elevations only complete with contour fitting and castings - 100 mm projection from wall and weight of approximately 1.42 kg/m. No trays are required on gymnasium whiteboards.

PART 3 EXECUTION

3.1 Coordination

.1 Co-ordinate with all other trades as required to ensure proper and adequate provision in framing and wall finish for the installation of whiteboards and tackboards in the locations required.

.2 Prior to installation, inspect locations of all whiteboards and tackboards and verify that all necessary provisions have been made. In the event of discrepancy, immediately notify the Consultant.

.3 Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 Installation

.1 Install all whiteboards and tackboards where indicated on the drawings and in full accordance with the manufacturer's recommendations, anchoring all components firmly in place for long life under hard use.

.2 Erection of materials shall be carried out to ensure a rigid, straight, square, plumb and horizontal installation.

.3 All aluminum trim to be attached in such a manner that all fastenings shall be concealed. All corners are to be mitred.

3.3 Cleaning

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

.2 All whiteboards, tackboards, and aluminum trim are to be cleaned on completion.

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 10 21 13 Compartments and Cubicles
.3 Section 10 51 13 Lockers

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM A167-99 (2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  .2 ASTM A653/A653M-11 Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process
  .3 ASTM A924/A924M-10a Standard Specification for General Requirements for Steel Sheet, Metallic Coated by the Hot Dip Process.
  .4 ASTM B456-11e1 Standard Specification for Electrodeposited Coatings of Copper plus Nickel plus Chromium and Nickel plus Chromium.
.2 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-1.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
  .2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.
  .3 CGSB 31-GP-107Ma-90, Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.
.3 Canadian Standards Association (CSA)
  .1 CSA-B651-12, Accessible Design for the Built Environment.
  .2 CAN/CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.4 Submittals

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

.2 Shop Drawings:
  .1 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars.

.3 Samples:
  .1 Submit samples when requested.
  .2 Samples to be returned for inclusion into work.

.4 Closeout Submittals:
  .1 Provide maintenance data for toilet and bath accessories for incorporation into manual 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.

1.6 Waste Management and Disposal

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

1.7 Extra Materials

.1 Provide special tools required for accessing, assembly/disassembly or removal for toilet and bath accessories in accordance with requirements specified in Section 01 78 00 - Closeout Submittals.

.2 Deliver special tools to Owner.

PART 2 PRODUCTS

2.1 Materials

.1 Sheet steel: to ASTM A653/A653M-11with ZF001 designation zinc coating.

.2 Stainless steel sheet metal: to ASTM A167-99 (2009), Type 304, with Brushed finish.

.3 Stainless steel tubing: Type 304, commercial grade, seamless welded, minimum 1.2 mm wall thickness.

.4 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.2 Manufacturers

.1 Products and components listed are minimum standard of acceptance. Alternative products by recognized manufacturers of toilet and bath accessories may be accepted subject to review by the Consultant of manufacturer's product information and specifications.

.2 Acceptable manufacturers include:
.1 Bobrick
.2 Bradley
.3 Frost
.4 Hafele
.5 Richelieu
.6 Watrous

2.3 Components

.1 Toilet Tissue Dispenser: Owner Supplied, Contractor Installed.

.2 Barrier Free Toilet Grab Bar 1: Bobrick B-5806.99 x24, 32mm diameter, peened finish complete with mounting kits.

.3 Barrier Free Toilet Grab Bars 2 (L-shaped): Bobrick 816722.99, 32mm diameter, peened finish complete with mounting kits.

.4 Swing Down Grab Bar: Bobrick B-4998 or Bradley 8370-101.

.5 Feminine Napkin Disposal: surface mounted Bobrick B-254, or Frost 622, or Bradley 4781-15.

.6 Liquid Soap Dispenser: Owner supplied, Contractor installed.

.7 Framed Mirror: Bobrick B-165 2436, or Bradley 780-2436.

.8 Adult Change Table: Owner supplied (portable).

.9 Coat Hook: Bobrick B-233.

.10 Stainless Steel Shelf: Bobrick 295, 125mm x 405mm.

2.4 Fabrication

.1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.

.2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.

.3 Brake form sheet metal work with 1.5 mm radius bends.

.4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

.5 Back paint components where contact is made with building finishes, to prevent electrolysis.

.6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to CSA G164-M92 (R2003).

.7 Shop assemble components and package complete with anchors and fittings.

.8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.

.9 Provide steel anchor plates and components for installation on studding and building framing.

2.5 Finishes

.1 Chrome and nickel plating: to ASTM B456-11e1, satin finish.

.2 Baked enamel: condition metal by applying one coat of metal conditioner to CGSB 31-GP-107Ma, apply one coat Type 2 primer to CAN/CGSB-1.81 and bake, apply two coats Type 2 enamel to CAN/CGSB-1.88 and bake to hard, durable finish. Sand between final coats. Colour selected from standard range by Owner’s Representative.

.3 Manufacturer's or brand names on face of units not acceptable.

PART 3 EXECUTION

3.1 Installation

.1 Install toilet and bath accessories in accordance with the Ontario Building Code, CSA B651-12 and

manufacturer's instructions.

.2 Coordinate installation of hand and hair dryers with Electrical.

.3 Install and secure accessories rigidly in place as follows:
- .1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.
- .2 Hollow masonry units or existing plaster/drywall: use toggle bolts drilled into cell/wall cavity.
- .3 Solid masonry or concrete: use bolt with lead expansion sleeve set into drilled hole.

.4 Install grab bars on built-in anchors provided by manufacturer.

.5 Use tamper proof screws/bolts for fasteners.

.6 Fill units with necessary supplies shortly before final acceptance of building.

.7 Install products in strict compliance with manufacturer's written instructions and recommendations, including the following:
- .1 Verify blocking has been installed properly.
- .2 Verify location does not interfere with door swings or use of fixtures.
- .3 Comply with manufacturer's recommendations for backing and proper support.
- .4 Use fasteners and anchors suitable for substrate and project conditions
- .5 Install units rigid, straight, plumb, and level, in accordance with manufacturer's installation instructions and approved shop drawings.
- .6 Conceal evidence of drilling, cutting, and fitting to room finish.
- .7 Test for proper operation.

3.2 Schedule

.1 Locate accessories where indicated. Exact locations determined by Owner.

3.3 Cleaning

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

.2 Clean exposed surfaces of compartments, hardware, and fittings using methods acceptable to the manufacturer.

.3 Touch-up, repair or replace damaged products until Substantial Performance.

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
.3 Section 08 80 05 Glazing

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM D5116-10 Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products
  .2 ASTM D6670-13 Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products
.2 Underwriters Laboratories of Canada (ULC)
  .1 CAN/ULC S109-14 Flame Tests of Flame Resistant Fabrics and Films
.3 National Fire Protection Association (NFPA)
  .1 NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films
.4 Canadian Electrical Code.

1.4 Submittals

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

.2 Submit shop drawings
  .1 Clearly indicate, by large scale details, anchorage, assembly, materials, components, finishes, and perimeter construction conditions.

.3 Submit duplicate 300 mm x 300 mm samples of fabric in selected colour.

.4 Submit manufacturer's maintenance data in the form of printed instructions for cleaning and maintaining roller shades, for inclusion in Operation and Maintenance Manuals specified in section 01 78 00 – Closeout Submittals

1.5 Quality Assurance

.1 Work of this Section shall be by forces in the direct employ or under control of the system manufacturer, skilled, trained and experienced in work of similar scope and complexity.

.2 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section, with a minimum of ten years of experience.

.3 Mock-Ups: Erect one full size mock-up of each roller shade type for review. Completed and accepted mock-up shall act as the standard to which the balance of the work will be judged.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 61 00 – Common Product Requirements.

.2 Test all operable components prior to shipping.

.3 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.7 Waste Management and Disposal

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

1.8 Warranty

.1 Warrant the work of this Section against defects of workmanship and material, for a period of two (2) years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

.2 Manufacturer's Warranty: Submit manufacturer's standard 10 year product warranty executed by an authorized company official.

PART 2 PRODUCTS

Manufacturers

.1 Roller Shade System to be Manually Operated Roller Shade system with fabric shadecloth.

.2 Specification is based on Moduline Lite-lift chain operated roller shade system as manufactured by Sun Project Inc. System will be single shade system, as indicated.

.3 Alternative products are acceptable, subject to approval of Consultant.

.4 System to be complete, including frame, header assembly, hembar, shade fabric.

.5 Shadecloth to be Ecofriendly shadecloth to meet indoor air quality guidelines of ASTM D5116/D6670.

.6 Fabric: SunProject SC2000 fine weave fiberglass and polyester sunscreen fabric. Openness factor: 3%; thickness: 0.48 mm; flame retardant; fade resistant. Colour to be selected by Consultant.

.7 Framing system to be factory finished aluminum framing, jambs, and header assembly. Colour to be selected by Consultant.

.8 Provide continuous lightseal hembar.

PART 3 EXECUTION

3.1 Installation

.1 Install shading devices in accordance with manufacturer's instructions.

.2 Take field measurements prior to fabrication to ensure fit.

.3 Fabric shall be premeasured and manufactured off-site.

.4 Secure with non-corrosive fasteners, concealed in final assembly.

.5 Install square, plumb, true to line with operable parts adjusted for correct function.

.6 Fabric shall hang flat, without buckling or distortion. The edge, when trimmed, shall hang straight without raveling. An unguided roller shade cloth shall roll true and straight, without shifting sideways more than + 3 mm in either direction due to warp distortion, or weave design.

.7 Adjust to provide for operation without binding.

.8 Refinish damaged or defective work so that no variation in surface appearance is discernable.

3.2 Cleaning

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

End of Section