Upper Yonge Village Daycare Centre

Building Renovation

14 St. Clements Avenue
Toronto, Ontario
M4R 1G9

TECHNICAL SPECIFICATIONS AND DRAWINGS

Prepared for:

City of Toronto
Metro Hall – 55 John Street
Toronto, ON M5V 3C6

Prepared by:

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RJC No. TOR.122940.0001

September 2024 - Issued for Tender

1.0 Seals

Discipline & Name	Seal
Discipline: Architectural Name: David Colussi, OAA	
Discipline: Building Envelope Name: Tiffany Sun Dela Cruz, P.Eng.	
Discipline: Structural Name: Stephen Plesko, B.Eng., P.Eng.	
Discipline: Mechanical Name: Wilbey Chow, P.Eng.	

Discipline: Electrical Name: Spencer Wong, P.Eng.	
Discipline: Landscaping Name: Matthew Sweig	
Discipline: Elevator Name: Jonathan Soberman, P.Eng.	

END OF SECTION

Division 00 - Procurement and Contracting Requirements

Division 01 - General Requirements

Division 02 - Existing Conditions

Division 03 - Concrete

Division 04 - Masonry

Division 05 - Metals

Division 06 - Wood, Plastics, and Composites

Division 07 - Thermal and Moisture Protection

Division 08 - Openings

Division 09 - Finishes

Division 10 - Specialties

Division 12 - Openings

Division 14 - Elevators

Division 22 - Plumbing

Division 26 - Electrical

Division 31 - Earthwork

Division 32 - Exterior Improvements

MECHANICAL (MECHANICAL, HVAC, PLUMBING, GEOTHERMAL)

Refer to ‘M’ Drawings

ELECTRICAL (POWER, LIGHTING, ELECTRIC SNOW MELTING, SECURITY)

Refer to ‘E’ Drawings

Appendix A – Topographic Survey with observations dated March 16, 2020

Appendix B – Arborist Inventory dated June 4, 2024

Appendix C – Quote for one Tosa Bold Powder-Coated Aluminum Pergola including engineering and installation dated December 4, 2023 by Stur Design

1.0 Drawings

The drawings listed below will be included in the General Contractor/ Owner agreement and will become part of the Contract.

Drawing No.	Drawing Title	Date
	Cover Page	September 2024
GN0.1	Project General Notes	September 2024
P0.0	Site Survey	September 2024
P0.1	Site Phasing Plan	September 2024
A0.0	OBC Matrix, Life Safety Plan, Key Plan	September 2024
A0.1	Schedules	September 2024
A1.0	Demolition Plans	September 2024
A1.1	Demolition RCPs	September 2024
A1.2	Proposed Plans	September 2024
A1.3	Proposed RCPs	September 2024
A2.0	Exterior Elevations & Roof Plan	September 2024
A3.0	Building Sections	September 2024
A3.1	Wall Sections & Details – Addition and Existing	September 2024
A3.2	Wall Sections & Details – West Vestibule	September 2024
A3.3	Detailed Plans, Interior and Exterior Details	September 2024
A4.0	Detailed Plans & Interior Elevations - Washrooms	September 2024

A4.1	Detailed Plans & Interior Elevations – Classrooms, Corridors, & Servery	September 2024
A5.0	Millwork	September 2024
A5.1	Millwork	September 2024

R1.1	Roof Plan	September 2024
R2.1	Sections and Details	September 2024
R2.2	Sections and Details	September 2024
R2.3	Sections and Details	September 2024

S0.1	General Notes	September 2024
S0.2	General Notes	September 2024
S1.1	Basement Level Demolition Plan	September 2024
S1.2	Ground Floor Demolition Plan	September 2024
S1.3	Ground Floor Reflected Ceiling Demolition Plan	September 2024
S1.4	Roof Level Demolition Plan	September 2024
S2.1	Basement Level Restoration Plan	September 2024
S2.2	Ground Floor Restoration Plan	September 2024
S2.3	Ground Floor Reflected Ceiling Restoration Plan	September 2024
S2.4	Roof Level Restoration Plan	September 2024
S3.1	Sections and Details	September 2024
S3.2	Sections and Details	September 2024
S3.3	Sections and Details	September 2024

S3.4	Sections and Details	September 2024
S3.5	Sections and Details	September 2024
S3.6	Sections and Details	September 2024
S3.7	Sections and Details	September 2024
S3.8	Sections and Details	September 2024
S3.9	Sections and Details	September 2024

M-1	Mechanical Specifications	May 2024
M-2	Level 1 & Basement Proposed Plan Plumbing Layout	May 2024
M-3	Level 1 & Basement Proposed Plan Cooling/ Heating Heat Pump Water Circulation Piping	May 2024
M-4	Level 1 & Basement Proposed Plan HVAC Layout	September 2024
M-5	Roof Plan	May 2024
M-6	Details	May 2024
M-7A	Schedules	September 2024
M-7B	Schedules	May 2024
M-8	Level 1 & Basement Proposed Plan Geothermal Layout	May 2024
M-9	Level 1 & Basement Proposed Plan Geothermal Riser Diagram & Details	May 2024

E-1A	Electrical Specifications	June 2024
E-1B	Legends and General Notes	June 2024
E-2	Basement Floor Demolition Electrical Layout	June 2024
E-3	Main Floor Demolition Electrical Layout	June 2024

E-4	Basement Floor New Power and Fire Alarm Layout	September 2024
E-5	Main Floor New Power and Fire Alarm Layout	September 2024
E-6	Basement Floor New Lighting Layout	September 2024
E-7	Main Floor New Lighting Layout	June 2024
E-8	Basement Floor New Security Layout	June 2024
E-9	Main Floor New Security Layout	June 2024
E-10	Roof Plan Solar Panels	June 2024
E-11	Power, Snow Melting, Solar Systems Single Line Diagram	June 2024
E-12	Security System Single Line Diagram	June 2024
E-13	Panel Schedule	June 2024
E-14	Fire Alarm Riser Diagram	September 2024
E-15	Lighting Control Details (1)	June 2024
E-16	Lighting Control Details (2)	June 2024

L0.0	Cover	September 2024
L1.0	Tree Removals and Protection Plan	September 2024
L1.1	Existing Conditions and Demolition	September 2024
L2.0	Materials Plan	September 2024
L2.1	Layout Plan	September 2024
L2.2	Grading Plan	September 2024
L2.3	Planting Plan	September 2024

L3.0	Details	September 2024
L3.1	Details	September 2024
L3.2	Details	September 2024
L3.3	Details	September 2024
L3.4	Details	September 2024
L3.5	Details	September 2024
L3.6	Details	September 2024
L3.7	Details	September 2024
L3.8	Details	September 2024

END OF SECTION

1.0 AGREEMENT SUPPLEMENT

The Agreement for the Standard Construction Document CCDC 2 – 2020, Stipulated Price Contract, is amended as follows:

1.1 Article A-1 The Work

.1 Paragraph 1.3:

.1 Replace the words "*Ready-for-Takeover*" with the words "*Substantial Performance of the Work*".

.2 Add the following to the end of the paragraph:

"Ready-for-Takeover of the Work by the ___ day of _____ in the year _____ and Total Performance of the Work by the ___ day of _____ in the year _____ (as applicable and per the Contract)."

1.2 Article A-5 Payment

.1 Paragraph 5.2.1: Insert the chartered lending institution as "The Bank of Nova Scotia"

1.3 Article A-7 Language of the Contract

.1 Paragraph 7.1: Strike out the word "French" to select English as the prevailing language."

2.0 SUPPLEMENTARY DEFINITIONS

Definitions used in the Standard Construction Document CCDC 2 - 2020, Stipulated Price Contract, are hereby amended as follows, and wherever the Definitions are referred to in the *Contract Documents*, it shall be understood that such reference means as amended by these Supplementary Definitions.

.1 Consultant: Add the following sentence to the end of the definition*:*

"The term *Consultant* means the *Consultant* or the *Consultant's* authorized representative."

.2 Contract Time: Delete the following words:

"the time from commencement of the *Work* to the date of *Ready-for-Takeover*"

.3 Contractor: Add the following sentence to the end of the definition:

"The term *Contractor* shall be defined as the *Contractor* or the *Contractor's* authorized representative, but does not include the *Consultant*."

.4 Dictionary: Add the following new definition:

"In case of dispute, The Concise Oxford Dictionary of Current English (current edition) shall prevail, except for those definitions given in CCDC 2 - 2020 and in various other places in the Contract Documents."

.5 Owner: Add the following sentence to the end of the definition:

"The term *Owner* shall be defined as the *Owner* or the *Owner's* authorized representative, but does not include the *Consultant*."

.6 Provide: Add the following new definition:

"Provide means to supply and install."

.7 Substantial Performance of the Work: Add the following sentence to the end of the definition:

"If such legislation is not in force or does not contain such definition at the *Place of the Work*, *Substantial Performance of the Work* shall have been reached when the *Work* is ready for use or is being used for the purpose intended and is so verified by the *Consultant*."

.8 Total Performance: Add the following new definition:

"With the exception of warranty obligations, *Total Performance* of the *Work* shall be achieved when the *Contractor* has fulfilled the requirements of the *Contract* in their entirety, including issuance of the Occupancy / Closeout Permit by the Authority having Jurisdiction if applicable; and is so verified by the *Consultant* through issuance of the final Certificate for Payment in accordance with GC 5.5."

.9 Total Performance Date: Add the following new definition:

"The date in which *Total Performance* has been scheduled and/or attained in accordance with the *Contract*."

3.0 SUPPLEMENTARY CONDITIONS

The General Conditions of Standard Construction Document CCDC 2 - 2020, Stipulated Price Contract, are hereby amended as follows and wherever the General Conditions are referred to in the *Contract Documents*, it shall be understood that such reference means as amended by the Supplementary Conditions.

3.1 GC 1.1 Contract Documents

.1 Paragraph 1.1.4: Delete the words:

“shall not proceed with the work affected”,

and replace with the words:

“shall take all reasonable measures so as not to delay the work affected”.

.2 Paragraph 1.1.12: Add the following new paragraph:

"The *Owner* will provide the *Contractor*, without charge, two hard copies and one PDF copy of the *Contract Documents* to perform the Work. Additional copies of the *Contract Documents* or parts thereof required by the *Contractor* shall be provided at the *Contractor's* expense."

3.2 GC 2.2 Role of the Consultant

.1 Paragraph 2.2.1: Delete entirely and replace with the following:

"The *Consultant* will provide administration of the *Contract* as described in the *Contract Documents* during construction until issuance of Final Certificate for Payment, and subject to GC 2.1 - Authority of the Consultant."

.2 Paragraph 2.2.3: Delete entirely.

3.3 GC 2.3 Review and Inspection of the Work

.1 Paragraph 2.3.8: Add the following new paragraph:

"Where standards of performance are specified and the *Work* is not compliant, such deficiency shall be corrected as directed by the *Consultant*. Any subsequent testing (including re-testing by the *Owner*) to verify performance shall be done at the *Contractor's* expense."

3.4 GC 3.4 Construction Schedule

.1 Paragraph 3.4.1.1: Delete the words: "prior to the first application for payment",

and replace with the words: "within one week of Contract award".

3.5 GC 3.6 Subcontractors and Suppliers

.1 Paragraph 3.6.7: Add the following new paragraph:

"*Specifications* are arranged in Divisions and Sections for convenience. They shall be read as a whole. This arrangement places no responsibility upon the *Owner* or *Consultant* to settle disputes between *Subcontractors* and *Suppliers* or between the *Contractor* and *Subcontractors* and *Suppliers*."

3.6 GC 3.7 Labour and Products

.1 Paragraph 3.7.2: Delete the words: “The Contractor”,

and replace with the words: “Unless otherwise specified, the Contractor”.

3.7 GC 3.8 Shop Drawings

.1 Paragraph 3.8.7: Delete the words:

"in accordance with the schedule agreed upon, or in the absence of such schedule, with reasonable promptness so as to cause no delay in the performance of the *Work*",

and replace with the words:

"to *Contractor* within 10 working days of receipt”.

3.8 GC 3.9 Documents at the Site

.1 Add the following section:

“GC 3.9 DOCUMENTS AT THE SITE

3.9.1 The *Contractor* shall keep one copy of current *Contract Documents*, submittals, reports, and records of meetings at the *Place of the Work*, in good order and available to the *Owner* and the *Consultant*.”

3.9 GC 4.1 Cash Allowances

.1 Paragraph 4.1.7:

.1 Delete the words: “and the”

and replace with the words: “in consultation with”.

.2 Delete the word “jointly”.

3.10 GC 5.1 Financing Information Required of the Owner

.1 Paragraphs 5.1.1 and 5.1.2: Delete entirely.

3.11 GC 5.2 Applications for Payment

.1 Paragraph 5.2.3: Delete the words:

"and *Products* delivered to the *Place of the Work*",

and insert the following sentence to the end of the paragraph:

"Payment will not be made for *Products* delivered to the *Place of the Work* but not yet incorporated into the *Work*."

.2 Paragraph 5.2.5: Delete entirely and replace with the following:

“The schedule of values shall be made out in such form as specified in the *Contract* and supported by such evidence and possible modification as the *Consultant* may reasonably require until accepted by the *Consultant*.”

.3 Paragraph 5.2.9: Add the following new paragraph:

“Upon establishing that the *Work*, or a portion of the *Work*, has been Completed (as per the governing Builder’s Lien Legislation), the *Contractor’s* applications for payment for those portions of the *Work* deemed Complete, shall reflect the balance of the *Contract* price less:

.1 the aggregate amount, if any, determined in accordance with GC 5.4.1 multiplied by two, and

.2 the amount, if any, determined in accordance with GC 5.6 - Deferred Work.

Until all of the deficient and incomplete work for which amounts are withheld pursuant to subparagraphs .1 and .2 of this Paragraph 5.2.9 are rectified and completed to the satisfaction of the *Consultant*, the *Owner* may withhold the full amounts set out in Subparagraphs .1 and .2 of this Paragraph 5.2.9 respectively."

.4 Paragraph 5.2.10: Add the following new paragraph:

"The *Contractor* shall complete the deficient and incomplete work in a timely manner in accordance with the *Contract*. Acceptance of the *Work* or occupancy of the *Project* or any portion thereof shall not relieve the *Contractor* from the obligation of correcting deficiencies which are not identified at the time of establishing the list of deficient and incomplete items of work."

.5 Paragraph 5.2.11: Add the following new paragraph:

"Unless all independent material testing results of *Products* supplied to the site have been received, or if the deficiency review process has not yet commenced, the maximum percent of work completed that can be claimed by the Contractor and certified by the *Consultant* for any item of work is 90%."

3.12 GC 5.3 Payment

.1 Paragraph 5.3.1: Delete the words "and the Owner".

.2 Paragraph 5.3.1.1:

.1 Add the following words after "receipt of the application for payment":

"that is complete and in conformance with the *Contract*".

.2 Add the following words after "or part thereof,":

", the *Consultant* in consultation with".

.3 Add the following sentences to the end of the paragraph:

"In addition to the statutory lien holdback, Certificates for Payment may provide for retention of amounts, as determined by the *Consultant,* to account for deficient or incomplete work, until the items in question have been addressed and are determined to be in general conformance with the *Contract.*"

.3 Paragraph 5.3.1.2: Delete the words: "by the *Owner* and the *Consultant* of the application for payment"

and replace with the words: "of the Certificate for Payment by the *Consultant*".

.4 Paragraph 5.3.2: Add the following new paragraph:

"The *Owner*, in consultation with the *Consultant* and as verified through a Certificate for Payment, may withhold total or partial payments at any point after Contract award to cover third party liability claims related to the *Contractor's* operations or actions. The withheld payment amounts shall be used by the *Owner* to cover third party liability claims when there is a dispute between the *Owner* and the *Contractor* regarding responsibility for the claim. These funds are intended to ensure that third parties receive compensation promptly.

.1 Payments to the third parties are to be released immediately and unresolved disputes between the *Owner* and the *Contractor* shall be addressed in accordance with the *Contract*.

.2 Receipts for payments to cover third party liability claims for damages shall be provided to the *Contractor* as requested or required in accordance with the *Contract*."

3.13 GC 5.4 Substantial Performance of the Work and Payment of Holdback

.1 Paragraph 5.4.1: Delete entirely and replace with the following:

"When the *Contractor* considers the *Work* to be substantially performed and in accordance with any applicable lien legislation requirements, the *Contractor* shall submit to the *Consultant* and the *Owner* a written application for *Substantial Performance of the Work*, which shall include a declaration stating that the *Contractor* has attained *Substantial Performance of the Work*, a comprehensive list of items to be completed or corrected, and a request for the *Consultant* to review the claim. The *Consultant* will review the *Work* to certify or verify the validity of the application and, in accordance with applicable lien legislation, or in the absence of such legislation, no later than 10 calendar days after receipt of the *Contractor's* application:

.1 advise the *Contractor* in writing that the *Work* or the designated portion of the *Work* is not substantially performed and give reasons why, or

.2 Issue or request the required documents for *Substantial Performance of the Work* in accordance with applicable lien legislation, or in the absence of such legislation, issue the Certificate of Completion."

.2 Paragraph 5.4.7: Add the following new paragraph:

"No later than five calendar days following the issuance of the Certificate of Completion, the *Contractor*, in consultation with the *Consultant*, shall establish a reasonable date for attaining *Ready-for-Takeover* and/or *Total Performance*. Where applicable, as the project may require and as confirmed by the *Consultant*, the dates for *Ready-for-Takeover* and *Total Performance* may be the same day. Should an independent earlier *Ready-for-Takeover* date apply, the base provisions of Part 12 of the *Contract* shall be followed, including Clause 12.1.5 which shall be intended to establish a *Total Performance Date*. The established *Ready-for-Takeover* and/or *Total Performance* dates shall be incorporated into the *Contract* through a *Change Order*. If the *Contractor* does not fulfill all requirements of the *Contract* by the established *Substantial Performance*, *Ready-for-Takeover*, and/or *Total Performance* dates, the *Contractor* may be considered in default of the *Contract*. The *Ready-for-Takeover* and *Total Performance* dates are directly linked to section GC 5.5 – FINAL PAYMENT."

3.14 GC 5.5 Final Payment

.1 Paragraphs 5.5.2, 5.5.3, and 5.5.4: Delete entirely.

.2 Paragraphs 5.5.2 and 5.5.3: Add the following new paragraphs:

"5.5.2 All parties are to process in accordance with Part 5 – PAYMENT.

5.5.3 The *Consultant* will not consider the application for final payment valid until all applicable materials installed are tested and the *Contractor* has fulfilled the project closeout requirements that include, but are not limited to, GC 5.4 and Part 12 – Owner Takeover."

3.15 GC 6.1 Owner's Right to Make Changes

.1 Paragraph 6.1.2: Add the following to the paragraph:

"The valuation for the change shall include the following maximum adjustments for overhead and profit based on the actual costs:

.1 For Subcontractors - 10% for overhead and 5% for profit on the cost of their work.

.2 For Contractor - 2.5% for overhead and 2.5% for profit on the cost of the Subcontractors' work.

.3 For Contractor - 10% for overhead and 5% for profit on the cost of their work.

Profit to be based on the value of work including overhead."

3.16 GC 6.2 Change Order

.1 Paragraph 6.2.1: Delete entirely and replace with the following:

"When a change in the *Work* is proposed or required, the *Consultant* will provide the *Contractor* with a written description of the proposed change in the *Work*. The *Contractor* shall prepare and submit to the *Consultant*, in a form required by the *Consultant* to permit evaluation, the adjustment in *Contract Price*, if any, and adjustment in *Contract Time*, if any, for the proposed change in the *Work*. Time is of the essence with respect to changes and the *Contractor* shall submit requested *Change Order* documents within a reasonable timeframe commensurate with the requirements of the *Change Order*, and as required to not cause a delay in the contract schedule."

.2 Paragraph 6.2.2: Delete the words "be effective immediately and shall be recorded in a *Change Order*"

and replace with the words "be recorded in a *Change Order* and shall take effect when the *Change Order* is fully signed by the required parties"

.3 Paragraph 6.2.3: Add the following new paragraph:

"The *Contractor* shall ensure that all adjustments in *Contract Price* and *Contract Time* associated with bonding are included in all *Change Orders* and *Change Directives*. The *Contractor* remains responsible to ensure bonding of the work is not jeopardized. Upon request by either the *Owner* or the *Consultant*, the *Contractor* shall provide proof that the Surety Company is being notified and kept apprised of the status of the *Contract* and any changes. The *Contractor* shall also provide, upon request by the *Owner* or *Consultant*, written confirmation from the Surety Company of any increases to bonding costs."

3.17 GC 6.3 Change Directive

.1 Paragraph 6.3.6.2: Delete entirely and replace with the following:

"If an *Owner* requested change results in a net decrease in the *Contractor's* cost, the *Contract Price* shall be decreased by the amount of the net decrease on the *Contractor's* costs, excluding the typical adjustment for the *Contractor's* percentage fee. If a *Contractor* requested change results in a net decrease in the *Contractor's* cost and is not required to maintain the primary design performance or intent of the *Project* as interpreted by the *Consultant*, the *Contract Price* shall be decreased by the amount of the net decrease in the *Contractor's* cost, including the adjustment for the *Contractor's* percentage fee."

3.18 GC 6.5 Delays

.1 Paragraph 6.5.2: Delete the words:

"attain *Ready-for-Takeover* by the date stipulated in Article A-1 of the Agreement – THE WORK ",

and replace with the words:

"maintain the schedule in accordance with the Contract".

.2 Paragraph 6.5.3: Revise as follows:

.1 In Sentence .4, insert the phrase, "except lack of funds or breakdown of Construction Equipment, and," after the word "control".

.2 In Sentence .4, replace "one" with "ones".

.3 Starting at "then the *Contract Time* shall be extended…", reduce indent so that the clause applies to Items 6.5.3.1 through 6.5.3.4.

.3 Paragraph 6.5.6: Add the following new paragraph:

"If the area of the *Work* outlined in these *Specifications* is not available to the *Owner* for its intended use after the *Ready-for-Takeover* or *Total Performance* dates, and the *Owner* claims the *Contractor* has caused the delay, the *Contractor* may be responsible for damages resulting from the delay in the work schedule. (For example, an *Owner's* cost and reduced revenues associated with an extended work schedule). This potential impact to the *Contractor* shall be subject to the provisions of the *Contract*, including but not limited to, SC 2.2.8, Part 8 Dispute Resolution, etc."

3.19 GC 6.6 Claims for a Change in Contract Price

.1 Paragraph 6.6.1: Delete entirely and replace with:

"If the *Contractor* intends to make a claim for an increase to the *Contract Price*, or if the *Owner* intends to make a claim against the *Contractor* for a credit to the *Contract Price*, the party that intends to make the claim shall provide *Notice in Writing* of intent to claim to the other party and to the *Consultant* no later than 10 working days after discovery of the condition or event giving rise to the claim. Should either party fail to submit proper notice within the required time frame, the responding party, in conjunction with the *Consultant*, reserves the right to reject the claim."

3.20 GC 7.2 Contractor's Right to Suspend the Work or Terminate the Contract

.1 Paragraph 7.2.3.1: Delete entirely.

.2 Paragraph 7.2.4: Replace the words "5 *Working Days*" with "10 *Working Days*".

.3 Paragraph 7.2.6: Add the following new paragraph:

"Withholding of payments to the *Contractor* shall remain in effect and may be implemented despite the requirements of GC 7.2. As deemed required by the *Consultant*, amounts may be retained for the *Contractor's* failure to pay all just claims and invoices in accordance with the *Contract*. Furthermore, at the discretion of the *Consultant*, registration or notice of a project-related lien against the *Owner's* property may also result in funds being retained pursuant to provincial lien legislation at the *Place of the Work*."

3.21 GC 8.3 Negotiation, Mediation, and Arbitration

.1 Paragraph 8.3.8.1(1): Delete entirely and replace with the following:

"*Total Performance*,"

3.22 GC 10.4 Workers' Compensation

.1 Paragraph 10.4.2: Add the following new paragraph:

"The *Contractor* shall indemnify and hold harmless the *Owner* from and against all claims, demands, actions, suits, or proceedings by any of the employees of the *Contractor* or *Subcontractors* with respect to worker's compensation insurance. This indemnity shall survive the completion of the *Work* or termination of the *Contract* for any reason."

3.23 GC 12.1 Ready-for-Takeover

.1 Paragraph 12.1.1: Add the following new paragraph before the sentence "The prerequisites to attaining *Ready-for-Takeover* of the *Work* are limited to the following":

"Please refer to the Supplemental Conditions of GC 5.4.7 for contractual requirements associated with establishing the *Ready-for-Takeover* and *Total Performance* dates, and their relationship to one another. For certain projects, and/or if the *Owner* requests Early Occupancy pursuant to GC 12.2, the *Ready-for-Takeover* date may be separate from the *Total Performance* date. In other circumstances, *Ready-for-Takeover* and *Total Performance* dates may be the same and shall be confirmed and captured through a *Change Order* process."

.2 Paragraph 12.1.5: Delete entirely and replace with the following:

"No later than five days following the confirmation of the date of *Ready-for-Takeover*, the *Contractor*, in consultation with the *Consultant*, shall establish a reasonable *Total Performance* date which shall be confirmed and captured through a *Change Order*."

3.24 GC 12.2 Early Occupancy by the Owner

.1 Paragraph 12.2.4: Delete the words "complete the *Work* in a timely manner",

and replace with the words "achieve *Total Performance* in accordance with the *Contract*."

3.25 GC 12.3 Warranty

.1 Paragraph 12.3.1: Replace the words “one year” with the words “as specified, or where not specified elsewhere, one year”.

.2 Paragraph 12.3.3: Delete the words “through the Consultant,”.

.3 Paragraphs 12.3.3, 12.3.4, and 12.3.6: Replace the words “one year” with the word “specified”.

.4 Paragraph 12.3.6: Delete the following sentences:

“The *Contractor’s* responsibility with respect to extended warranties shall be limited to obtaining any such extended warranties from the warrantor. The obligations under such extended warranties are solely the responsibilities of the warrantor.”

3.26 GC 13.1 Indemnification

.1 Paragraph 13.1.1: Insert the following before Paragraph 13.1.1:

“The *Contractor* and the *Owner* shall indemnify and hold harmless each other, and their respective agents and employees from and against all claims, demands, losses, costs or damages of third parties arising or alleged to arise directly, indirectly or incidentally by reason of the operations of the party from whom indemnification is sought in the carrying out of the *Contract*. This indemnification shall survive completion of the *Work* or termination of this *Contract* for any reason.

The *Contractor* shall indemnify and hold harmless the *Consultant* and their respective agents and employees from and against all claims, demands, losses, costs or damages of third parties arising or alleged to arise directly, indirectly or incidentally by reason of the operations of the *Contractor*, his *Subcontractors* and their respective agents or employees, in the carrying out of the *Contract*. This indemnification shall survive completion of the *Work* or termination of this *Contract* for any reason.”

.2 Paragraph 13.1.2.2: Replace the value “$2,000,000” with the value “$5,000,000”.

.3 Paragraph 13.2.5.4: Replace the words “*Notice is Writing*” with the words “*Notice in Writing*”.

END OF SECTION

1. GENERAL

1.1 SCOPE OF WORK

1.1.1 This project is for the renovation of the playground at Upper Yonge Village Daycare Centre. The scope includes:

1.1.1.1 Protection of existing adjacent site elements including the building, City park and right-of-way, neighboring properties and existing trees;

1.1.1.2 Removals, demolition & excavation;

1.1.1.3 Installation of rubber safety surfacing and drainage;

1.1.1.4 Installation of asphalt and concrete paving and concrete curbs;

1.1.1.5 Installation of natural logs elements;

1.1.1.6 Installation of site furnishings, including a pergola and shade sails;

1.1.1.7 Installation of fencing;

1.1.1.8 Planting new trees and sodding

1.1.1.9 Others, as described in the drawings & specifications

1.2 GENERAL INSTRUCTIONS

1.2.1 Work of this Contract shall comply with all local authority building and zoning by-laws, and authorities having jurisdiction, including Public Utilities. The Site shall be protected to meet all regulations and work on and around the Site.

1.2.2 All Work shall be executed in strict accordance with codes, standards and manufacturers' instructions and with best materials and quality of work under full time supervision of competent superintendent.

1.2.3 Coordination of the Work of all Sections of the specifications as required to complete the Project is the responsibility of the Contractor.

1.2.4 Examine the site, existing premises and surrounding areas and be fully informed as to the conditions and limitations under which the Work has to be executed. Claims for additional costs will not be accepted with respect to conditions which could reasonably have been ascertained by an inspection prior to bid closing.

1.2.5 Prior to commencement of work, make careful examination of previously executed work, existing conditions, levels, dimensions and clearances. Immediately notify the Consultant of unsatisfactory preparatory work or substrate conditions.

1.2.6 Specifications, Schedules and Drawings are complementary, and items mentioned or indicated on one may not be mentioned or indicated on the others.

1.2.7 Mention in the specifications or indication on the drawings of materials, Products, operations, or methods, requires that the Contractor Provide each item mentioned or indicated of the quality or subject to the qualifications noted; perform according to he conditions stated each operation prescribed; and provide labour, materials, Products, equipment and services to complete the Work.

1.2.8 Where the singular or masculine is used in the Contract Documents, it shall be read and construed as if the plural, feminine or neuter had been used when the context or the statement so requires and as required to complete the Work, and the rest of the sentence, clause, paragraph, or Article shall be construed as if all changes in grammar, gender or terminology thereby rendered necessary had been made.

1.2.9 It is intended that Work supplied under this Specification shall be complete in every detail for purpose required. This Contract shall include supply of all materials specifically mentioned, but which may be found necessary to complete any portion of Work in accordance with requirements and intent of these Specifications.

1.2.10 Where a trade Section corresponding to any part of the Work is not included in Specifications, cutting and patching for such portions of Work under this category shall be done under this Section.

1.2.11 Perform any type of Work which may be required to make its several parts come together properly to fit into, receive, or be received by Work of each trade shown upon, or reasonably implied by Contract Documents, and make good after them as required.

1.2.12 Submit certificates that are required by authorities having jurisdiction or that are requested in the specification sections.

1.3 SUBMITTALS

1.3.1 Before delivery of Products to Site, submit Product data as specified in each section or as requested by the Consultant.

1.3.2 Submit manufacturer's Product data for systems, materials, and methods of installation proposed for use. Such literature shall identify systems, each component, and shall certify compliance of each component with applicable standards.

1.3.3 Shop Drawings for custom furniture elements.

1.3.4 Submit product data sheets for the following elements of the Work:

1.3.4.1 Source of plant materials.

1.3.4.2 Cut-sheets for all site furnishings and related equipment.

1.3.4.3 Proof of graphics for any signage or engravings.

1.3.5 Before delivery of Products to the Site, submit samples of Products as specified or as requested by the Consultant. Label samples as to origin and intended use in the Work and in accordance with the requirements of the Specification Sections. Samples must represent physical examples to illustrate materials, equipment or work quality and to establish standards by which completed Work is judged.

1.3.6 Ensure samples are of sufficient size and quantity, if not already specified, to illustrate:

1.3.6.1 The quality and functional characteristics of Products, with integrally related parts and attachment devices.

1.3.6.2 Full range of colours available.

1.3.6.3 Notify the Consultant in writing, at time of submission, of any deviations in samples from requirements of the Contract Documents and state the reasons for such deviations.

1.3.7 Identify samples with Project name, Contract number, date, Contractor's name, number and description.

1.3.8 If samples are not acceptable, both samples will be returned. If samples are acceptable, one sample will be so indicated and returned. Be responsible for the cost of samples that are not accepted and for resubmission of samples.

1.3.9 Acceptable samples shall serve as a model against which the products incorporated in the work shall be judged.

1.3.10 Each Product incorporated in the Work shall be precisely the same in all details as the acceptable sample.

1.3.11 Should there be any change to the accepted sample, submit in writing for approval of the revised characteristics and resubmit samples of the Product for approval if requested.

1.3.12 Arrange for the preparation of shop drawings as called for in the Contract Documents or as may be reasonably requested by the Consultant. The Contractor and each Subcontractor shall operate as experts in their respective fields and all shop drawings and samples shall conform to the requirements of the Contract Documents.

1.3.13 The term "shop drawings" means drawings, diagrams, schematics, illustrations, schedules, performance charts, brochures and other data which are required to illustrate details of the Work.

1.3.14 In addition to shop drawings specified in the specification sections, submit shop drawings required by jurisdictional authorities in accordance with their requirements.

1.3.15 Shop drawings shall indicate the following minimum criteria and any additional criteria indicated in the individual specification sections requiring shop drawings:

1.3.15.1 Clear and obvious notes of any proposed changes from the Contract Documents.

1.3.15.2 Fabrication and erection dimension.

1.3.15.3 Details to indicate construction arrangements of the parts and their connections, and interconnections with other work.

1.3.15.4 Location and type of anchors and exposed fastenings.

1.3.15.5 Materials, physical dimensions including thicknesses, and finishes.

1.3.15.6 Descriptive names of equipment.

1.3.15.7 Information to verify that superimposed loads will not affect function, appearance, and safety of the work detailed as well as of interconnection work.

1.3.16 Include in shop drawing submissions detailed information, templates, and installation instructions required for incorporation and connection of the Work.

1.3.17 Before submitting to the Consultant, review all shop drawings to verify that the Products illustrated therein conform to the Contract Documents. By this review, the Contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers and similar data and that it has checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents. The Contractor's review of each shop drawing shall be indicated by stamp, date and signature of a qualified and responsible person possessing the appropriate authorization.

1.3.18 Be responsible for dimensions to be confirmed and correlated at the Site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of the Work of all subtrades.

1.3.19 Submit shop drawings for the Consultant's review with reasonable promptness and in orderly sequence so as to cause no delay in the Work nor in the work of Other Contractors. At the time of submission, notify the Consultant in writing of any deviations in the shop drawings from the requirements of the Contract Documents. The Contractor will be held responsible for changes made from the Contract Documents which are not indicated or otherwise communicated in writing with the submission.

1.4 WARRANTY

1.4.1 Provide **one-year warranty** against defects in materials and workmanship for work carried out under this Contract that is not covered by Manufacturer's warranty.

1.4.2 Act as the Owner's agent to ensure that any deficiencies, repairs or replacements that are required and are covered by manufacturer's warranties are addressed, prior to final acceptance.

1.5 INSPECTION AND TESTING

1.5.1 Be responsible for inspection and testing as required by the Contract Documents, statutes, regulations, by-laws, standards or codes or any other jurisdictional authority. Give the Consultant timely notice of the readiness for inspection, date and time for such inspection for attendance by the Consultant.

1.5.2 Conduct testing, balancing and adjusting of equipment and systems specified in applicable mechanical and electrical specifications sections by independent testing company.

1.5.3 Do not limit responsibility for ensuring that products and execution of the work meet Contract requirements, and inspection and testing required to this end, to specified inspection and testing.

1.5.4 Retain the same independent testing agency that produced the Geotechnical Report provided in these documents to provide quality assurance testing and inspection services relating to earth and granular compaction, as well as the testing of asphalt and concrete materials. This firm is to be

approved by Consultant prior to being retained. Laboratory facilities and field concrete technicians are to be certified by the Canadian Standards Association (CSA).

1.5.5 Testing will include, but not be limited to, the following;

1.5.5.1 Washed sieve gradation analysis for aggregates and granular materials.

1.5.5.2 Standard Proctor field density tests for earth and granular compaction.

1.5.5.3 Concrete cylinder tests.

1.5.5.4 Asphalt Marshall testing.

1.5.5.5 Distribute one copy of all test results to the Consultant for review.

1.5.5.6 Refer to individual Sections of the Specifications for additional inspection and testing requirements.

1.5.5.7 The value of the testing is to be drawn from an allowance – refer to Section 01 21 00 Allowances. The value is not to exceed the specified amount and must meet the requirements described herein. The Contractor's cost for labour, overhead and other expenses are not to be included in the allowance.

1.5.6 Defective products, materials and workmanship found at any time prior to Contract Completion will be rejected regardless of previous inspections, testing, and reviews of the Work. Inspections, testing, and reviews shall not relieve the Contractor from their responsibility but are a precaution against oversight or error. Remove and replace defective and rejected products, materials, systems, and workmanship. Be responsible for delays and expenses caused by rejection.

1.6 TEMPORARY PROTECTION

1.6.1 Include all costs for the provision of temporary heating, temporary shelters and all other necessary cold weather measures to enable all trades including any assigned sub trades to proceed without delay regardless of weather, to complete the work.

1.7 SITE ACCESS, PROTECTION AND STAGING

1.7.1 Site is to be accessed for construction only in areas indicated on drawings and as verified in the field.

1.7.1.1 Storage of equipment and materials shall only occur in areas designated by Owner and protected from public access.

1.7.1.2 Trained flag-person must be present for access of all vehicles and equipment.

1.7.1.3 Contractor shall not permit any construction-related activities in any area on-site that has not been agreed in writing by Owner.

1.7.1.4 Site Protection fencing shall be 2.0 metres high, portable, sectional metal fencing. Fencing shall be erected and maintained where shown on plans, until final acceptance of work.

1.7.1.5 All fencing materials shall be removed from Site upon acceptance by Owner, and all fences opened for access shall be restored to their previous condition or better.

1.8 TEMPORARY DUST AND TRACKING CONTROL

1.8.1 Contractor shall be solely responsible for controlling dust nuisances resulting from work both within work limits and elsewhere, as directed by Consultant. Quantities of water and calcium chloride which are to be supplied and applied by Contractor to those areas as being necessary and unavoidable for prevention of dust nuisance or hazard to area, as directed by Consultant at no additional cost.

1.8.2 Care shall be taken to control dust. Provide adequate protection and dust screens to complete satisfaction of Consultant.

1.8.3 All points of construction egress and ingress are to be maintained to prevent tracking or flowing of soil / mud / sediment onto public roads, sidewalks or abutting property. Contractor shall be responsible for immediately cleaning up any tracking or flowing of soil / mud / sediment onto public roads to satisfaction of Owner or Consultant.

1.9 TEMPORARY ENVIRONMENTAL CONTROLS

1.9.1 **Protection of Existing Trees**:

1.9.1.1 Trees on City property, or on adjacent properties: Install tree protection barriers or other measures as indicated in arborist's report and as shown on drawings.

1.9.1.2 Supply, install and maintain tree protection measures as indicated on plans, or as directed by Consultant.

1.9.1.3 Ensure that flooding or sediment deposition is not caused on areas where existing trees are located.

1.9.1.4 If the bark of any tree is damaged, it is to be neatly trimmed back to uninjured bark without causing further damage. Injuries to trees caused by Contractor are to be treated as directed by Consultant. This may include treatment with acceptable wound dressing by commercial tree care expert at Contractor's expense, or tree removal and replacement as determined by Consultant.

1.9.1.5 Branches 25 mm or larger in diameter that are broken by Contractor are to be cut back to neat surface within five calendar days of breakage. Branches to be removed completely shall be cut back to within 10 mm of their base.

1.9.1.6 Roots 25 mm or larger that are exposed by Contractor are to be cut back cleanly to soil surface within five calendar days of exposure.

1.9.1.7 During construction period Contractor will not stockpile construction materials or excavated material in lawn areas under trees or re-fuel construction equipment in vicinity of trees. All re-fuelling shall be undertaken in areas designated for use by Consultant.

1.9.1.8 Any large (greater than 75 mm diameter) roots cut, excavated or injured during construction are to be properly cut and painted with orange shellac as directed by Consultant.

1.9.1.9 Branch and root pruning shall be carried out by certified arborist, in accordance with good arboricultural practice.

1.9.2 **Sediment and Erosion Control:**

1.9.2.1 Duration of excavation and backfill operations shall be minimized to reduce potential for transport of materials (i.e. soil, sediment, granular material) to storm drains or off-site.

1.9.2.2 Measures including but not limited to use of containers, tarps, and windrows must be in place to secure stockpiled materials (i.e. excavated soils, new materials) where there is risk that loose material could be transported off site through surface runoff and/or wind.

1.9.2.3 Sediment and erosion control measures will be installed in manner that prevents transport of sediment from work area to storm drains or off-site. This can include but is not limited to installation of sediment control fencing along down slope of work area, in swales, or surrounding catch basins, to intercept runoff. Sediment control fencing shall be installed and maintained in accordance with Ontario Provincial Standard Details (OPSD) 219.110, and 219.190.

1.9.2.4 If dewatering is required (i.e. following precipitation) then sediment filtering shall be required prior to discharge of pump water. This may include but is not limited to discharge of pump water through a sediment filter bag, settling pond and/or silt fencing enclosure prior to discharge or collection of and transport of pump water off-site to an approved disposal site using vacuum or tank truck. If pump water is discharged on-site avoid discharging pump water onto areas that are prone to flooding or erosion.

1.9.2.5 All disturbed areas will be stabilized and restored immediately following construction.

1.9.2.6 Appropriate sediment and erosion control measures should be left in place and maintained by Contractor until such time as construction is complete and site restoration measures are functioning as intended.

1.9.3 **Construction Activities:**

1.9.3.1 All vehicle fuelling and maintenance will be carried out in areas off slope and away from drainage features (i.e. swales, storm sewers) that may transport deleterious substances (i.e. fuel, oil, lubricant) off site.

1.9.3.2 All chemical and petroleum products (i.e. oil, fuel, lubricants) will be stored a minimum of 15 m from drainage features and root zones of existing trees, and in secure areas to minimize their potential transport to storm drain systems or off-site.

1.9.3.3 All construction materials shall be stored in manner that prevents their transport to storm drain systems or off-site.

1.9.3.4 Keep adequate supply of clean up material on-site as well as crews fully trained on their use to respond to and contain spills that may occur during construction. In the event of a spill the Contractor is to contact the Ministry of the Environment immediately and report the incident.

1.9.3.5 Give particular attention to finished dimensions and elevations of the Work. Make finished Work flush, plumb, true to lines and levels and accurate in all respects.

1.10 WORKMANSHIP

1.10.1 Workmanship shall be the best quality, executed by workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Consultant if required Work is such as to make it impractical to produce required results.

1.10.2 Do not employ any unfit person or anyone unskilled in their required duties. The Consultant reserves the right to require the dismissal from the Place of the Work, workers deemed incompetent, careless, insubordinate or otherwise objectionable.

1.10.3 Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with the Consultant, whose decision is final.

1.11 FASTENINGS

1.11.1 Supply all fastenings, anchors, accessories and adhesives required for fabrication and erection of the work.

1.11.2 Exposed metal fastenings and accessories to be of same texture, colour and finish as base metal on which they occur.

1.11.3 Metal fastenings shall be of the same material as the metal component they are anchoring or of a metal which will not result in an electrolytic action which would cause damage to the fastening or metal component under moist or acidic conditions.

1.11.4 Anchoring and fastening devices or adhesive to be of appropriate type and to be used in sufficient quantity in such a manner as to provide positive permanent anchorage of the unit to be anchored in position. Install anchors at spacing to provide for required load carrying capacity.

1.11.5 Keep exposed fastenings to a minimum, evenly spaced and neatly laid-out.

1.11.6 Supply adequate instructions and templates and, if necessary, supervise installation where fastenings or accessories are required to be built into work of other trades.

1.11.7 Fastenings which cause spalling or cracking of material to which anchorage is being made are not permitted.

1.11.8 Powder actuated fastening devices will not be permitted.

1.12 SETTING OUT

1.12.1 Before commencing work, verify lines, levels and dimensions shown on the drawing and report discrepancies in levels or dimensions to the Consultant. Be responsible for work done prior to the receipt of the Consultant's decision regarding reported discrepancies.

1.13 CHANGES AND DAMAGES

1.13.1 Any changes or Damage to property site elements or the surrounding environment shall be documented and reported immediately to the consultant and shall be promptly and completely repaired.

1.13.2 Any proposed changes shall be approved by the consultant prior to any changes being made.

1.13.3 The Contractor shall be liable to the Owner for all costs or damages arising from acts, omissions, negligence or willful misconduct by their own forces and/or by their sub-contractors.

1.14 CLEANING

1.14.1 Do not allow waste material and debris to accumulate in an unsightly or hazardous manner. Provide containers in which to collect waste material and debris.

1.14.2 Separate and salvage materials suitable for recycling from general waste stream and transport to recognized recycling facility. Buying, burning or selling of any waste materials on-site is prohibited.

1.14.3 Use cleaning materials recommended for the purpose by both the manufacturer of Products forming surfaces to be cleaned and cleaning material.

1.14.4 Conduct cleaning operation in compliance with the occupational health and safety regulations, with local ordinances and anti-pollution laws.

1.14.5 Remove hazardous substances from work areas at the close of each day, or more often if required.

1.14.6 Disposal of liquid wastes into waterways or sewers is prohibited.

1.14.7 When the Work is substantially performed, remove surplus Products, tools, construction machinery and equipment not required for the performance of the remaining Work.

1.14.8 Broom clean and wash exterior walks, steps and surfaces.

1.14.9 Rake clean exterior grassed areas and planting beds.

1.15 CLOSE OUT

1.15.1 **Contractor's Inspection:**

1.15.1.1 Contractor to conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

1.15.1.2 Notify Consultant in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.

1.15.1.3 Request Consultant's inspection.

1.15.2 **Consultant's Inspection:**

1.15.2.1 Consultant and Contractor to inspect Work and identify defects and deficiencies.

1.15.2.2 Contractor to correct Work as directed.

1.15.3 **Completion Tasks:**

1.15.3.1 Submit written certificates in English that tasks have been performed as follows:

1. Work: completed and inspected for compliance with Contract Documents.
2. Defects: corrected and deficiencies completed.
3. Equipment and systems: tested, adjusted and fully operational.
4. Work: complete and ready for final inspection.

1.15.4 **Final Inspection:**

1.15.4.1 When completion tasks are done, request final inspection of Work by Consultant, and Contractor.

1.15.4.2 When Work incomplete according to Owner or Consultant, complete outstanding items and request re-inspection.

1.15.5 **Declaration of Substantial Performance:**

1.15.5.1 When Consultant considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

1.15.6 **Commencement of Lien and Warranty Periods:**

1.15.6.1 Date of Owner's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

END OF SECTION

1.0 GENERAL

Work under this Contract includes the complete site and building renovation at the Upper Yonge Village Daycare Centre, located at 14 St. Clements Avenue in Toronto, Ontario.

1.1 Description of Existing Building

The 14 St. Clements Avenue site is located north of Eglinton Avenue at Yonge Street. The site and building originally served as a place of worship circa 1909 to 1923, then as a public library until 1975, and lastly as a daycare space for much of the time since.

The building structure has approximate plan dimensions of 19.8 metres in the north-south direction and 21.3 metres in the east-west direction for an overall footprint of approximately 425 square metres. The building footprint is per original construction, excepting a small washroom addition off the west extent of the north elevation. The site dimensions are approximately 32.0 metres by 32.0 metres for a total area of approximately 1,024 square metres.

The building is a single-storey wood and brick masonry framed structure with a partially excavated basement level, finished ground floor, and unfinished attic space. The building has wood floor and roof framing supported by exterior load-bearing brick masonry walls, and interior wooden partition walls and beams. The building foundation is of cast-in-place concrete construction. The building is generally constructed tight to the west property line and near to the south property line within the site footprint.

There is an enclosed outdoor child play area immediately adjacent the east building elevation. A City park is present between the play area and Yonge Street to the east. The enclosed playground area wraps around the north elevation tight to the north and west property lines. It is our understanding that part of the play area extending to the east is on leased park space; though, this isn’t visually obvious as we are told the agreement has been in place since some time in the mid-1980’s.

The play area includes asphalt, interlocking brick, and wood chips on sand bedding around playground climbing apparatuses. The yard area is completely enclosed by fencing and adjacent building walls. Large precast paver hard-landscaping finishes are present along the south elevation, along with a concrete building access sidewalk, and interlocking unit paver driveway at the west extent of the south elevation of the building. The west and south perimeters of the site feature a metal fence, while the north perimeter features a wooden fence.

The building interior finishes are typically vinyl composition tile (VCT) flooring, painted gypsum wall board wall finishes, and painted gypsum board and suspended acoustical tile ceiling finishes. The building includes two (2) single occupancy washrooms and two (2) multi-use washrooms equipped with porcelain fixtures. The building also has one (1) kitchen featuring typical household/ non-commercial appliances, wooden cabinetry, and laminate countertops.

The building envelope elements include mass brick masonry exterior walls and foundations, single-glazed aluminum storefront porch enclosures, wood cladding elements, wood-framed double-glazed insulated glass unit (IGU) windows, hollow-metal doors, sloped asphalt shingle roofing, and conventional modified bitumen membrane (MBM) roofing on the small washroom addition at the west extent of the north elevation.

Domestic water enters the building through the basement level via a 25 millimetre (1”) incoming municipal water service that passes through a digital water meter complete with a bypass and backflow preventer. Domestic hot water (DHW) is provided by two gas-fired tank type water heaters located in the basement.

Heating for the building is primarily provided by a series of ceiling hung hot water unit heaters. Hot water for the unit heaters is provided by a gas-fired atmospheric type heating boiler located in a basement service room. Supplementary heating is provided by electric baseboard heaters and forced flow heaters.

Cooling for the building is provided by a split type AC system with a Carrier condensing unit located on the roof over the northwest washroom addition and an interior evaporator/ air handling section in the ceiling space above a large multi-purpose/ classroom.

1.2 Description of Work

.1 The requirements of the Articles of Agreement, Conditions of the Contract, Division 1 apply to and form all Sections of the Contract Documents and the Work.

.2 Work in this Specification is divided into descriptive sections which are not intended to identify absolute contractual limits between Subcontractors, nor between the Contractor and their Subcontractors. The Contractor is responsible for organizing division of labour and supply of materials essential to complete the Contract. The Consultant assumes no liability to act as an arbiter to establish subcontract limits between Sections or Divisions of Work.

.3 It is intended that the Work supplied under these Contract Documents shall be complete and fully operational in every detail for the purpose required. Provide all items, articles, materials, services and incidentals, whether or not expressly specified or shown on Drawings, to make finished Work complete and fully operational, consistent with the intent of the Contract Documents.

.4 Specifications, Schedules, and Drawings are complementary and items mentioned or indicated on one, may not be mentioned or indicated on the others.

.5 Contractors finding discrepancies or ambiguities in, or omissions from the Drawings, Specifications, or other Contract Documents, or having doubt as to the meaning and intent of any part thereof shall contact the Consultant for clarification.

.6 Mention in the specifications or indications on the drawings of materials, products, operations, or methods, requires that the Contractor provide each item mentioned or indicated of the quality or subject to the qualifications noted; perform according to the conditions stated in each operation prescribed; and provide labour, materials, products, equipment, and services to complete the Work.

.7 Where the singular or masculine is used in the Contract Documents, it shall be read and construed as if the plural, feminine, or neuter had been used, when the context or the statement so requires and as required to complete the Work, and the rest of the sentence, clause, paragraph, or Article shall be construed as if all changes in grammar, gender, or terminology thereby rendered necessary had been made.

.8 The terms “approved”, “review”, “reviewed”, “accepted”, “acceptance”, “acceptable”, “satisfactory”, “selected”, “directed”, “instructed”, required”, submit”, “permitted”, “approved alternative”, “approved equal”, or similar words or phrases are used in standards or elsewhere in the Contract Documents, it shall be understood that words “by (to) the Consultant” follow, unless context provides otherwise.

.9 It is the Contractor’s responsibility to provide all labour, material, equipment, supervision, and services necessary to complete the renovations outlined in these Contract Documents taking into account all site conditions, noise restrictions, work area restrictions, protection requirements, accessibility restrictions, phasing restrictions, etc. No extras will be entertained for inconveniences after the award of this Contract.

.10 The term ‘or approved alternative’ following a list of products, systems, or manufacturers used in the Contract Documents shall be construed to mean approved by the Consultant. Specified products to be Base Bid. Contractor follow ‘Substitution’ procedures specified in Section 01 60 00 for submitting proposed products, systems, and manufacturers and obtain Consultant’s approval of the same prior to proceeding with ordering proposed products and systems, or engaging Manufacturers prior to Consultant’s review and acceptance do so at their own risk.

.11 Where the works ‘submit’, ‘acceptable’, and ‘satisfactory’ are used in the Contract Documents, they shall be considered to be followed by the Words ‘to the consultant’ unless the context provides otherwise.

.12 The terms “exposed” or “exposed to view” refers to surfaces that are within the line of vision of persons from any accessible viewpoint, both within and without the building. Where any part of a surface is exposed to view, all other portions of that surface shall also be considered as exposed to view.

.13 In particular the work, briefly described below, applies to all sub-scopes and phases of the work and includes, but is not necessarily limited to the following:

.1 The installation and maintenance of hoarding, dust protection, site protection, and construction signage around the areas of work as described in Section 01 56 00.

.2 The installation and maintenance of ventilation and exhaust systems into and out of the work areas as described in Section 01 56 00.

.3 Pre-Construction deficiency review complete with photographs and videos, to be submitted to the Owner and Consultant prior to start of Demolition and Construction.

.4 <u>Demolition Scope:</u>

.1 Removal and disposal of all interior finishes (i.e. furniture, millwork, doors, door hardware, door frames, floor finishes, wall finishes, ceiling finishes, insulation, etc.) from the Basement and Ground Floor levels of the building.

.2 Removal and disposal of the existing windows, including hardware, framing, etc.

.3 Removal and disposal of electrical, HVAC, and plumbing services, including appliances, lighting fixtures, plumbing fixtures, conduit and cabling, plumbing piping, duct work, mechanical units, etc.

.4 Removal and disposal of the slab-on-grade within the Basement Level of the building, including subgrade material and unexcavated fill material, as indicated on the Drawings.

.5 Removal and disposal of brick masonry as required to facilitate new wall openings in the Basement and Ground Floor levels of the building, as indicated on the Drawings.

.6 Removal and disposal of the Ground Floor structure as required to facilitate new floor openings, as indicated on the Drawings and where required to facilitate the installation of new services.

.7 Removal and disposal of the building structure, southwest vestibule structure, and other structural elements on the Ground Floor level of the building, as indicated on the Drawings.

.8 Removal and disposal of the existing roofing systems from the building roof levels.

.9 Removal and disposal of existing playground equipment, furniture, shed structures, stair and ramp structures, and other exterior features as indicated on the Drawings.

.10 Removal and disposal of hard and soft landscaping features throughout the property, as indicated on the Drawings.

.11 Removal and disposal of subgrade materials to facilitate installation of new foundation walls and footings in the Basement Level, new elevator pit in the Basement Level, new foundation walls and footings for new ramp and vestibule at the southwest corner of the building/ site, new foundation walls and footings for new addition at the northwest corner of the building, new waterproofing systems on the foundation walls, and as required to instate new site grading, as indicated on the Drawings.

.12 Disposal of all construction materials/ debris must be performed in a legal manner and in accordance with best practices referenced in the Contract Documents.

.5 Reconstruction/ Renovation Scope:

.1 Underpinning of existing building foundations from within the Basement level of the building, as indicated on the Drawings and where required to facilitate new construction.

.2 Construction of new reinforced cast-in-place concrete elevator pit base, footings, and foundation walls, and installation of a new LULA lift. Work includes structural reinforcing at new floor openings, installation and commissioning of all associated electrical, fire protection and sensors, security, and mechanical systems, shop drawing preparation, etc.

.3 Construction of new reinforced cast-in-place concrete footings and foundation walls within the Basement Level, at the new building addition at the northwest corner of the building, and at the new vestibule and ramp at the southwest corner of the building/ site, as indicated on the Drawings. Work includes cold-applied waterproofing installation on the exterior side of the foundation walls where indicated on the Drawings.

.4 Construction of a new reinforced cast-in-place concrete slab-on-grade structure within the Basement Level of the building, complete with new granular base, insulation, vapour barrier, etc., as indicated on the Drawings.

.5 Construction of new stairs from the Basement to the Ground Floor level of the building, including structural reinforcing at new floor openings.

.6 Construction of a new building addition at the northwest corner of the building, including new structural framing, sub-flooring, stud walls, roof and wall sheathing, insulation, exterior finishes, etc.

.7 Construction of a new vestibule at the southwest corner of the building, including new structural framing and columns, slab-on-grade with granular materials and insulation, walls, etc.

.8 Building structure modifications on the Ground Floor level to accommodate revisions to the Ground Floor layout, including new structural steel columns, beams, reinforced wood joists, etc., as indicated on the Drawings and where otherwise directed by the Consultant.

.9 Surface preparation and crystalline and cold-applied waterproofing system installation, and installation of curtain injection foundation wall waterproofing along building foundation walls, where indicated on the Drawings.

.10 Installation of new windows throughout the building, including new framing, sealants, etc.

.11 Installation of a new roofing system on the building roof levels, including new eavestroughs, downspouts, pre-finished metal flashings, etc.

.12 Installation and commissioning of new geothermal systems and associated components, including augering/ excavations, piping, controls, connections, hardware, accessories, etc.

.13 Installation and commissioning of new HVAC systems and associated components, including equipment, duct work, plumbing and electrical, controls, structural supports and reinforcing, hardware, accessories, etc.

.14 Installation and commissioning of new plumbing systems, fixtures, devices, etc. throughout the building and site, including all associated drains, sump pits, pipes, pumps, connections, hardware, accessories, etc.

.15 Installation and commissioning of new electrical systems, fixtures, devices, etc. throughout the building and site, including all associated lighting fixtures, receptacles, power systems, PV systems, heat tracing, cabling, conduits, connections, hardware, accessories, etc.

.16 Installation and commissioning of new security systems, fixtures, cameras, devices, etc. throughout the building and site, including all associated conduit, cabling, hardware, etc.

.17 Installation of all new interior finishes, including new stud framing, insulation, wall and ceiling finishes, millwork, doors, door hardware, floor finishes, finish carpentry, paint, etc.

.18 Supply, installation, and commissioning of new appliances, including connections to building systems/ services.

.19 Construction of a new reinforced cast-in-place concrete ramp slab at the southwest corner of the building, including perimeter guardrails and handrails, embedded snow melting system, etc.

.20 Construction of a new wood deck structure on the north elevation of the site, complete with new foundations, stairs, guardrails and handrails, decking, etc.

.21 Construction of new wood stair and landing structures along the east elevation of the building, complete with new foundations, guardrails and handrails, decking, etc.

.22 Re-grading of the site and installation of new exterior finishes, including hard and soft landscaping features, fencing, storage sheds, playground equipment, etc.

.6 Repair all areas damaged by construction activity; specifically, the Contractor shall repair all damage resulting from the Construction to the satisfaction of the Consultant including repainting of surfaces that have been damaged in accordance with these Contract Documents.

.7 Final cleaning of structure, fixtures, finishes, piping, hard and soft landscaping, etc., and the disposal all waste products and/ or debris generated by the construction activity as well as any material present in the work area prior to the commencement of the Work. The areas requiring cleaning shall consist of all areas affected by the Work.

.8 Coordinate and administer all necessary inspections for Authorities having Jurisdiction including but not limited to ESA inspections, TSSA, MOE, Building Department Inspections and signoff, Fire alarm Verification, and HVAC and plumbing inspections and applications for all occupancy permits. The complete approvals of these agencies is the responsibility of Contractor, the City will provide the Building Permit.

.1 Include for cleaning and re-commissioning of existing equipment.

.2 Include for cleaning and restoration of existing mechanical equipment and services as noted in the construction documents.

.14 Provide temporary power to the site for use during construction and pay all costs for disconnection of existing power, supply and connection of temporary power, and connection of permanent power service after completion of interior and exterior renovations, including meters and other equipment specified and required by Toronto Hydro and/ or other Authorities Having Jurisdiction. Pay fees and costs associated with temporary power usage during construction.

1.3 Existing Conditions

.1 Make a careful examination of the site, and investigate and be satisfied as to all matters relating to the nature of the Work to be undertaken, as to the means of access and egress thereto and therefrom, as to the obstacles to be met with, as to the extent of the Work to be performed, any limitations under which the Work has to be executed, and any and all matters which are referred to in the Contract Documents. Claims for additional costs will not be entertained with respect to conditions which could reasonably have ascertained by an inspection prior to Tender closing.

.2 Report any inconsistencies, ambiguities, discrepancies, omissions, and errors between Site conditions and Contract Documents to the Consultant prior to the commencement of Work. If inconsistencies, ambiguities, discrepancies, omissions, and errors are not reported and clarified, the most stringent requirement shall govern, as determined by the Consultant. Ensure that each Subcontractor performing work related to the site conditions has examined it so that all are fully informed on all particulars which affect the Work thereon in order that construction proceeds competently and expeditiously.

.3 Before commencing the Work of any section or trade, carefully examine the Work of other sections and trades upon which it may depend, examine substrate surfaces, and report in writing to the Consultant, defects which might affect new Work. Commencement of Work shall constitute acceptance of conditions and Work of other sections, trades, and other Contractors, upon which the new Work depends. If repair of surfaces is required after commencement of specific Work, it shall be included in the Work of the trade providing the specific system or finish.

1.4 Work Sequence

.1 The work areas will be available within 60 days of tender close. Contractor to confirm start date. All work outlined in these specifications is to be complete **within two (2) years of Contract award**.

1.5 Phasing of the Work

.1 Work to be performed shall be in accordance with Section 01 11 01 - Use of Site, and the provided Phasing Drawings.

.2 Alternate work sequencing may be proposed by the Contractor for review and acceptance by the Owner. Deviation from the recommended sequence of work on the phasing drawings shall not be undertaken without the written approval of the Owner.

.3 Provide and maintain access facilities, as may be required for access to the Work.

.4 Minimize disruption, noise, and dust to the functions of existing operational areas of the site and neighbouring properties. Times of entry, routes of access, and time required to complete the Work shall be arranged and scheduled in coordination with the Owner.

.5 Confine Work and operations of employees to limits indicated by the Contract Documents. Do not unreasonably encumber the premises with products.

.6 Organize delivery of materials/ equipment to and removal of debris and equipment from place of Work to permit continual progress of Work.

.7 Determine and make arrangement as required for loading and unloading of equipment and products at times that will not affect public traffic flow, and that will be permitted by the Owner and municipality. Conform to Local by-laws with regards to parking restrictions, street closures, and other conditions.

.8 Make provisions and arragements, and provide allowances if times for loading and unloading allowed by the Owner and municipality are other than regular working hours.

.9 All products, materials, and equipment required on Site shall be portable and/or size suitable for access and movement on Site without causing damage to the existing building or neighbouring properties.

1.6 Construction Schedule

.1 In conjunction with and in a form acceptable to the Consultant and Owner, provide within five (5) working days after award of Contract a detailed schedule indicating the following parameters:

.1 Start date and completion date for the overall project

.2 Start and completion dates for demolition scope of work, broken down into all individual aspects of the demolition scope of work.

.3 Start and completion dates for the base building reconstruction scope of work, broken down into all individual aspects of this scope.

.4 Start and completion dates for the electrical, mechanical, security, HVAC, and fire protection scopes of work.

.5 Start and completion dates for the millwork supply and installation.

.6 Start and completion dates for building envelope scopes of work, including windows, roofing systems, insulation, etc.

.7 Start and completion dates for supply and installation of plumbing fixtures, appliances, lighting fixtures, etc.

.8 Start and completion dates for all other scope of work items.

.9 Daily and weekly schedule for labour and equipment, hours of operation, and crew sizes.

.2 The construction schedule shall reflect completion of all work under the Contract within the specified time and in accordance with these Specifications.

.3 If the Contractor desires to make a major change in the method of operation after commencing construction, or if the schedule fails to reflect the actual progress, the Contractor shall submit to the Consultant a revised construction schedule in advance of beginning revised operation.

.4 Should the progress of work fall behind schedule, the Contractor will be responsible for working additional hours or increasing workforce as required to meet the specified completion date.

.5 The Contractor shall submit a revised construction schedule showing delays and additional measures to complete the project by the specified completion date.

.6 Provide detailed 2-week look ahead schedules if requested by Owner or Consultant.

.7 Incorporate into the Contract Schedule allowances for the number of working days lost due to inclement weather, which can be anticipated, on the basis of analysis of information available from Environment Canada, for weather conditions on and near the site, over the last ten (10) years. The Contractor may be entitled to a schedule extension for those activities on the critical path which are delayed on account of inclement weather, assessed on a quarterly basis, by the number of days in excess of the anticipated number of working days for the quarter in question by more than 20%. No additional payment will be made on account of any such schedule extension.

.8 For the purpose of Item 1.4.4 above, the quarters are defined as January 1 to March 31; April 1 to June 30; July 1 to September 30; and October 1 to December 31.

END OF SECTION

1.0 GENERAL

1.1 Contractor's Use of Site

.1 The site and building are to be closed for the duration of construction. Contractor has complete and sole use and access to the designated work areas during the specified work hours unless otherwise stipulated by the Owner during the course of the Work.

.2 Contractor accepts full responsibility for assigned work and storage areas from the time of Contract award, until Substantial Performance of the Work. The site and building are to remain secured throughout the course of the Work.

.3 Coordinate work schedule with the Owner and Consultant. No work shall be performed until approved by Owner. Provide all parties with a schedule at least one (1) week following Contract Award.

.4 It is Contractor's responsibility to control vehicle and pedestrian traffic and to redirect if necessary to allow access to public areas outside of work areas. Any required traffic rerouting and work sequence shall be closely coordinated with the Owner.

.5 Provide signage of professional quality, barriers, and hoarding as necessary to protect the public from construction and Contractor operations, to secure the site and work areas, and to route vehicle and pedestrian traffic around the site. Provide signage at each site and work area entrance indicating that repairs are being performed and we are sorry for the inconvenience. Refer to the Drawings and Section 01 56 00 for a list and approximate locations of non-standard construction signage that must be supplied by the Contractor. These signage requirements are in addition to any standard signs required to control and reroute traffic or maintain public safety.

.6 Hoarding and dust protection is to be provided around the site and each area of work in accordance with Section 01 56 00 and the Phasing Drawings. The site and work areas are to be sealed to prevent the release of construction dust and debris into other areas.

.7 Completely enclose and ventilate interior work areas (fresh air in and exhaust out) without allowing dust to escape from the work areas. Exhaust system must filter dust out of the air before it is released into the atmosphere. All exhaust systems must be filtered and directed to the outside through ducting, which is to be installed in a manner acceptable to the Owner and Consultant. Clean and replace filters regularly.

.8 Implement temporary measures to maintain interior air quality, temperature, and ventilation during performance of the Work.

.9 Use of power plant, percussive, and all other noise-generating equipment to be in accordance with all local by-laws and ordinances.

.10 Confine construction equipment, temporary work, storage of products, waste products and debris, and operations of employees and subcontractors to limits indicated by laws, ordinances, permits, or Contract Documents and do not unreasonably encumber the Place of the Work.

.11 Do not overload floor or roof areas with equipment or stored materials. Review all equipment weights and loading procedures with Consultant prior to commencing work.

.12 Do not close, obstruct, or store materials in roadways, sidewalks, or other public passageways without prior approval and permits from authorities having jurisdiction, and from the Owner. Do not interfere with safe passage to and from building and adjacent public sidewalks and roads.

.13 Move stored products or equipment that interfere with the Work, the safe passageway through public areas, adjacent residents, etc.

.14 Obtain and pay for all necessary approvals to locate equipment or materials on municipal property, excluding building permit.

.15 Protect all existing elements to remain. Typical items include, but are not limited to light fixtures, walls, plants, finishes, windows, doors, etc.

.16 Protect all utilities and services that must remain in service throughout the construction period.

.17 During transportation of materials or equipment through public areas, protect the public, property, landscaping, finishes, etc. from damage. All damage caused by the Contractor is to be repaired or rectified at Contractor’s expense.

.18 Make allowance in price to cover all costs of temporary removal and replacement or relocation of existing mechanical/ electrical services, hardware, landscaping, etc. required for completion of the Work.

.19 Propane powered equipment is not permitted within interior areas.

.20 Temporary heat and ventilation used during construction – including the cost of installation, fuel, operation, maintenance, and removal of equipment – shall be paid for by the Contractor. Use of direct-fire heaters discharging waste products into work areas is not permitted.

.21 Provide temporary power to the site for use during construction and pay all costs for disconnection of existing power, supply and connection of temporary power, and connection of permanent power service after completion of interior and exterior renovations, including meters and other equipment specified and required by Toronto Hydro and/ or other Authorities Having Jurisdiction. Pay fees and costs associated with temporary power usage during construction.

.22 Use St. Clements Avenue for delivery and removal of material for duration of Project. Disposal bins, supply trucks, etc. are to be located within the site enclosures, unless otherwise approved by the Owner during the course of the Work. Contractor is responsible for all required permits.

.23 Maintain free access routes for ambulance, fire emergency vehicles, garbage trucks, etc.

.24 The Contractor’s staff, including all subtrades, suppliers, delivery personnel or any other person visiting the site under the Contractor’s direction or engagement, shall behave and conduct themselves professionally. Validated complaints lodged against the Contractor by the Owner, Owner’s representatives, site occupants, the public, or the Consultants shall result in the immediate and permanent removal of the individual on the Contractor’s staff from the site for the remainder of the duration of the project.

1.2 Hours of Work

.1 Hours of work and use of all equipment to be restricted in accordance with local and municipal noise by-laws and regulations.

1.3 Effect on Building and Site

.1 Schedule operations to comply with laws, by-laws, ordinances, rules, and regulations relating to the Work.

.2 Locate all existing utilities prior to construction and protect them during construction.

END OF SECTION

1.0 GENERAL

1.1 Section Includes

.1 Cash Allowances

.2 Contingency Allowances

.3 Determination of Actual Costs

.4 Adjustment of Contract Price

1.2 Allowances

.1 Allowances include for the following:

.1 Material Testing and 3rd Party Inspections

.2 Furniture Supply and Installation

.2 Unless otherwise specified, amounts for each allowance include:

.1 Actual product cost

.2 Applicable taxes and tariffs

.3 Freight, handling, unloading, and storage

.4 Contractor services

.5 Labour for installation and finishing

.6 Construction machinery and equipment

.7 Authorized expenditures

.3 Value Added Taxes do not form a part of the allowances.

.4 Contractor’s overhead and profit to be included as follows:

.1 Overhead and profit for each cash allowance will be included in Contract Price.

.2 Overhead and profit for contingency allowance, as noted in Section 00 73 00, under Article 2.16.

.5 Contractor will provide the Owner with at least three (3) competitive prices for work of each allowance. The Owner shall determine actual costs as specified in Paragraph 8.

.6 Additional expenditures not identified as part of the allowances will be submitted for review by the Owner and where deemed applicable authorized in writing by the Owner.

.7 Notification in writing by the Owner is required prior to the Contractor executing work outlined under each allowance.

.8 The Owner will provide the Contractor with applicable documentation, equipment, and products within the time specified or, where such time is not specified, in sufficient time to permit the construction schedule to be maintained.

1.3 Cash Allowance – Material Testing and 3rd Party Inspections

.1 Include in Stipulated Sum, a cash allowance of $ 50,000.00 for material testing and inspection services specified herein or at the request of the Consultant by an Independent Testing Agency selected by the Owner. Reimbursement of the material tester's services shall be via this allowance for passing results only. Testing services for non-compliant materials or installation shall be borne by the Contractor.

1.4 Cash Allowance – Appliance Supply and Installation

.1 Include in Stipulated Sum, a cash allowance of $ 80,000.00 for the supply, installation, and commissioning of new appliances per Owner requirements. Reimbursement of the costs shall be via this allowance for approved and successfully commissioned products only. Non-compliant products or installation shall be borne by the Contractor.

1.5 Contingency Allowance

.1 Include in Stipulated Sum, a contingency allowance of $500,000 for project incidentals. Includes unforeseen work related to the Project.

1.6 Determination of Actual Costs

.1 Invoices, bills of sale, and notes payable for actual cost of items and services covered in an allowance amount shall be submitted by the Contractor for verification by the Owner.

.2 Trade discounts and refunds shall be credited to Owner.

.3 Where applicable, the valuation for a change shall be in accordance to Section 00 73 00 – Supplementary Conditions.

1.7 Adjustment of Contract Price

.1 When actual costs are determined for each allowance, the Contract Price will be valued accordingly by a Change Order.

END OF SECTION

1.0 GENERAL

1.1 Substitution of Materials Prior to Bid Closing

.1 Substitution of specified products or systems is permitted only when alternatives have been approved by the Consultant, in writing, prior to bid closing.

.2 Inform the Consultant in writing when specified products or systems are not anticipated to be available at the Place of the Work during construction. The Consultant will advise Bidders of alternatives.

.3 If specified products or systems are not available and the Consultant was not notified prior to bid submission, the Consultant will choose a suitable substitute product at the time of construction.

1.2 Request for Approval of Alternatives

.1 A Bidder or Supplier of a product or system may apply for approval of their product or system as an alternative prior to bid closing in conformance with the question period and addenda time frames indicated in the Bid Documents. The Consultant will advise applicants of the status of their request prior to bid closing.

.2 Provide the Consultant with sufficient information to review the alternative. This information may include:

.1 Project name and number

.2 Specification sections affected by the proposed alternative

.3 Product technical data sheets

.4 Supplier installation instructions and requirements

.5 Supplier warranty and warranty requirements

.6 Product application sample at specified material thickness and finish on sample substrate

.7 Installation history, including:

.1 Installation locations, dates, project sizes, project values

.2 Description of project and product usage

.3 Owner and consultant

.8 Test data

1.3 Approval of Alternatives

.1 The Consultant reserves the right to reject any requests for approval of alternatives.

.2 The Consultant will outline approved alternatives by addenda issued prior to bid closing. The addenda will indicate the alternative Product or system, where and how it may be used, and limitations. If an addendum is not issued, the bid is to be based on use of the specified Product or system.

.3 The Contractor assumes full responsibility and bears all associated costs where an alternative Product or system is incorporated into the Work. Claims for increases to the Contract Price or for changes to the Date for Substantial Performance of the Work due to changes in the Work that are necessitated by the use of an alternative will not be considered. All associated costs are to be included in the bid.

.4 The Contractor is to reimburse the Owner for their additional costs associated with incorporating alternatives into the Work. This may include additional consulting costs billed to the Owner to accommodate changes to the Contract Documents necessitated by the change.

.5 Contractor cost savings arising from approval of alternatives are to be reflected in the Contract Price.

END OF SECTION

1.0 GENERAL

1.1 Project Coordination

.1 The Contractor is responsible for coordination of trades. Lines of demarcation between Contractor and trades or trade and trade are solely the responsibility of the Contractor.

.2 Contractor is responsible for coordination with the Owner for on-site activity as it affects the operation of the building.

1.2 Notification for Field Review

.1 Notify the Consultant at least 72 hours in advance for field review. No work shall be covered or concealed until reviewed by the Consultant unless informed that a field review will not be performed. Such review does not absolve the Contractor from their responsibility to perform the work in accordance with the Contract Documents.

.2 The Contractor shall notify the designated testing company for material sampling and testing.

.3 Provide the Consultant with safe access to any part of the Work requiring field review.

.4 The Owner may be present during field review at the Owner’s discretion.

1.3 Superintendence

.1 Provide a full time Superintendent who is to be on-site on a continuous basis during the execution of the work. Superintendent shall have a mobile phone at all times during working hours to allow for communication with the Consultant or Owner.

.2 Superintendent shall have facility with the English language both written and verbal.

.3 Superintendent shall be satisfactory to the Owner and the Consultant, and shall not be changed without the Consultant or Owner’s consent.

.4 Superintendence shall be deemed unsatisfactory and changes or additions to superintendence may be demanded when control, organization, or coordination of the Work is not satisfactory, quality of the Work does not meet requirements of the Contract Documents, directions given in accordance with the Contract Documents are not followed, or progress is behind schedule.

1.4 Contractor Behaviour and Decorum

.1 The Contractor's staff, including all subtrades, suppliers, delivery personnel or any other person visiting the site under the Contractor's direction or engagement, shall behave and conduct themselves professionally. Validated complaints lodged against the Contractor by representatives from the Owner, Owner's representatives, site occupants, the public, or the Consultants shall result in the immediate and permanent removal of the individual on the Contractor's staff from the site for the remainder of the duration of the project.

.2 The Contractor will be responsible for communication of behaviour and decorum expectations to those members of their staff, as noted in 1.4.1 above, attending site.

.3 Vulgar language, slurs, harassment, etc. by the Contractor's staff shall not be accepted at any time during the project and may be grounds for removal from site, per 1.4.1 above.

.4 The Contractor shall be responsible for replacing staff removed from site, as required to carry out the work and maintain the construction schedule. Delays due to removal of the Contractor's staff due to behaviour and decorum are the sole responsibility of the Contractor.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Administration of Project Meetings

.2 Pre-Construction Meetings

.3 Progress Meetings

1.2 Administration of Project Meetings

.1 Consultant will preside at meetings.

.1 A representative of the Consultant will record the minutes, include significant proceedings and decisions, and identify "action by" parties.

.2 Consultant will reproduce and distribute copies of the minutes to meeting participants, affected parties not in attendance, the Owner, and the Contractor.

.2 Consultant will:

.1 Schedule and administer project meetings unless otherwise noted.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each unscheduled meeting three days in advance of meeting date to the Contractor and Owner. Contractor is to notify relevant Subcontractors.

.3 Contractor shall provide physical space and arrange for meetings on site.

.4 Representatives of Contractor, Subcontractors, and suppliers attending meetings shall be qualified and authorized to act on behalf of the party each represents.

1.3 Pre-Construction Meeting

.1 After award of Contract, a meeting of all parties in the Contract shall be held to discuss and resolve administrative procedures and responsibilities.

.2 Representatives of the Owner, Consultant, Contractor, major Subcontractors, and construction review personnel will attend.

.3 Consultant will establish a time and location of the meeting and notify concerned parties at least five days before the meeting.

.4 Agenda to include the following:

.1 Appointment of official representatives of participants of the Work.

.2 Schedule of Work, progress scheduling.

.3 Shop drawings (if required) and schedule of shop drawing submissions.

.4 Requirements of temporary facilities, site signage, hoarding, dust protection, offices, storage sheds, utilities, fences.

.5 Delivery schedule of critical equipment.

.6 Site security.

.7 Contemplated change orders, procedures, approvals required.

.8 Take over procedures, acceptance, warranties.

.9 Monthly progress claims, administrative procedures, holdbacks.

.10 Appointment of inspection and testing agencies or firms.

.11 Insurance, transcript of policies.

1.4 Progress Meetings

.1 During the course of Work, the Consultant or Contractor will schedule progress meetings every two weeks. Further progress meetings may be scheduled by the Consultant, Contractor, or Owner as required to expedite the Work.

.2 Consultant, Contractor, major Subcontractors involved in the Work, and Owner, when required, are to attend.

.3 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems that impede construction schedule, conflicts.

.4 Progress, schedule during succeeding work period.

.5 Corrective measures and procedures to regain projected schedule.

.6 Revisions to construction schedule.

.7 Review of off-site fabrication delivery schedules.

.8 Review submittal schedules; expedite as required.

.9 Maintenance of quality standards.

.10 Pending changes and substitutions, Notices of Proposed Change, Change Orders.

.11 Review proposed changes effect on construction schedule and on completion date.

.12 Other business.

END OF SECTION

1.0 GENERAL

.1 This Section specifies general requirements and procedures for shop drawing, product data, sample, and mock-up submissions for Consultant's review. Additional specific submission requirements may be specified in other Sections.

.2 Do not proceed with Work until relevant submissions are reviewed by Consultant.

.3 Present shop drawings, product data, samples, and mock-ups in SI metric units. Where items or information is not produced in SI metric, converted values are acceptable.

.4 Contractor's responsibility for errors or omissions in any submission is not relieved by Consultant's review of the submission.

.5 Notify Consultant, in writing at time of submission, of any deviations from the requirements of Contract Documents that form part of submissions. Also indicate the reasons for the deviations.

.6 Contractor's responsibility for deviations from the requirements of the Contract Documents in submissions is not relieved by Consultant's review of the submissions unless Consultant provides written acceptance of the identified deviations.

.7 Make any changes in submissions that Consultant may require consistent with the Contract Documents and resubmit where directed by Consultant.

.8 Notify Consultant in writing of any revision other than those requested by Consultant when resubmitting.

1.1 Submission Requirements

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

.2 Submit electronic copies of product data, manufacturer's catalogue sheets, brochures, literature, performance charts, and diagrams.

.3 Comply with the following requirements in regards to submission of product data:

.1 Delete information not applicable to project.

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

.3 Provide certification of compliance to applicable codes.

.4 Provide manufacturer's certification as to current production.

.4 Allow 10 working days for Consultant's review of each submission.

.5 Accompany submissions with an electronic transmittal letter that contains:

.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.

.6 Submission 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.

.6 After Consultant's review, distribute electronic copies to relevant affected subcontractors.

1.2 Shop Drawings

.1 Provide electronic copies of shop drawings pertaining to installations and fabrications required by the Contract for Consultant review prior to commencing work. Provide full-size hard copy submissions if requested by Consultant. Unless noted otherwise, submit shop drawings for the following:

.1 Temporary shoring and bracing

.2 Underpinning

.3 Reinforcing steel fabrication and placement

.4 Millwork

.5 Windows, doors, and glazing

.6 Elevator

.7 Structural steel and metal fabrications

.8 HVAC systems

.9 PV (solar) systems and installation

.10 Geothermal bore hole layouts

.11 Any other items requiring shop drawings as indicated in relevant Technical Specification sections.

.2 As part of RJC's field services, RJC will review shop drawings pertaining to work shown on RJC's drawings by means of an appropriate rational sampling procedure and will comment on the accuracy with which the Contractor prepared the shop drawings.

.3 Review of shop drawings is for the sole purpose of ascertaining conformance with the general design concept and is not an approval of the detail design inherent in the shop drawings. Design responsibility remains with the Contractor submitting the shop drawings.

.4 Review of shop drawings does not relieve Contractor of their responsibility for errors and omissions in shop drawings or for meeting all requirements of the Contract Documents.

.5 Contractor is solely responsible for information pertaining to fabrication process, techniques of construction and installation, and coordination of subcontractors.

.6 Cross-reference shop drawing information to applicable portions of Contract Documents.

.7 Shop drawings that require approval of any legally constituted authority having jurisdiction shall be provided by the Contractor to such authority for approval.

1.3 Product Data

.1 Product Data: Manufacturer's catalogue sheets, brochures, literature, performance charts, and diagrams, used to illustrate standard manufactured products.

.2 Submit electronic copies of product data.

.3 Sheet Size: 215 x 280 mm.

.4 Delete information not applicable to project.

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

.6 Cross-reference product data information to applicable portions of Contract Documents.

1.4 Samples

.1 Samples: Examples of materials, equipment, quality, finishes, workmanship.

.2 Where colour, pattern, or texture is criterion, submit full range of samples.

.3 Reviewed and accepted samples will become standard of workmanship and material against which installed work will be reviewed.

1.5 Mock-Ups

.1 Mock-Ups: Field-erected examples of work complete with specified materials and workmanship.

.2 Erect mock-ups at locations acceptable to Consultant.

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

END OF SECTION

1.0 GENERAL

1.1 Responsibilities of the Contractor

.1 The Contractor shall be solely responsible for quality control methods and procedures to ensure performance of the work in accordance with the Contract Documents, including work performed by all subtrades and specialty contractors.

.2 The Contractor shall be responsible for inspection and testing as required by the Contact Documents, statutes, regulations by-laws, standards or codes or any other jurisdictional authority.

.3 The Consultant shall be provided adequate notice for timing of site reviews or activities requiring the Consultant's attendance. At minimum 72 hours' notice shall be provided.

.4 The Contractor's work shall be generally complete when the Consultant's review is called for.

.5 The Contractor shall not conceal any work prior to the Consultant's review. Work which has been concealed by the Contractor may be required to be exposed at the discretion of the Consultant. The Contractor shall expose work which has not been reviewed and reinstate covering finishes or material, at no additional cost to the Contract, even if covering finishes or material was installed in conformance with the Contract.

.6 The Contractor shall notify the Consultant of any clarifications required in order to complete the work indicated on the drawings. The Contractor is responsible for fully understanding the requirements of the Contract Documents during bidding. No cost of schedule extras will be entertained due to misunderstanding of design intent indicated in the Contract Documents.

.7 The Contractor shall verify by certification that specified products and manufacturers retained meet the requirements of reference standards specified in the applicable specifications sections.

.8 Conduct testing, balancing and adjustment of equipment and systems specified and modified by the work in applicable mechanical and electrical specifications sections by and independent third party testing company. Provide written certification reports as part of close-out documentation.

1.2 Responsibilities of the Consultants

.1 The Consultants shall provide field review only for the work shown on their respective drawings and specifications. This review is not a “full-time” review but is a periodic review at their sole discretion in order to ascertain that the work is in general conformance with the Contract Documents.

.2 Field review services by the Consultants is not carried out for the benefit of the Contractor, nor does it make the Consultants guarantors of the Contractor’s work.

.3 The Consultants’ field review services do not relieve the Contractor of their responsibilities in Section 1.1.

.4 The Consultants are not responsible for the acts, errors or omissions of the Contractor or their subtrades, specialty contractors or any persons performing any of the work or for the failure of any of them to carry out the work in accordance with the Contract Documents.

1.3 Inspection and Testing by the Owner

.1 The Consultant, on behalf of the Owner, may appoint an independent inspection and testing agency to carry out review of part or all of the work for conformance to the Contract Documents. Such costs for inspection and testing will be paid for by the Owner.

.1 Additional expenses incurred by the Owner for inspection and testing as a result of Contractor deficiencies or non-conforming Work shall be at the Contractor’s expense.

.2 Inspections and testing by an independent company will be made promptly. Uncover for examination any Work concealing the Work to be reviewed prior to review or without approval of the Consultant. The Contractor shall make good such Work per Section 1.1.5.

.3 The Owner may inspect and test Products during manufacture, fabrication, shop testing, installation, construction and testing phases of the Contract. The Consultant will determine the quantity and quality of testing to be performed. Inspection and testing may be performed at the place of manufacture/fabrication, storage, or at the Site as designated by the Consultant. Where inspection and testing is done, either during manufacture, fabrication, or at Site, the Contractor shall provide the proper facilities, access and assistance.

1.4 Inspection and Testing

.1 The Contractor shall provide or adhere to the requirements of Source and Field Quality Control identified in other specification sections.

.2 This section and the requirements of other specifications sections shall be read in conjunction with one another. The Contractors shall seek clarification if Testing and Inspection requirements conflict or are unclear.

.3 Information pertaining to the responsibilities of an independent testing and inspection agency and their function retained by the Owner and which may be specified in other specifications sections shall be exempted from these requirements. Such information is included in the Section for the Contractor's information only.

.4 The Contractor shall not limit their responsibility for quality control of the work and ensuring the requirements of the Contract Documents are met solely by the inspection and testing identified in the Contract Documents.

1.5 Qualifications of Inspection and Testing Agencies

.1 Inspection and testing agencies shall be certified by the Standards Council of Canada (SCC) or Canadian Council of Independent Laboratories (CCIL).

.2 Independent testing agencies engaged shall provide the necessary equipment, labour, supervision, materials, methods of recording and evaluations, calibration of equipment and personnel with requisite expertise to conduct tests precisely and as specified in reference standards.

.3 Independent testing agencies shall submit certificates of calibration made by an accredited calibrator verifying calibration of equipment and its accuracy within the last twelve (12) months, at the request of the Consultant.

1.6 Responsibilities of Inspection and Testing Agencies

.1 Review the Contract Documents in order to determine the extent of testing and inspection required.

.2 Notify the Consultant of any omissions or discrepancies in the work inspected or tested.

.3 Perform testing and inspection specified in the Contract Documents in accordance with the reference standards and as requested by the Consultant.

.4 Provide competent, experienced personnel to perform testing and inspection services when notified by the Contractor or Consultant that the applicable work is being performed. Inspection and testing personnel shall cooperate with the Contractor and Consultant in order to maintain the daily and overall work schedule.

.5 Notify the Contractor and Consultant of deficiencies, irregularities in the Work immediately when they are observed and document in written reporting.

.6 Inspection and testing agencies shall not perform the work of the Contractor and shall not authorize:

.1 Performance of the Work that is not in strict accordance with the Contract Documents.

.2 Approval, certification, acceptance of any part of the Work.

1.7 Inspection and Testing Procedures

.1 Perform specified testing and inspection is accordance with the Contract Documents and the reference standards referenced therein, unless otherwise approved.

.2 Observe and report on conformance of the Work with the requirements of the Contract Documents.

.3 Ensure that testing and inspection personnel are on site or at fabricator’s operations for full duration of the performance of the work being reviewed, unless otherwise directed by the Consultant or indicated in the Contract Documents.

.4 Identify samples and sources of materials.

.5 Review and report on progress of work. Report on count of units fabricated and inspected at fabricator’s operations.

.6 Observe and report on conditions of significance to work in progress at the time of review or at the fabricator’s operations. Include where applicable and if critical to the work in progress:

.1 Time and date of review.
.2 Environmental conditions such as temperature of air, materials and adjacent surfaces.
.3 Humidity of air, moisture content of material and adjacent materials.
.4 Presence of sunlight, wind, rain, snow, or other weather.

.7 Include all information critical to inspection in reports.

.8 Ensure that only materials from work and intended for use therein are tested.

.9 Determine locations of work to be tested, unless otherwise directed by the Consultant.

1.8 Tolerances

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

.2 Unless otherwise defined in the technical specification sections or required for proper function of equipment, services, mechanical or electrical systems or to accommodate existing conditions, the following definitions shall govern:

.1 Plumb or level: plumb or level within 1 millimeter in 1metre.
.2 Square: within 10 seconds of 90 degrees.
.3 Straight: within 1millimeter under a 1 metre long straightedge.
.4 Flush:
1. Within 6 millimeter for exterior concrete, masonry and paving materials
2. Within 1 millimeter for concrete, masonry, tile or similar surfaces
3. Within 0.05 millimeter for other interior surfaces

.3 Allowable tolerances shall not be cumulative.

1.9 Reference Standards

.1 Review the Contract Documents for the applicable reference standards quoted. Comply with the reference standards during performance of the work and the performance of inspection and testing.

1.10 Deficiencies

.1 Deficiencies are defined as products, material workmanship, cleanliness, protection measures, or other parts of the Contract Documents for which the Contractor or their subtrades are responsible, which do not comply with the requirements of the Contract Documents.

.2 Deficiencies identified by the Consultant shall be tracked by the Contractor throughout construction for correction. The Contractor shall correct all deficiencies promptly upon notification and notify the Consultant of the corrected deficiency.

.3 Deficient products, materials and workmanship found at any time prior to the completion of the Contract will be rejected regardless of previous inspections, testing, and reviews of the Work.

.4 The Contractor shall be responsible for all delays and expenses as a result of deficiencies and their rectification.

.5 Photographs of completed work or deficiency correction in lieu of a field review may be accepted by the Consultant at their discretion only. This does not relieve the Contractor of their responsibilities identified above.

1.11 Documents on Site

.1 The Contractor shall have access to the following documents in hard and/or soft copy for the use of the Contract, Consultant and Owner:

- .1 Contract Documents, including specifications, drawings, addenda, and other modifications to the Contract Documents.
- .2 “Reviewed” or “Reviewed as Modified” Shop Drawings.
- .3 Project Construction and Shop Drawings Schedules.
- .4 Site Instructions, Change Orders and Change Directives
- .5 Field Test and Site Review Reports.
- .6 Reports from Authorities Having Jurisdiction.
- .7 Building and other applicable permits.
- .8 Daily Log including:
  - .1 Weather conditions.
  - .2 Trades on site and their start and finish times.
  - .3 Dates quantities and particulars of waterproofing work.
  - .4 Visits to site by the Owner, Consultants, Jurisdictional Authorities, Testing and Inspection agencies, Material and Equipment Supplier Representatives.
- .9 Material Safety Data Sheets per WHMIS and the OHSA.

.10 As-Built drawings recording as-built conditions, instructions, changes to structure, equipment, wiring, plumbing, and conditions concealed.
.11 Copies of applicable codes.
.12 Copies of available original building construction documents.

1.12 Drainage

.1 Layout and construct work to ensure positive drainage is provided to floor drains, ditches, site drains and catch basins, as set in their final position, preventing undrained areas and/or ponding.

.2 Ensure that allowable construction tolerances and structural deflection do not cause ponding of water.

.3 Report to the Consultant in writing prior to executing the work affected, in case adequate drainage cannot be provided.

.4 Account for all finishes and product thicknesses prior to installing drainage.

.5 Flood test existing floors to located low spots for new drain installation if required.

2.0 PRODUCTS

Not applicable.

3.0 EXECUTION

Not applicable.

END OF SECTION

1.0 GENERAL

1.1 Temporary Utilities

.1 Provide and pay for where specified, locate where directed, and maintain temporary facilities for the Work and for all Subcontractors, and remove them upon completion of the Work.

.2 Provide temporary power to the site for use during construction and pay all costs for disconnection of existing power, supply and connection of temporary power, and connection of permanent power service after completion of interior and exterior renovations, including meters and other equipment specified and required by Toronto Hydro and/ or other Authorities Having Jurisdiction. Pay fees and costs associated with temporary power usage during construction.

.3 Where specified to provide utilities, make all arrangements with the public utilities, obtain all necessary permits, provide or pay for connections, and pay all respective fees.

1.2 Electrical Power

.1 Discuss available power with the Owner prior to bidding.

.2 The Contractor shall pay for any alternations to the electrical system that may be needed to accommodate the Contractor’s equipment. Coordinate any required alterations with the Owner’s Representative. Reinstate the system to its original condition upon completion of the Work.

.3 The Owner shall pay for electrical consumption from building sources made available by the Owner.

1.3 Water Supply

.1 Contractor shall pay for the cost of any temporary water connections or alterations that are required to perform the Work. Reinstate the system to its original condition upon completion of the Work.

.2 The Owner shall pay for water consumption from building sources made available by the Owner.

1.4 Temporary Lighting

.1 Provide and maintain temporary lighting for safe demolition and working conditions conforming to Ontario Occupational Health and Safety Act.

.2 Illumination must be provided and maintained at all interior and exterior areas affected by the Work.

.3 Contractor is to have an emergency generator system available to be used in a situation where the existing system becomes inoperative due to the Work and cannot be repaired within a two (2) hour period. Once the repair is complete, the temporary systems may be removed.

.1 If the damaged/ non-functioning systems cannot be repaired within the specified period, the Contractor must promptly notify the Owner.

.2 If the Contractor does not repair the damaged/ non-functioning systems within the specified time and does not promptly notify the Owner, the Owner reserves the right to repair the damage and deduct the cost from the Contract.

.4 Temporary lighting requirements discussed herein shall also apply to all subcontractors.

1.5 Temporary Telephone

.1 Provide and pay for a mobile telephone for the Contractor’s own use and, as required, the use of Consultant and Owner.

1.6 Temporary Fire Protection

.1 Provide and maintain temporary fire protection equipment during performance of the Work as required by governing codes, regulations, and by-laws.

1.7 Temporary First Aid Facilities

.1 Provide well-stocked and maintained first aid kits within the site office that are adequate to meet the requirements and hazards of the Work.

.2 Maintain safety data sheets (SDS) for all material being used at the project site. Ensure the SDS are readily available to the Consultant, Owner, and Contractor’s forces.

1.8 Temporary Sanitary Facilities

.1 Provide temporary sanitary facilities at the time of initial mobilization and maintain them throughout the course of the work. An exception will be granted to this requirement only where Owner has confirmed in writing that on-site washrooms are available for Contractor use.

.1 Sanitary facility is to include an odourless flushing chemical type temporary toilet that is properly enclosed, weatherproof, and serviced periodically as required.

.2 The building toilets and facilities shall not be used by the Contractor's forces unless approved by Owner

1.9 Temporary Field Offices and Sheds

.1 Provide or construct work sheds for storage of tools, equipment, and materials that may be damaged by weather.

.2 Provide and maintain a field office for the Contractor's personnel that is equipped with lights, power, and tables for drawing examinations.

.3 Maintain sheds in a clean and orderly condition to the Consultant's satisfaction.

.4 Provide suitable hardware and locks on doors to sheds to reasonably secure them and keep locked when unsupervised.

.5 Field sheds shall be weather tight and have floors elevated above grade.

.6 Relocate sheds as required by the progress of the Work. Remove sheds from the Site when directed or when they are no longer required.

1.10 Temporary Barriers and Enclosures

.1 Provide hoarding, fencing, barriers, barricades, and plant protection as required by the authorities and specified herein to protect persons and property, public and private. Refer to Section 01 56 00 for signage and hoarding requirements.

.2 Maintain barriers in sound, clean, and where required painted condition throughout the Work.

.3 Keep site clear of unauthorized signs.

.4 Provide barriers with required warning lights and signs.

.5 Hoarding, fencing, barriers, and barricades are to be constructed and supported in such a manner that no sharp projections that can cause personnel injury are created.

.6 Remove hazards requiring barriers as soon as possible.

.7 Remove barriers at time of turn-over of the Work to the Owner.

.8 Exterior enclosures shall be constructed to protect the work area from environmental conditions (i.e. weather tight) that may affect schedule.

1.11 Temporary Heating and Ventilation

.1 Provide and maintain supplementary heating as required to maintain sufficient application and curing temperatures, maintain safe working conditions in conformance with Occupational Health and Safety Standards, and maintain interior heating levels such that existing systems remain operational throughout the course of the Work.

.2 Provide and maintain supplementary ventilation as required. Ventilation requirements shall conform to Occupational Health and Safety Standards. Do not modify the base building systems without the coordination and approval of the Owner.

.3 Temporary heating and ventilation used during construction -- including the cost of installation, fuel, operation, maintenance, and removal of equipment -- shall be paid for by the Contractor. The use of direct-fired heaters discharging waste products into enclosed work areas will not be permitted.

1.12 Security

.1 Take all necessary precautions to guard site, premises, materials, and the public at all times other than when supervised work is in progress.

1.13 Protection of Work During Close-Down

.1 Should the project be closed down for any cause, assume all responsibility for its proper protection during such period.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Protection of the Work, work in progress, property, and persons by all Sections.

1.2 Walk-Through Inspection of Site

.1 Prior to start of Work, Contractor, Consultant, and Owner will perform walk-through inspection of site, building, adjacent properties, roads, sidewalks, curbs, landscaping, etc. to determine existing conditions.

.2 The Contractor is to perform a thorough inspection of the site, building, adjacent properties, roads, sidewalks, curbs, landscaping, etc. prior to the start of work and provide a written notice to the Consultant that details all damaged property, as well as all items that appear to be of poor working order or appearance (i.e. sign, fixtures, dirt, etc.)

.3 Upon receiving this notice, the Consultant and Owner will review the validity of the items listed.

.4 If written notice is not given within five days of commencement of Work, it will be assumed that the Contractor has reviewed the site, building, adjacent properties, roads, sidewalks, curbs, landscaping, etc. and has accepted the condition of the property as being free of damage.

.5 Any damages not listed as part of the written notice of clause 1.2.2 above found after the completion of the work will be the sole responsibility of the Contractor to rectify. These rectifications shall be completed in a timely and satisfactory manner.

.6 The project will not be considered substantially performed if the cost to correct these outstanding deficiencies is greater than the limits outlined in the Construction Act.

1.3 The Work, Work In Progress, Property, and Persons

.1 Protect the Work during construction from damage by weather.

.2 Provide protection as required to protect work in progress and other property from damage and to provide suitable conditions for the progress of finishing work.

.3 Provide means for protecting areas from water leakage between removal and reinstallation of the roofing systems, building envelope elements, etc..

.4 Take reasonable and required measures, including those required by authorities having jurisdiction, to protect the public and those employed on the Work from bodily harm.

.5 Comply with requirements of Ontario Occupational Health and Safety Act for construction projects.

.6 Contractor shall be prepared to provide respirators, dust protection, ear protection for those employed by the Consultant and Owner at the site.

.7 Direct all Subcontractors to protect their own work, existing property, adjacent public and private property, and work of other Sections from damage while working.

1.4 Construction Signage

.1 Contractor shall provide all required signage necessary to protect the public from the construction, control vehicle and pedestrian traffic flow around the site and work areas, and to inform the public that construction activity is in process.

.2 Additional signs may be required at the discretion of Owner or Consultant as construction progresses. No extras will be entertained for signage requirements after tenders close.

.3 All signage required are to be as per Owl-Lite Rentals, Sales and Manufacturing Product Catalogue (quality, design, size, etc.). This catalogue is available for viewing in the office of the Consultant, or copies can be obtained from Owl-Lite (tel: 416-647-9663). “Standard Construction Signs” (i.e. orange background with 150 mm high black letters or decals). All signage to be of professional quality and design.

.4 Typical signage that may be required are as follows:

.1 Keep Out: Work in Progress

.2 Danger – Due to:

.3 Yield, stop, detour

.4 One-way traffic

.5 No parking, directional arrows, etc.

.6 Caution

.7 Watch Your Step

.8 Caution: Work Overhead

.5 Signage will be required at all access gates and entrances to the work site and work areas. This signage shall consist of the standard “Danger Do Not Enter” sign with an additional signs (special order) indicating that the “Daycare is Temporarily Under Construction” and “Sorry for the Inconvenience”.

.6 Typical additional non-standard signage that will be required is as follows:

.1 Daycare is Temporarily Under Construction - Sorry for the Inconvenience

.2 Proceed with Caution (with directional arrow)

.3 Do Not Enter – Closed for Repairs

.4 Slow – 10 km/hr Max

.5 No Parking (with directional arrows)

.6 Site Access (with directional arrow)

.7 Exit (with directional arrow)

.7 All non-standard signage is to be of adequate size (discuss with Consultant prior to ordering) with orange background and large black letters and decals. Plywood backing is sufficient. All signs are to be of professional quality.

.8 All signage is to be securely fastened directly to hoarding or, if signage is required and hoarding is not available, the signs are to be securely fastened to ballasted stands (exterior) or two screw jack (post shores) which are fully tightened to the floor soffit and surface (interior). Signs and posts are to be installed in such a manner that projections that may cause public injury are not created. Ballasted stands are to be capable of resisting all wind and impact loads.

1.5 Construction Barriers and Enclosures

.1 The site and all work areas are to be completely enclosed by hoarding and dust protection and only accessible to the Contractor, Owner, and Consultant.

.2 Contractor shall supply and construct hoarding, barriers, and enclosures as indicated in these specifications, drawings, and as directed by the Consultant or Owner as the construction progresses.

.3 No extras shall be entertained for hoarding, barriers, and enclosures after bid close unless the scope of work is significantly changed.

.4 The site and work areas are to be completely enclosed to keep dust generated by construction activity from escaping into other areas of site or interior areas outside of current work areas.

.5 Contractor shall be responsible to ventilate work areas as required (fresh air in and exhaust out) without allowing any dust to escape from the work areas. Exhaust system must filter dust out of the air before it is released into the atmosphere. All exhaust systems must be filtered and directed to exhaust vents or outside of the building through ducting, which is to be suspended from the floor soffits. Filters are to be cleaned and replaced regularly, and as directed by Consultant.

.6 The Contractor is responsible for any damage to mechanical and electrical systems and equipment, security systems and equipment, motors, fire alarm system/devices, telecommunications systems and equipment, plumbing systems and equipment, elevator systems and equipment, etc. resulting from dust and water contamination.

.7 The following types of enclosures/ hoarding systems will be required for this construction project:

.1 Type 1 – Fast Fence Hoarding with Fabric Lining

.1 This system consists of 6’-0” high temporary fencing. A continuous sheet of poly-weave tarping or filter fabric is to be installed at the fencing to create a dust tight enclosure and hide the areas of work from view. System must be ballasted or anchored to prevent overturning due to impact and wind loads.

.2 This system shall be supplied around the exterior of the building and property to enclose the site, as indicated on the Drawings.

.2 Type 2 - Full Height Dust Protection

.1 This system consists of full height poly-weave tarping fastened to floor surfaces and soffits with 2x4 construction grade wood nailers wedged tight to floor surface and soffit with 2x4 studs or post shores at 4'-0" c.c. Seams of poly-weave tarping, if any, are to be fastened together with duct tape. System shall be equipped with zippered entrances to work areas.

.2 The main purpose of this system is to control dust and keep it from escaping from work areas, thus it must be dust tight.

.3 This system shall be supplied to enclose all areas at which dust-generating activities are to be performed, or at locations where materials, equipment, and/or new work is to be protected from other construction-related activities.

.8 All seams in poly-weave tarping and hoarding are to be taped together to provide dust tight enclosure.

.9 Anchor holes are to be repaired after construction hoarding has been removed. Contractor to repair all finishes and painted surfaces damaged by fastening materials used as part of hoarding and protection systems.

.10 Restrict access for unauthorized personnel by placing barricades or posting guards around areas of the Work. Unauthorized personnel shall mean the public and anyone not directly concerned with the execution, supervision, or inspection.

.11 Exterior locations (areas exposed to weather) are to be protected against weather conditions that may hinder the performance of work in these areas.

1.6 Existing Buildings, Curbs, Roads, Lanes, and Landscaping

.1 Protect existing buildings, structures, curbs, roads, lanes, and hard and soft landscaping. If, during work, any existing items are damaged, repair or replace them.

.2 Provide pavement, curb, and sidewalk protection for public thoroughfares and the Work in progress as required by the authorities, and to protect public property and the Work.

.3 The Contractor shall remove and re-install all steel bollards anchored to slab surface in areas where repairs are to be performed. Re-install bollards after installation of waterproofing.

1.7 Control of Construction Generated Dust, Debris, Fumes, Etc.

.1 Dust, dirt, construction debris, water, and fumes from the work areas must not be permitted to enter areas of the site or building or rooms in or adjacent to work areas.

.2 Protection shall be provided for all entrance and exit ways, floors, walls, standing fixtures, air intakes, exhaust fan openings, floor drains, catch basins, equipment rooms, and adjacent property features against dust, spillage, overspray of materials, and damage during the construction period. The required protection shall consist of but not be limited to the following:

.1 Filter cloth in all floor drains, catch basins, and utility hole covers within the work areas.

.2 Filter cloth over all intake and exhaust louvers and openings.

.3 Poly-weave tarping over doorways and around the exterior perimeter of work area to prevent the escape of dust and debris from the work area.

.4 Protect fire protection equipment, mechanical and electrical systems, fixtures, devices, etc. with polyethylene or filter cloth to prevent dust build up.

.3 Provide for protection of vehicles in or near the site and payment for cleaning or damage to vehicles.

1.8 Protection of Existing Exposed Facilities

.1 Protect existing systems, utilities, equipment, etc. from damage, or remove and re-install upon completion of repairs.

.2 Existing site and building systems, services, utilities, etc. are to be demolished. Contractor is responsible for installing, maintaining, and removing temporary systems, services, utilities, etc. to facilitate the work.

.3 Protect exposed conduit, fixtures, attached devices, sprinkler fire system plumbing, mechanical system components, louvres, and ducts against the accumulation of dust, debris, and damage. The Contractor will be responsible to correct any damages to these systems at their own expense. Contractor to promptly report any damage to the Owner and the Consultant.

.4 Inspect materials, equipment, and components to be re-used or turned over to the Owner. Note their condition and advise Consultant in writing of any defects or conditions that would affect their removal and re-use, prior to removal.

.5 Prior to commencing Work, contact the Owner to locate all protective or alarm systems and sensors that are to remain. All services to remain shall be protected against damage or interruption. All claims resulting from damage shall be the responsibility of the Contractor.

.6 Contractor must notify the Owner of any fault or alarm to the main fire alarm panel immediately. When Contractor's activities result in charges to service the fire alarm panel or alarm system, the Contractor shall bear all costs.

.7 Any damage to existing building elements, finishes, structure, etc. to remain caused by the construction shall be repaired by the Contractor at no cost to the Owner.

1.9 Overloading

.1 Load no part of the structure during construction with a load greater than its designed capacity.

.2 Submit equipment weights and construction procedures to the Consultant for review prior to commencing the Work.

.3 Make every temporary support as strong as the designed permanent support.

.4 Place no load on concrete slabs until they have cured and have achieved sufficient strength to bear the load safely.

1.10 Fire Protection

.1 Take necessary precautions to eliminate fire hazards and to prevent damage to the Work, building materials, equipment, and other property, both public and private, having to do with the Work. Inspect the Work at least once a week for this purpose.

.2 Store and locate products and equipment packed in cardboard cartons, wood crates, and other combustible containers in orderly and accessible manner. Place approved types of firefighting equipment in vicinity of products packed in this type of crate or carton until permanent fire protection and equipment are available.

.3 Do not store flammable products, such as paint or fuel, on site except in Owner-approved locations, if available.

.4 Tarpaulins to be fire-resistant.

.5 Open fires and burning of rubbish or debris are not permitted on site.

END OF SECTION

1.0 GENERAL

1.1 Manufacturer's Instructions

.1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods. Supply copies of these instructions to Consultant prior to commencing work.

.2 Notify Consultant in writing of any conflict between the Contract Documents and manufacturer's instructions.

1.2 Delivery, Storage, and Handling

.1 Deliver, store, and maintain packaged materials with manufacturer's seals and labels intact.

.2 Immediately remove rejected materials from the Place of the Work.

.3 Storage and handling of materials shall conform to Ontario Occupational Health and Safety Act and manufacturer's instructions.

.4 Toxic or hazardous materials shall be secured in a locked storage area.

.5 All containers to be labeled in accordance with WHMIS regulations.

.6 All containers to be labeled with material expiration dates. Materials older than the expiry date shall not be used on the Work and shall be removed immediately from the site.

.7 Provide Owner and Consultant with electronic copies of all Safety Data Sheets (SDS) and maintain hard copies on site.

1.3 Materials

.1 Use new products unless otherwise specified.

.2 Provide electronic copies of maintenance instructions and material literature for finished surfaces prior to Substantial Performance.

END OF SECTION

1.0 GENERAL

1.1 Description of Work Included

.1 Provide all labour, material, equipment, supervision, and services necessary to clean the areas of the Work, including all surfaces, fixtures, equipment, finishes, landscaping, etc., and dispose of all waste products and debris in the work area as indicated in the Contract Documents.

.2 Provide all labour, material, equipment, supervision, and services necessary to clean outside the areas of the work if dust, debris, and waste products generated by the Work have affected these areas.

1.2 General Requirements

.1 Conduct cleaning and disposal operations in compliance with local, provincial, and federal regulations and laws, as well as Owner requirements.

.2 Prevent the accumulation of waste that creates hazardous conditions.

.3 Provide adequate ventilation during use of volatile or noxious substances. Obtain approval for ventilation exhaust locations with the Owner prior to installation.

.4 Coordinate requirements for ventilation and waste disposal operations with the Owner and Consultant.

1.3 References

.1 Waste Control Regulation - Ontario Environmental Protection Act

1.4 Materials and Equipment

.1 Use only cleaning materials and equipment that are approved by the manufacturer of the surface to be cleaned, and use the cleaning materials in conformance with manufacturer recommendations.

1.5 Prior to Construction

.1 The Contractor shall examine the Place of the Work prior to mobilization to determine conditions with respect to dust, debris, rubbish, and waste material.

.2 It is the Contractor's responsibility to clean Work areas and all areas affected by the Work free of all debris generated by the construction activity and existing dust, debris, rubbish, and waste material present at the start of Work, unless explicitly otherwise indicated in the Contract Documents or there are significant variations in conditions in comparison to the time of Bid.

.3 Onus is on the Contractor to satisfactorily demonstrate to the Consultant if conditions vary significantly from the time of bid. Significant variations will be resolved by the Owner.

.4 No extras will be entertained for site cleaning after Contract award.

1.6 Waste Removal and Cleaning During Construction

.1 Contractor to perform all required cleaning during the Work.

.2 Maintain the Place of the Work and areas affected by the Work free from accumulations of dust, debris, rubbish, and waste materials generated by the Work.

.3 Provide sufficient on-site containers for collection and disposal of dust, debris, rubbish, and waste material.

.4 Store volatile waste in covered containers. All waste that is volatile or creates a hazardous condition must be removed from the premises daily.

.5 Disposal is to be performed in strict accordance with the product Safety Data Sheet (SDS) and local, provincial, and federal regulation.

.6 Enclose work areas and prevent dust and debris generated by construction from affecting other areas, including areas required for construction access. Any dust and debris that escapes from the Work area is to be cleaned in a timely fashion and, at latest, prior to the end of the work day/ shift.

.7 If the Consultant deems that cleaning has not been performed in a timely fashion, the Owner may seek to resolve the conditions in accordance with the Contract General Conditions.

.8 Flush and clean the drainage system, including buried or hidden drain lines, all the way to sump pits and municipal mains to maintain operation of the drainage system throughout the Work.

.9 Cover drains, catch basins, utility hole covers, etc. within the areas of Work with filter fabric to prevent debris from entering the drainage systems.

.10 Do not dispose of project waste and material in the drainage, storm water management, nor site sewer systems.

1.7 Waste Audit/ Plans for Waste Reduction

.1 Comply with the requirements of local authorities having jurisdiction.

.2 Prepare and submit waste audit and waste reduction plans, in accordance with Ontario Regulation 102/94 Waste Audits and Waste Reduction Workplans.

.3 Prepare and submit source separation plan, in accordance with Ontario Regulation 103/94 Industrial, Commercial and Institutional Source Separation Programs.

.4 Delivery to the nearest appropriate depot all materials accepted for recycling by the region or municipality having jurisdiction over the Place of Work, including but not limited to cardboard, paper, plastic, aluminium, steel, and glass. Deliver to nearest appropriate depot all scrap and excess gypsum wallboard for recycling of this material. This shall be performed at no additional cost to the Contract.

1.8 Drainage System – Cleanliness and Damage

.1 Flush clean all the drainage systems – including catch basins, maintenance holes, drains, sump pits, weeping tile, piping, etc. – within the area of Work. Remove and dispose of silt and debris by manual or suction means without washing it down or through the drainage system.

.2 Maintain the drainage systems in this cleaned state throughout the Work.

.3 Confirm the operation and condition of the sump pits and municipal mains prior to performing work that affects or requires their operation. The existing pumps may be used during construction but the Contractor is responsible to maintain their operation.

.4 Provide additional pumps if existing pumps cannot effectively remove water generated by construction.

.5 Do not discharge water from construction directly into any of the site sewer or storm water management systems. The water is to be treated with proper filtering, stilling basins, and tankage to prevent silt and debris from entering the systems.

.6 All equipment maintenance and refuelling operations shall be controlled to prevent the discharge of petroleum products into the sewer system.

.7 Damage caused to the existing water supply systems, storm water management systems, sewer systems, and surrounding areas by the Contractor's operations are to be made good to the full satisfaction of the Owner at Contractor cost.

.8 A cleaning contractor specializing in flushing and cleaning drainage systems shall clean and flush the sewer systems after completion of the Work.

1.9 Final Cleaning

.1 Thoroughly clean all areas affected by the Work free of all dust, debris, construction material, waste, and rubbish immediately prior to final review and turn-over of the Work area to the Owner.

.2 Remove all grease, dust, dirt, stains, labels, fingerprints, over-spray, and other foreign materials immediately prior to final review and turn-over of the Work area to the Owner.

.3 Flush and clean free of all silt and debris and provide CCTV inspection of all drainage, storm water management, and sewer lines for the Consultant to review to demonstrate the condition of these lines and effectiveness of the cleaning.

.4 Prior to Substantial Performance of the Work being considered, the Contractor shall remove their surplus products, tools, and Construction Equipment not required for the performance of the remaining Work. Leave the area of Work clean and suitable for occupancy.

.5 The Contractor shall remove their remaining products, tools, and Construction Equipment prior to final completion of the Work.

.6 All vertical and horizontal surfaces, systems, fixtures, equipment, etc. shall be cleaned of all dust, grease, or spray accumulations. Power wash exterior surfaces affected by the Work. Ensure moisture sensitive equipment (i.e. fire detection sensors and pull stations, CO detectors, exposed electrical, etc.) is removed or protected against moisture ingress and damage prior to, and during, washing.

.7 Return all interior areas and rooms to the Owner in a dust, dirt, and debris-free condition.

.8 Elements, fixtures, finishes, windows, doors, fire protection equipment, security equipment, etc. that have been coated with paint, cement paste, or other foreign materials shall be cleaned or replaced at no additional cost to the Owner.

END OF SECTION

1.0 GENERAL

1.1 Take Over Procedure

.1 Contractor's Review

.1 The Contractor and their Subcontractors shall conduct a review of the work and correct all noted deficiencies.

.2 The Contractor shall notify the Consultant, in writing, of satisfactory completion of the "Contractor's Review" after the correction of all noted deficiencies and shall request a "Consultant's Review".

.2 Consultant's Review

.1 The review team shall consist of the Consultant and the Contractor. The Owner or their representative shall attend at their option.

.2 The Consultant will prepare a list of deficiencies noted during the "Consultant's Review" and will issue the list to the Contractor.

.3 The Consultant will determine the value of work associated with any outstanding deficiencies noted during the Consultant's Review. Payment of these retained funds will be withheld until the deficiencies have been rectified to the satisfaction of the Consultant and Owner.

.4 The Contractor shall correct all deficiencies indicated on the list in a timely and satisfactory manner.

.3 Final Review

.1 The Contractor shall request a "Final Review" when the Contractor is satisfied that all deficiencies have been corrected. The request shall be made in writing.

.2 The "Final Review" shall be conducted by the Consultant and the Contractor. The Owner or their representative will attend at their discretion.

.4 Certificate of Substantial Performance

.1 The Contractor must submit a request in writing to the Consultant for a Certificate of Substantial Performance.

.2 The Contractor shall comply with the following during Contract close-out:

.1 The requirements of the Construction Act.

.2 The requirements of the Workers Compensation Act.

.3 All other contractual requirements.

.5 Total Performance

.1 Immediately following the issuance of the Certificate of Substantial Performance, the Consultant, in consultation with the Contractor, will establish a reasonable date for the “Total Performance of the Work”.

.2 The Contractor shall supply all guaranties and review certificates in accordance with the requirements of the Contract Documents prior to the date established for “Total Performance of the Work”.

.6 Release of Holdback

.1 The lien holdback amounts will be released pursuant to the Construction Act.

END OF SECTION

1.0 GENERAL

1.1 Manual

.1 An organized compilation of maintenance and renewal data including detailed technical information, documents, and records describing maintenance of individual products or systems as specified in individual sections of Divisions 02 through 32. Also including identification of, and contact information for, specific individual trades and suppliers for work as specified in individual sections of Divisions 02 to 32.

1.2 General

.1 Assemble, coordinate, bind, and index required maintenance and renewal data into Maintenance and Renewal Manual.

.2 Submit a review copy of the completed Maintenance and Renewal Manual to the Consultant two weeks prior to application for Certificate of Substantial Performance. Attach draft or example copies of specific warranties/guaranties if required.

.1 A Deficiency Holdback of $10,000 (prior to factoring) may be enforced for non-delivery of the completed maintenance manual as noted above.

.3 Submit electronic and two hard copies in English.

.4 Organize data into same numerical order as Contract specifications.

.5 Material: Label each section with tabs protected with celluloid covers fastened to dividing sheets.

.6 Type lists and notes. Handwritten summaries will not be accepted.

.7 Drawings, diagrams, and manufacturers' literature must be legible. Provide direct print offs, in colour where applicable, from manufacturers' websites. Copies of re-faxes shall not be accepted.

.8 Refer also to specific Third Party Warranty Provider's requirements.

1.3 Binders

.1 Binders: Vinyl hard covered 3" D-ring, loose leaf sized for 215 x 280 mm paper with spine pocket.

.2 Identify contents of each binder on spine.

1.4 Contents

.1 Cover sheet containing:

.1 Date submitted.

.2 Project title, location, and project number.

.2 Maintenance and Renewal Manual, including but not limited to the following:

.1 General Introduction – explain nature of operations and maintenance items, as well as items that constitute renewals.

.2 Contacts – Include a summary sheet of contact names, telephone, fax, e-mail, and mailing addresses for all applicable parties. Include such parties as:

.1 General Contractor

.2 Specific trades

.3 Specific manufacturers

.4 Related consultants

.5 Etc.

.3 General Summary of Building Envelope Principals – explain function of various materials, components, and assemblies. Include such items as:

.1 Moisture barrier

.2 Air barrier

.3 Vapour barrier

.4 Drainage cavity

.5 Insulation

.6 Etc.

.4 Building Envelope Assemblies – explain main assemblies, and their components related to building envelope. Include such items as:

.1 Wall assemblies

.2 Window, door, and glazing assemblies

.3 Roofing assemblies

.4 Etc.

.5 Maintenance Plan – include, in tabular form, a maintenance plan identifying specific components, recommended actions, and time frames. Include such items as:

.1 Sealants
.2 Windows
.3 Doors
.4 Exhaust vents
.5 Membranes
.6 Roofing systems
.7 HVAC systems
.8 Electrical fixtures
.9 Mechanical systems
.10 Geothermal systems and components
.11 Plumbing systems
.12 Security systems
.13 Accessibility systems, including door openers, LULA lift, etc.
.14 Appliances
.15 Millwork
.16 Etc.

.6 Renewals Plan – include, in tabular form, a summary outlining timing, cost, and nature of component replacement. Include such items as:

.1 Sealants
.2 Windows
.3 Doors
.4 Membranes
.5 Roofing systems
.6 HVAC systems
.7 Electrical fixtures
.8 Mechanical systems

.9 Geothermal systems and components

.10 Plumbing systems

.11 Security systems

.12 Accessibility systems, including door openers, LULA lift, etc.

.13 Appliances

.14 Millwork

.15 Etc.

.7 Materials and Components Summary – include, in tabular form, a summary outlining the specific materials involved in the envelope's construction. Include the product, product manufacturer, trade involved in its application or installation, warranty, and technical data sheet supplied by the manufacturer. Include such items as:

.1 Membranes

.2 Insulation

.3 Windows

.4 Doors

.5 Roofing systems

.6 Flashings

.7 HVAC systems

.8 Electrical fixtures

.9 Mechanical systems

.10 Geothermal systems and components

.11 Plumbing systems

.12 Security systems

.13 Accessibility systems, including door openers, LULA lift, etc.

.14 Appliances

.15 Millwork

.16 Etc.

.8 Inspection Form – include a sample inspection form. In tabular form, identify the purpose of the inspection and how, when, and where the inspections should take place. Provide space for recording of weather conditions, general observations, and remarks.

.9 Shop Drawings – attach record copies of all final applicable shop drawings.

END OF SECTION

1.0 GENERAL

1.1 Warranty / Guaranty Period

.1 Provide a three (3) year minimum warranty for all Work of the Contract, including a guaranty secured by Performance Bond for the first two (2) years, commencing on date of substantial performance.

.2 Extended and/or product warranties beyond the minimum three (3) year period are outlined within the various Technical Specification sections.

1.2 Remedial Work Under Guaranty/Warranty

.1 Perform any warranty repair work required during the warranty period at no extra cost. Refer to 1.2.3 for additional information on costs.

.2 The Owner will notify the Contractor within 30 days of the discovery of any suspected warrantable defect in the Work. Immediately take necessary steps to protect the area against further damage and take corrective action to bring the defect into conformance with the Contract Documents and rectify any damage incurred. Schedule repair work with the Owner and make every attempt to correct defects within three weeks of notice.

.3 In the event of a valid warranty claim resulting in corrective work, the Contractor and Owner shall contact the Consultant to determine what level of involvement, including but not limited to field review, may be necessary. Should the Consultant determine that field reviews are required during the warranty repair work, the Contractor shall be responsible for Consultant fees.

.4 Remedy be at no cost to the Owner and includes all labour, material, equipment, supervision, and field review necessary to correct defective areas of the Work and any damages incurred to obtain access to defective areas.

.5 Reimburse the Owner for any resulting assessment costs, including fees associated with Consultant involvement, incurred to define the extent of the defect and for testing costs incurred to confirm acceptability of repairs.

.6 Reimburse the Owner for all associated costs incurred due to closure of areas requiring repair under warranty.

.7 Warranty periods for areas requiring repair are to be extended by the amount of time elapsed between issuance of notice and completion of remedial work. Warranty/ guaranty period will re-commence upon completion of remedial work.

.8 Warranties are not to be deemed to restrict any liability of the Contractor arising out of any applicable law.

END OF SECTION

1.0 GENERAL

1.1 Progress Records

.1 Consultant will provide Contractor two sets of clean white prints for record drawing purposes.

.2 The Contractor shall maintain accurate project record drawings on one set of white prints throughout the course of the Work that indicate deviations from the Contract Documents in red ink. Records shall be open to review by Consultant and Owner at all times and a copy shall be furnished to the Consultant on at regular intervals, but no less than once per month.

.3 Record following information:

.1 Field changes of dimensions and details.

.2 Modifications made via Change Order, Change Directive, or Supplemental Instruction.

.3 Deviations from architectural, structural, electrical, mechanical, security, etc. installations shown on Drawings.

.4 Other significant deviations that are concealed in construction and cannot be identified by visual inspection.

.5 Type and location of repairs not indicated on the construction drawings.

.6 Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.

1.2 As-Built Drawings

.1 At completion of the Work and prior to final review, neatly transfer “as-built” records to the second set of white prints using a fine red marker. Neatly print lettering and numbers to match original size. Lines shall be neat and accurate.

.2 Add “AS-BUILT RECORD” at each drawing title block. Circle on List of Drawings each title and number of drawings marked with "as-built" records.

.3 Maintain as-built drawings up to date as Work progresses. Status of maintained as-built drawings may be considered as a condition of validation of applications for payment.

.4 Identify each as-built drawing as “As-Built Copy” and maintain the as-built drawings in good condition. Make as-built drawings available to the Consultant at all times.

.5 As-built drawings shall include accurate dimensioned record of deviations and changes in Work from drawings.

.6 As-built drawings shall be signed and dated by the Contractor.

.7 Submit as-built drawings to Consultant to for review and make corrections as directed by Consultant.

.8 Record accurately all deviations in the Work.

.9 Accurately record locations of concealed structure, mechanical and electrical services, and similar Work not clearly in view, the location of which is required for maintenance, alteration Work, and future additions. Do not conceal such Work until the location has been recorded.

.10 Accurately record locations of equipment bases, anchors, concrete pads and roof curbs, sleeves, piping, conduits, ducts, maintenance holes and valves, etc. located either below, outside, or within structure.

.11 Where piping, conduits, and ducts are underground, underfloor, embedded in concrete, or otherwise in inaccessible locations, accurately record with respect to structure column lines or walls and elevations with respect to finished floor levels or grades referenced to the centre line of components.

.12 Accurately record any components which will be in inaccessible locations for Consultant’s review before the component is covered, or buried, or made inaccessible.

.13 Electronic copies of Contract Drawings can be obtained from Consultants in AutoCAD format at a cost of $150 plus HST per sheet for drawings. A ‘Release/Terms of Use’ waiver may be required to be signed at the Consultant’s sole discretion, for each disciplines’ drawings.

.14 Clearly and prominently mark each drawing “AS-BUILT DRAWING prepared by _____ (name of Contractor)”.

.15 Submit both sets of "as-built record" drawings to Consultant on completion of Contract and before the final payment.

.16 If the project is completed without significant deviations from contract drawings, declare this in writing and submit to Consultant in lieu of project record drawings.

1.3 Operation and Maintenance Manuals

.1 Submit electronic copies of manufacturers' printed operation and maintenance manuals where outlined in the Technical Specifications.

.2 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance as requested within the related Specification sections.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to supply, install, and maintain hoarding, dust protection, site protection, shoring and bracing systems, etc. as indicated on phasing drawings and in accordance with Section 01 56 00.

.2 Provide all labour, material, equipment, supervision, and services necessary to remove and dispose of all material and debris resulting from removal of:

.1 The existing concrete slab-on-grade, subgrade material, and unexcavated fill material within the Basement Level of the building, as indicated on the Drawings.

.2 The existing building structure in the north-west corner of the property, including but not limited to interior finishes, structural floor, wall, and roof elements, subgrade materials, roofing and waterproofing systems, mechanical/ electrical/ plumbing systems, etc., as indicated on the Drawings.

.3 All existing interior finishes and partition/ non-load bearing walls within the building.

.4 Sound and unsound materials from localized concrete, brick masonry, and wood structure repair areas, where directed by the Consultant.

.5 Building structural elements, where indicated on the Drawings, including brick masonry walls, columns, etc.

.6 The existing building windows and doors, including hardware, frames, etc., as indicated on the Drawings.

.7 The existing building roofing systems.

.8 All existing building services, including plumbing, electrical, HVAC, mechanical, telecommunications, etc. indicated in the Specification and on the Drawings. Contractor to confirm systems to be removed with Consultant prior to performing removals.

.9 All existing playground features and equipment, including storage sheds, playground items and equipment, etc.

.10 The existing landscaping features within the building playground area, including but not limited to asphalt pavement, wood retaining walls, fencing, soft landscaping elements, subgrade materials, etc.

.11 The existing landscaping features at the south and southwest corner of the property, including but not limited to pavers, concrete sidewalk/ pads, soft landscaping elements, stairs, ramps, sheds, etc., as indicated on the Drawings.

.3 Cutting and remedial work required to make the affected parts of the Work come together properly.

.4 Disconnect existing site power supply and provide temporary service sufficient for performance of the work including meters and other equipment specified and required by Toronto Hydro and/ or other Authorities Having Jurisdiction. Pay fees and costs associated with temporary power usage during construction.

2.0 PRODUCTS

Not applicable.

3.0 EXECUTION

3.1 Inspection

.1 Visit and examine the site and note all characteristics and features affecting the Work of this Section.

.2 Properly identify all services, whether buried, built-in, or exposed, as to position, type of service, size, and direction of flow.

.3 Inspect materials, equipment, and components to be re-used or turned over to the Owner. Note their condition and advise the Consultant in writing of any defects or conditions that would affect their removal and re-use.

3.2 Preparation

.1 Prevent movement, settlement, or damage of elements of existing building and site landscaping that are to remain. Provide bracing, shoring, and supports as required. Protect existing surfaces not to be restored from damage during removal procedures.

.2 Cut and/or cap existing services within the work area, if any, prior to start of Work as required, but do not affect services of areas not under construction or essential to on-going operation of the building.

.3 In all cases, exercise reasonable care during removal operations to avoid damaging items to be salvaged, re-used, or items that are not part of the Work.

.4 Seal off work areas to prevent dust and debris from affecting other areas outside of work area. Prevent public access to areas being repaired.

.5 Tape and/or seal and provide protection to all mechanical and electrical services and all fire alarm and security devices still functioning adjacent to work areas to prevent damage resulting from dust, water, or impact.

.6 Cover drains, catch basins, utility access holes, etc. as required to prevent any construction-related materials and debris from entering these elements and the drainage systems. Ensure that all drains and catch basins continue to operate as required during construction.

.7 Remove or protect in place all surface-mounted or permanent fixtures not to be demolished from damage during demolition procedure.

.8 Apply filter cloth to all exhaust and ventilation vents within work area to prevent dust generated by construction activity from escaping.

.1 Clean or replace filter cloth if filter cloth becomes unsuitably dirty as determined by Consultant.

.9 Provide proposed demolition sequence for Consultant review prior to commencing work.

.10 Provide temporary lighting and ventilation as required to work areas. Owner to provide 110 volt, 220 amp service to work area for Contractor’s use.

.11 Provide temporary lateral bracing for walls, foundation walls, columns, etc. as required to facilitate the Work. Refer to Section 03 01 31.

3.3 Demolition

.1 Remove and dispose of material and debris resulting from removal of the existing concrete slab-on-grade, subgrade material, and unexcavated fill material within the Basement Level of the building, as indicated on the Drawings.

.2 Remove and dispose of material and debris resulting from removal of the existing building structure in the north-west corner of the property, including but not limited to interior finishes, structural floor, wall, and roof elements, subgrade materials, roofing and waterproofing systems, mechanical/ electrical/ plumbing systems, etc., as indicated on the Drawings.

.3 Remove and dispose of material and debris resulting from removal of all existing interior finishes and partition/ non-load bearing walls within the building.

.4 Remove and dispose of material and debris resulting from removal of sound and unsound materials from localized concrete, brick masonry, and wood structure repair areas, where directed by the Consultant.

.5 Remove and dispose of material and debris resulting from removal of building structural elements, where indicated on the Drawings, including brick masonry walls, columns, etc.

.6 Remove and dispose of material and debris resulting from removal of existing building windows and doors, including hardware, frames, etc., as indicated on the Drawings. Existing frames and framing elements shall be totally removed leaving a clean, sound, smooth rough opening suitable for placement of new materials to approval of Consultant.

.7 Remove and dispose of material and debris resulting from removal of the existing building roofing systems. Existing roofing system, including eavestroughs, downspounts, etc. shall be totally removed leaving a clean, sound, smooth surfaces suitable for placement of new materials to approval of Consultant.

.8 Remove and dispose of material and debris resulting from removal of all existing building services, including plumbing, electrical, HVAC, mechanical, telecommunications, etc., as indicated on the Drawings. Contractor to confirm systems to be removed with Consultants prior to performing removals.

.9 Remove and dispose of material and debris resulting from removal of the existing playground features and equipment, including storage sheds, playground items and equipment, etc.

.10 Remove and dispose of material and debris resulting from removal of the existing landscaping features within the building playground area, including but not limited to asphalt pavement, wood retaining walls, fencing, soft landscaping elements, subgrade materials, etc.

.11 Remove and dispose of material and debris resulting from removal of the existing landscaping features at the south and southwest corner of the property, including but not limited to pavers, concrete sidewalk/ pads, soft landscaping elements, stairs, ramps, sheds, etc., as indicated on the Drawings.

.12 Demolition procedures and equipment shall meet all applicable noise control by-laws and regulations at the Place of the Work.

.13 Provide shoring to support the structure when removals reduce its load-carrying capacity, as directed by Consultant. No payment will be made for such shoring, as it is to be included in costs of repair as outlined in these documents.

.14 Take care not to damage the surface of sound material that is to remain through removal operation. Where any such damage is done, it is to be repaired by Contractor at their own expense to Consultant's approval.

.15 Where new materials are to be applied to existing materials, leave surface clean and sound.

.16 At end of each day's work, leave work in safe condition so that no part is in danger of causing injury or damage.

3.4 Cutting and Remedial Work

.1 Perform cutting and remedial work required to make affected parts of the Work come together properly and complete the Work.

.2 Coordinate and perform the Work so that cutting and remedial work is kept to a minimum.

.3 Perform cutting by methods to avoid damage to other work.

.4 Provide proper surfaces to receive patching, remedial work, and finishing.

.5 Cutting and remedial work shall be performed by competent and qualified specialists familiar with the Products affected and in a manner that neither damages nor endangers the Work.

.6 Ensure that cutting and remedial work does not jeopardize manufacturers' warranties.

3.5 Waste Disposal

.1 Dispose of waste products and material in strict accordance with product manufacturer's material safety data sheets and governing waste control regulations.

.2 Existing drainage and sewer systems are not to be used to dispose of project wastes and/or materials.

.3 Store volatile wastes or material in covered metal containers. Remove wastes that create hazardous conditions from premises daily.

.4 Refer to Specification Section 01 74 00 for further requirements relating to waste disposal.

END OF SECTION

1. GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 The work described in this Section shall include demolition, salvage, removal, and in-place abandonment, either completely or partially, of those materials and structures so designated, including the requirements for backfilling resulting excavations, trenches, holes, and pits, as shown on the drawings and specified herein.

1.1.2 The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.

1.1.3 Removal, abandonment, demolition, or salvage of a particular item shall be as indicated on the Drawings and herein.

1.2 REFERENCES

1.2.1 OPSS 510, Ontario Provincial Standard Specification 510 (Construction Specification for Removal).

1.3 SUBMITTALS

1.3.1 Submit details of where waste and surplus materials are to be disposed or reused. Include each disposal/reuse site location, operator's name and business address, type of license under which site operates, and criteria used by site to assess suitability of waste and surplus materials for disposal.

1.3.2 Submit documents in accordance with Section 01 00 05.

1.4 SITE CONDITIONS

1.4.1 Geotechnical Conditions: For information on subsurface conditions refer to Geotechnical Report.

If Cultural Heritage Resources (such as archaeological sites, artifacts, building and structural remains, and human burials) are encountered during performance of Work, contact Consultant immediately and suspend Work in immediate area until an assessment has been completed by Ministry of Culture, Tourism and Recreation. Protect cultural heritage resources to acceptance of Consultant.

1.5 ADMINISTRATIVE REQUIREMENTS

1.5.1 Coordination: Coordinate with Owner / Consultant for the material ownership including the following:

1.5.1.1 Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to the Owner that may be encountered during demolition remain the Owner's property:

1. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.
2. Coordinate with Owner's, who will establish special procedures for removal and salvage operations.

1.5.2 Pre-Construction Meeting: Arrange a pre-construction meeting attended by a representative of the Contractor, the Owner and the Consultant to discuss the following:

1.5.2.1 Verify project requirements.

1.5.2.2 Review site conditions.

1.5.2.3 Examine existing site conditions adjacent to demolition work, prior to start of Work.

2. PRODUCTS

2.1 MATERIALS

2.1.1 All materials requiring removal shall become the Contractor's property and shall be removed and disposed of from the site, as the work progresses, unless indicated otherwise.

2.1.2 Salvaged material: Salvage and stockpile Products, materials, and equipment as specified herein, indicated on Site or indicated on drawings.

3. EXECUTION

3.1 PROTECTION

3.1.1 Prior to commencing Work: Have authorities stake out utility locations to prevent disturbance during Work.

3.1.2 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered. Obtain permission of Consultant before moving or otherwise disturbing utilities or structures.

3.1.3 Protect existing buildings and surface features which may be affected by Work from damage while Work is in progress and repair damage resulting from Work.

3.1.4 Keep access roads clear of debris and dirt resulting from Work of this Section to acceptance of authorities having jurisdiction.

3.2 PREPARATION

3.2.1 Temporary Erosion and Sedimentation Control:

3.2.1.1 Where applicable, provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to: requirements of authorities having jurisdiction.

3.2.1.2 Inspect, repair, and maintain erosion and sedimentation control measures during demolition.

3.2.1.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal after completion of demolition work.

3.3 EXCAVATION, STOCKPILING AND DISPOSAL

3.3.1 Refer to Specification Section 31 23 00 for requirements for excavation, stockpiling and disposal related to items indicated to be removed.

3.3.2 Excavation required for the Work to be carried out under this specification shall be part of the removal operation and shall be performed in a manner that leaves any portions not designated for removal undisturbed.

3.3.3 All materials indicated to be removed shall be disposed of legally, off-site.

3.4 REMOVAL AND DEMOLITION OPERATIONS

3.4.1 Remove items as indicated.

3.4.2 Disruption of items designated to remain in place is not permitted.

3.4.3 Removal of pavements, curbs and gutters:

3.4.3.1 Square up adjacent surfaces to remain in place by saw cutting or other method acceptable to the Consultant on site.

3.4.3.2 Protect adjacent joints and load transfer devices.

3.4.3.3 Protect underlying and adjacent granular materials where they are exposed and identified to remain.

3.4.3.4 Prevent contamination with base course aggregates, when removing asphalt pavement for subsequent incorporation into hot mix asphalt concrete paving.

3.4.4 Excavate at least 300 mm below pipe invert, when removing pipes under existing or future pavement area.

3.4.5 Remove designated trees during demolition.

3.4.5.1 Obtain written approval of Consultant prior to removal of trees not designated.

3.4.5.2 Relocate trees designated for removal and identified by Consultant to be healthy.

3.4.5.3 Grind, chip, or shred other vegetation for mulching and composting.

3.4.6 Stockpile topsoil for final grading and landscaping:

3.4.6.1 Provide erosion control and seeding if not immediately used.

3.4.7 Salvage:

3.4.7.1 Items to be salvaged: of diversion:

3.4.7.2 Dismantle items containing materials for salvage and stockpile salvaged materials at locations as indicated.

3.4.8 Disposal of Material:

3.4.8.1 Dispose of materials not designated for salvage or reuse on site at authorized facilities.

3.4.8.2 Backfill: Backfill in areas as indicated and in accordance with Section 31 23 33.01- Excavating, Trenching and Backfilling.

3.5 TREE ROOT AND LOWER BRANCH PRUNING

3.5.1 Take special precautions for trees indicated on Drawings that may be adversely affected by excavation and installation of Work specified. Hand-dig within drip line of noted trees in order to expose root systems, then consult with Consultant on how to proceed. Selective root pruning and relocation should be expected. For root and branch pruning requirements see Section 32 90 00. Safeguard and keep moist exposed tree roots until backfilling is complete.

3.5.2 Minimize adverse impact on tree root systems, by employing a number of special granular backfill and compaction measures as necessary. Granular base material depth and degree of compaction may be adjusted in vicinity of tree trunks and major roots by Consultant. Avoid direct contact of tree roots with limestone gravel or concrete slurry. Supply and install continuous layer of geo-textile filter cloth.

3.5.3 After backfilling excavations with topsoil, apply slow release nitrogen fertilizer and soak root system of trees with water.

3.5.4 Prune branches of affected trees to compensate for root loss, as directed by Consultant.

3.5.5 Prune lower branches to establish minimum 1.8 metre vertical clearance under affected trees, as directed by Consultant.

3.6 OTHER REMOVALS

3.6.1 Remove existing on-site features, as shown on Drawings, or as directed by Consultant.

3.6.2 Remove and dispose of features legally off-site.

3.6.3 Reinstate affected areas to topsoil and sod or as indicated on Drawings.

3.7 BACKFILLING, COMPACTING AND TRIMMING

3.7.1 Where removal or partial removal requires the filling of a trench, hole, or pit, backfilling shall be to required grade using either excavated materials approved by Consultant or imported materials, as required, and shall include levelling and trimming of site to match required contours and provide adequate drainage.

3.7.2 Backfill material shall be placed according to Section 31 23 00 - EXCAVATION, BACKFILL AND SITE GRADING.

3.8 RESTORATION

3.8.1 Restore areas and existing works outside areas of demolition to match condition of adjacent, undisturbed areas and/or conditions that existed prior to beginning of Work.

3.8.2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

3.8.3 Restoration shall be in accordance with relevant Sections of these Specifications for each type of work.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, material, equipment, supervision, and services necessary to prepare localized/ targeted foundation wall concrete repair areas and place new concrete repair material as described herein.

.2 This Specification Section is only relevant to localized/ targeted concrete repair locations as directed by the Consultant. Refer to Section 03 30 00 – Cast-In-Place Concrete for requirements relating to larger concrete installations.

1.2 Repair Quantity Determination

.1 Length and width shall be measured to the nearest 25 mm (1”).

1.3 References

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CSA A23.1/CSA A23.2	Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
.4	CSA A3000	Cementitious Materials Compendium
.5	ASTM C260/C260M	Standard Specification for Air-Entraining Admixtures for Concrete
.6	ICRI 310.2R	Selecting and Specifying Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair

1.4 Performance Requirements

.1 Repaired concrete surfaces shall not scale or crack excessively.

.2 Concrete repair materials shall not spall or debond from existing concrete.

.3 Concrete repair materials shall achieve a minimum compressive strength of 20 MPa within 24 hours.

1.5 Submittals

.1 Submit manufacturer's product specifications and data sheets for the following products:

.1 Cement slurry bonding agent

.2 Rapid cure delamination repair concrete material

.3 Vertical patch materials

.2 Submittals to be provided for review by the Consultant a minimum of two weeks prior to placement or use of products.

.3 Do not commence placement of repair products until review is complete and proposed products and procedures are accepted by Consultant.

.4 If requested by Consultant, provide a certificate signed by the Contractor and pre-packaged material manufacturer certifying the following:

.1 Surfaces to receive pre-packaged material were acceptable and satisfactory to receive the materials per the manufacturer’s requirements and these Specifications. Application of pre-packaged materials shall imply acceptance of surfaces.

.2 Pre-packaged materials were installed in accordance with manufacturer’s written instructions and these Specifications.

1.6 Qualifications

.1 Use only qualified concrete placers and finishers, with a minimum of two years’ experience in similar work.

2.0 PRODUCTS

2.1 Materials

.1 Portland Cement: Type GU to CSA A3000.

.2 Aggregate: Natural stone to CSA A23.1.

.3 Water: Potable and to CSA A23.1.

.4 Air Entraining Agents: To ASTM C260/C260M.

.5 Chemicals Admixtures: To CSA A3000. Calcium chloride is not permitted.

.6 Pozzolanic Mineral Admixtures: To CSA A3000.

.7 Curing Materials: To CSA A23.1.

.8 Blended Hydraulic Cementing Material: Type 10SF to CSA A3000.

.9 Supplementary Cementing Material: To CSA A3000.

.10 Superplasticizing Admixture: To CSA A3000.

2.2 Bonding Agent

.1 Contractor to provide manufacturer's recommended bonding agent, if applicable, prior to placement of repair material.

2.3 Vertical Delamination Repair Materials

.1 Vertical patch materials shall be polymer-modified, cementitious, fast setting, and formulated especially for the repair of vertical concrete surfaces.

.2 Patch materials to have the following properties:

	Description	Requirements
.1	Compressive Strength (7 days)	30 MPa minimum
.2	Flexural Strength (7 days)	5 MPa minimum
.3	Slant/Shear Bond Strength (7 days)	5 MPa minimum
.4	Linear Shrinkage	0.10% maximum
.5	Rapid Chloride Permeability	less than 1,000 coulombs
.6	Thermally compatible with concrete substrate under all applicable service conditions.	

.3 The patch materials listed below may conform to the specified properties and linear shrinkage requirements. Manufacturer's latest product data sheets for proposed patch materials shall demonstrate that the patch material conforms to the specified requirements. Where product data is incomplete, manufacturer is to provide supplementary independent test data that demonstrates conformance.

.4 Patch Materials:

	Product Name	Manufacturer
.1	MasterEmaco S 440MC (form)	Master Builders Solutions

	Product Name	Manufacturer
.2	MasterEmaco S 466CI (form, vertical only)	Master Builders Solutions
.3	MasterEmaco S 488CI	Master Builders Solutions
.4	MasterEmaco N 400	Master Builders Solutions
.5	MasterEmaco N 425	Master Builders Solutions
.6	MS-S6 Concrete	King
.7	MS-S6 Self-Consolidating Concrete	King
.8	MS-S10 Self-Consolidating Concrete	King
.9	Structuroc V	Solhydroc

2.4 Admixtures

.1 Use only compatible admixtures and add to mix in strict accordance with manufacturer's written instructions.

.2 Use of calcium chloride not permitted.

2.5 Non-Shrink Grout

.1 Premixed compound consisting of non-metallic aggregate, cement, and water reducing and plasticizing agents, of pouring consistency, capable of developing compressive strength of 35 MPa at 28 days.

.2 Non-shrink grout materials:

	Product Name	Manufacturer
.1	In-Pakt Construction	King
.2	Sika Grout 212	Sika Canada Inc.
.3	Masterflow 100	Master Builders Solutions
.4	CPD Non-Shrink Grout (Pre-Mix)	CPD Construction Products

2.6 Dry Pack

.1 Premixed or non-premixed composition of non-metallic aggregate, cement, and sufficient water for the mixture to retain its shape when made into a ball by hand and capable of developing compressive strength of 35 MPa at 28 days.

3.0 EXECUTION

3.1 Concrete Surface Preparation

.1 All concrete surfaces to receive new concrete repair material shall have a minimum No. 6 CSP per ICRI 310.2R and be thoroughly abrasive-blast prior to concrete placement to remove laitance, debris, and loose aggregate.

.2 Clean all existing concrete surfaces to receive new concrete of foreign material, dust, debris, grease, and oil as directed by Consultant. Emulsifiers shall be required for surfaces containing grease or oil.

.3 Contractor to notify Consultant to review surfaces prior to concrete placement.

3.2 Concrete Placement – Vertical Surfaces (Gravity Grouting)

.1 Prepare patch surface, mix patch material, and apply, finish, and cure in strict accordance with the more stringent requirements of the Contract Specifications and manufacturer's written instructions.

.2 Ensure formwork is secure and free of debris.

.3 Thoroughly wet the patch area and forms for a period of not less than twenty-four (24) hours prior to concrete placement.

.4 If required by manufacturer, apply a bonding agent to the surface of the concrete just prior to placing new concrete. The bonding agent shall be scrubbed into the concrete to fully saturate the surface but not allowed to puddle.

.5 Prepare pre-packaged concrete mix per manufacturer's specifications.

.6 Contractor to confirm the minimum and maximum application lift thickness prior to placement of concrete. If required and permitted by the manufacturer, the concrete repair material can be extended with aggregate.

.7 Contractor to submit proposed aggregate extension mix design to the Consultant prior to proceeding with Work.

.8 Place new concrete into forms by gravity method and thoroughly consolidate concrete in forms using vibrators or other Consultant-approved method.

.1 Ensure reinforcing steel is secured in place and is not disturbed during placement.

.2 Vibrators are to be used for consolidation purposes only and are not to be used to an extent that causes segregation of the concrete.

.3 Internal vibrators shall conform to CSA A23.1 Clause 7.2.5.2 and Table 19: Internal Vibrators for Various Applications.

.4 Vibrators shall be inserted into concrete perpendicular to concrete surface.

.5 Vibrators shall be inserted such that zones of consolidation always overlap.

.9 Remove all formwork and support brackets to leave a smooth and flush concrete finish after curing. Formwork to remain in place for seven days minimum for curing or longer until concrete has attained 75% of its specified 28-day strength.

.1 Apply approved curing compound as recommended by grout manufacturer as alternative to seven-day cure by formwork if 75% of concrete strength is achieved.

.2 Cure in accordance with the more rigorous requirements of this Section and manufacturer’s written instructions.

.10 Edges of repair areas are to be ground, hand patched, etc. as required to produce a smooth (form-like) transition from the new patch surface to the existing slab to the approval of the Consultant once forms have been removed.

.11 Concrete repair material that is sagged, debonded, porous, honeycombed, or cracked shall be replaced.

.12 Do not use steel trowels with air-entrained concrete. For air-entrained concrete, the surface can be further levelled and consolidated with a magnesium bull float for larger repairs or a magnesium trowel for smaller repairs. One or more passes shall be made at suitable time intervals to obtain a level finish free of float marks. Do not work bleed water on the concrete surface into the concrete during finishing.

3.3 Concrete Mixing and Placing

.1 Concrete shall be machine mixed unless otherwise stipulated by the manufacturer. Mixing and placing shall be in accordance with CSA A23.1.

.2 Concrete shall be conveyed from the mixer to the place of deposit by methods that will ensure the required quality of concrete. Equipment for conveying the concrete shall be of such size and design as shall ensure a practically continuous flow of concrete at the delivery end without separation of materials.

.3 Concrete shall be deposited in the forms as near as practicable to its final position to avoid re-handling.

.4 Depositing shall be continuous throughout each division and the concrete shall be placed and worked so that a uniform texture will be produced.

.5 No concrete shall be placed later than one half hour after leaving the mixer. No re-tempered concrete shall be allowed.

.6 Mix concrete in accordance with the manufacturer’s written instructions.

3.4 Compaction and Vibration

.1 Concrete shall be consolidated by means of sufficient vibrators of adequate size operated by competent workers.

.2 The use of vibrators to transport concrete shall not be allowed.

.3 Concrete shall be thoroughly worked around reinforcement, around embedded items, and into corners.

.4 Compaction and vibration is to eliminate all air and stone pockets that may cause honeycombing, pitting, or planes of weakness.

3.5 Concrete Curing

.1 Ensure manufacturer's recommended curing conditions are maintained over the patch area. The more stringent curing conditions between the manufacturer’s written instructions and those outlined in this section will govern unless otherwise agreed upon by the Consultant in writing.

.2 Vertical repair patches are also to be wet cured for a duration of seven days by either:

.1 Maintaining formwork in place with form ties loosened and water applied to run down the inside form face after the concrete has hardened to keep the repair surfaces wet.

.2 Removing formwork from vertical surfaces and providing fog misting, light water spray, or application of wet burlap covered with polyethylene to keep the repair surfaces continually wet.

.3 The use of chemical curing compounds is not permitted.

.4 Protect concrete from the harmful effects of heat, cold, running or surface water, and mechanical shock.

.5 Do not place concrete when air temperature is below 10°C, or without implementing provisions to ensure proper curing of concrete when, in the opinion of the Consultant, there is a possibility of air temperature falling below 10°C. These provisions shall be reviewed by the Consultant and conform to the requirements of CSA A23.1.

.6 Maintain concrete material and forms between 15°C and 32°C until concrete placement whenever the surrounding air is below 5°C. No frozen material or material containing ice shall be used. All existing concrete, reinforcement, forms, and ground that the concrete will contact is to be free from frost.

.7 Maintain a curing temperature above 10°C for a minimum of 24hrs or longer to ensure proper concrete curing per manufacturer requirements. Under no circumstances may dry heat be used. Provide means to humidify the air within the heated enclosure and ensure that moisture requirements for curing are maintained.

.8 Do not allow loads to be applied to affected concrete element until material has adequately cured to its specified 24-hour compressive strength.

.9 The Consultant will have cause to not certify payment for repairs undertaken without adequate wet-curing procedures or that become surface dry during the specified curing period.

3.6 Inspection and Testing

.1 Testing is to conform to CSA A23.2.

.2 Inspection and testing to be conducted by a testing agency designated by the Owner. The Owner will pay costs of inspection and testing described in this section.

.3 Contractor to inform testing agency 72 hours in advance of concrete placement.

.4 Testing shall include:

.1 Preparation and testing of concrete grout cubes or cylinders for compressive strength.

.2 Review manufacturer product data sheets submitted by the Contractor.

.3 Bond testing of concrete repair patches to existing concrete where designated by the Consultant.

.4 Submission of test results to the Owner, the Consultant, and the Contractor.

.5 A minimum of one set of concrete grout cubes (9 cubes) or cylinders (4 cylinders) shall be taken for compressive strength testing for each concrete patch material used each day unless otherwise directed by Consultant. Concrete test samples are to be placed in an area with similar curing conditions to that of the cast concrete.

.5 Testing procedures for concrete shall conform to the following requirements:

.1 Compression tests on concrete shall be carried out in accordance with CSA A23.1 and A23.2. Strength test on approved grout shall consist of nine grout cubes with three cubes tested at seven days and the remainder tested at 28 days. For cylinders, strength tests shall be undertaken on one cylinder each at 3 and 7 days with the remaining two tested at 28 days.

.6 The Contractor shall provide at no additional costs to the Owner:

.1 Samples of all material required for testing.

.2 Cooperation with the execution of concrete testing which shall include protection against injury or loss of grout cubes or cylinders.

.3 Access for the testing agency to test and/ or inspect materials.

.4 Site storage facilities meeting requirements of CSA A23.2 for concrete test specimens prior to removal to laboratory.

.7 Bond Strength:

.1 After the concrete or grout has cured, the testing agency may perform bond strength tests if requested by Consultant.

.2 These cores are to be used for the evaluation of the bond strength of the new concrete to the existing by direct tensile force. The testing agency will drill through patches selected by Consultant.

.3 Failure to achieve a minimum tensile bond strength of 0.9 MPa shall constitute failure of patches.

.4 Contractor to fill all core holes with non-shrink cementitious grout upon completion of the tests.

.8 Contractor shall pay for costs of additional testing as follows:

.1 If Contractor fails to notify testing agency in event of pour cancellation.

3.7 Field Quality Control

.1 The Consultant shall evaluate bonding of fresh patch material to existing concrete after the fresh patch material has cured sufficiently.

.2 The evaluation shall be performed by sounding, using a "chain-drag" or other techniques.

.3 Hollow sounds detected in repair area provide reason to suspect inadequate bonding. Contractor to core these areas to determine bonding adequacy where requested by the Consultant.

.4 Coring shall be through the new concrete and into the existing concrete. Core diameter shall be 75 mm, or as required by the Consultant. Length of cores shall be twice the core diameter or twice the thickness of new concrete, unless otherwise requested by the Consultant.

.5 Scanning is to be completed prior to coring to avoid coring through embedded reinforcing, conduit, or other embedded items.

.6 Cores will be visually inspected after removal and any further testing that is required will be determined by the Consultant.

.7 Contractor to patch core holes.

3.8 Rejection of Defective Work

.1 The Consultant shall have the right to order additional concrete testing of any portion of repairs in accordance with CSA A23.1 if previous testing demonstrates non-conformance with specified requirements. The testing agency shall be selected by the Consultant and shall deal directly with the Consultant. Payment for costs associated with the additional concrete testing will be at the Contractor's expense.

.2 Where it is the Consultant's opinion that material or workmanship fails to meet the specified requirements, the work shall be replaced or repaired to the approval of the Consultant at no additional cost to the Owner.

.3 Bond failure between repair material and the existing concrete, or failure to meet compressive strength requirements based on compression testing of concrete cylinders, will result in drilling of additional core samples at the Contractor's expense. Failure of these additional samples will require the work to be replaced or repaired to the approval of the Consultant at no additional cost to the Owner.

3.9 Record Drawings

.1 Maintain accurate records of the location, size, and concrete placement date for each repair area.

.2 Records to be kept up-to-date and made available to Consultant throughout the duration of the Work.

.3 Prior to Substantial Performance of the Work, provide a plan showing location, size, and date of concrete repairs.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to supply, install, maintain, and remove shoring and bracing systems as required to support the structure, excavations, etc. during performance of the Work.

.2 Structural shoring must be provided as indicated in shoring shop drawings prepared by a specialty Professional Engineer retained by the Contractor.

.3 Structural shoring costs are included in the Contract Price.

1.2 Submittals

.1 Provide shoring shop drawings that include a shoring design and layout designed by a specialty Professional Engineer licensed to practice in Ontario a minimum of two weeks prior to starting demolition Work. Specialty Professional Engineer is to be retained by the Contractor at no additional cost to the Owner.

.1 Shoring shop drawings are to include shoring layouts for randomly located repairs, for excavations, for supporting the structure during performance of the work, and lateral wall bracing if required.

.2 Shoring layout and shop drawings shall depict arrangement of equipment for shoring, showing installation details, timber cribbing, member types, and spacing of connections.

.3 Shoring layout and shop drawings shall be designed, sealed, and signed by specialty Professional Engineer.

.2 Shoring shop drawings are to be reviewed by the Consultant for the effect on the base structure and accepted prior to installation of shoring.

.3 Shoring shop drawing submission excludes any shoring specifically detailed on the Drawings.

.4 Submit documentation of field inspections and certifications required from specialty Professional Engineer, as specified by this Section, and Contract Documents.

1.3 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3 CSA S269.1 Falsework and Formwork

.4 CSA S269.2 Access Scaffolding for Construction Purposes

.5 CSA S350 Code of Practice for Safety in Demolition of Structures

2.0 PRODUCTS

2.1 Equipment and Materials

.1 Unless otherwise specified by Contract Documents, use only commercially manufactured shoring and bracing systems.

.2 Minimum capacity of commercially manufactured equipment as follows:

.1 Post shores with a minimum capacity of 24 kN at 2.5 m height

.2 Standard scaffold frames with a minimum capacity of 22 kN per leg.

.3 Heavy-duty scaffold frames with a minimum capacity of 44 kN per leg.

.3 Manufactured shoring systems shall consist of pre-engineered steel or aluminium components, designed and produced specifically for structural shoring, and installed in accordance with manufacturer’s recommendations.

.4 Shoring members need not be new materials. Previously used materials are acceptable, provided that they are in good repair, unbent, and undamaged.

.5 Use of “scaffolding” equipment (i.e. where not specifically intended for use as structural shoring of heavy loadings), wood shoring or bracing members, or tube-and-coupler assemblies require preapproval by the Consultant or Specialty Professional Engineer

.1 Use of wood materials shall be limited to wedges and shims, where not supporting vertical loading and where not subject to shrinkage or potential deterioration in wet conditions or long-term application.

.6 Design of shoring members or structural steel members and components that are not of a pre-manufactured system shall be in accordance with provisions of governing Building Code and Standards for specific material of member.

.7 Shoring and bracing systems to be installed to the on-grade level unless otherwise indicated on the approved shoring shop drawings or the Drawings.

3.0 EXECUTION

3.1 Structural Shoring

.1 Support the structure, excavations, etc. during the Work. Supply and install all shoring and bracing systems in accordance with approved shop drawings and as necessary to prevent movement, settlement, or damage to the structure, services, and property.

.2 Specialty Professional Engineer who designed shoring and bracing systems shall inspect installation and provide written certification that shoring and bracing systems and components, as installed, meets intent of their design and compliance with project criteria.

.3 Provide additional shoring and bracing prior to performing removals where the Consultant or specialty Professional Engineer deems it necessary to prevent movement, settlement, or damage to the structure, services, and property based on identified repair locations and work areas.

.4 Provide additional shoring and bracing to support suspended piping, mechanical systems, etc. during the Work.

.5 Provide additional shoring and bracing at the Contractor’s expense where it is necessary to support stockpiled rubble and equipment.

.6 Formwork shoring and bracing requirements are in addition to structural shoring and bracing requirements.

.7 Install and arrange shoring and bracing systems in a manner that prevents sharp projections that may cause personnel injury.

.8 Modify the position of shoring and bracing system components if requested by the Consultant or specialty Professional Engineer at no additional cost to Owner.

.9 Manage and maintain shoring and bracing systems by regularly inspecting and checking installed shoring and bracing components to ensure that supports, fastenings, wedges, ties, and parts are secure.

.10 Tighten all shoring and bracing system components below the level being repaired prior to applying loads and new materials.

.11 In relation to concrete, do not strip shores until concrete material has reached 75% of design strength, and not sooner than seven days after concrete placement.

3.2 Lateral Bracing

.1 Install a lateral bracing systems in areas where required to support the structure, foundations walls, excavations, etc. during performance of the Work. The lateral bracing system must be sufficient to support the lateral forces to be resisted.

.2 The lateral bracing drawings are to form part of the required engineered shop drawing submission.

.3 Contractor is to install bracing system prior to performing removals.

.4 In relation to concrete, lateral bracing systems are to remain in place until new concrete material has attained 75% of its specified strength.

.5 Contractor is responsible for the management and maintenance of lateral bracing systems and for removal of all lateral bracing systems upon completion of the Work.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to remove sound and unsound concrete from foundation walls at localized/ targeted concrete repair areas where directed by the Consultant, and where otherwise required as part of the Work, as described herein.

2.0 PRODUCTS

2.1 Equipment

.1 Provide hand-held jackhammers for concrete removal that are capable of efficiently removing sound and unsound concrete without causing excessive or unwanted removal.

.2 Maximum jackhammer size is 15 kg. Light chipping hammers are to be used where the Consultant deems it necessary to reduce the amount of concrete breakage. Maximum light chipping hammer size is 7 kg. The use of light chipping hammers is at no additional cost to the Owner.

.3 Equipment located outside shall be mufflered or placed within an acoustic enclosure to produce maximum operating noise levels of 70 dBa at 3.0 m. Noise levels are also to be in accordance with all local and municipal by-laws and regulations.

.4 Use "silenced" compressors.

.5 Compressors and all diesel-powered equipment are to be fitted with a diesel exhaust scrubber.

3.0 EXECUTION

3.1 Vertical Surface Concrete Removal

.1 Remove concrete in areas that are already spalled or that produce a hollow sound under a hammer test, which indicates the presence of concrete delaminations. The areas shall be initially located by the Contractor and marked on the concrete surface with a durable red-coloured paint. The Consultant will then review the markings and mark out the actual area of concrete to be removed.

.2 Take precautions to avoid punching through the vertical element.

.3 Use light chipping hammers for all vertical concrete removal.

.4 Remove concrete within designated areas to obtain a minimum of 25 mm clearance around all exposed reinforcement within the delamination repair. Minimum removal depth shall not be less than 50 mm, which may include sound concrete.

.5 Upon exposure of visibly corroded or debonded reinforcement, additional concrete removal shall be performed until bars appear to be rust-free for a distance of 75 mm around the perimeter of a patch or until otherwise directed by the Consultant.

.1 This concrete removal shall not proceed until authorized by Consultant.

.2 Contractor shall not receive payment for concrete removals not authorized by nor considered necessary to Consultant.

.6 Excess or unnecessary concrete removal to be at no extra cost to the Contract.

.7 Outline patch area with a 13-mm deep vertical sawcut as close as possible to limits of concrete already removed. Reduce sawcut depth if necessary to avoid cutting reinforcement. Remove concrete to sawcut taking precautions to avoid damaging sawcut edge. Edges with spalls or chips will be rejected and shall be re-sawcut at Contractor's expense.

.8 Call for review by Consultant to confirm acceptability of patch preparation prior to cleaning of reinforcement. After concrete removal has been complete, a final check adjacent to the areas shall be made by the Contractor to determine any additional spalling or delamination which may have occurred. Contractor shall mark out these areas and notify Consultant to make a review.

.9 Remove additional concrete required to provide adequate development and/or lap for new reinforcing steel required as directed by the Consultant.

3.2 Existing Exposed Electrical Services

.1 The Contractor shall perform temporary removal, replacement, or relocation of existing electrical wiring, conduit, equipment, fixtures, or hardware in designated concrete delamination repair areas as required for completion of the Work.

.2 All exposed conduit, fixtures, attached devices, wet-sprinkler fire system piping, heads and pull stations, fire extinguishers, mechanical system components, louvers and ducts are to be protected or Contractor to correct damages at their own expense. The Contractor shall promptly report any damage to the Owner and the Consultant.

.3 Prior to commencing the Work, the Contractor shall contact the Owner to locate all protective or alarm systems and sensors. All services shall be protected against damage or interruption. The Contractor shall provide the Owner with minimum 48 hours advance notice of any necessary interruption. All claims resulting from damage shall be the responsibility of the Contractor.

3.3 Existing Embedded Electrical Services

.1 It is the Contractor's responsibility to ensure that all potential areas of buried conduit be identified and that all high voltage systems located in the area of work are switched off to prevent possible injury. Coordinate requirements with Owner.

.2 The Contractor shall take the utmost caution during concrete removal operations in order to prevent damage to embedded conduits. Any damage caused to such conduits will be immediately reported to the Owner and Consultant. In no instance will damaged or deteriorated conduits be covered up by the Contractor without specific approval from the Owner.

.3 Contractor to repair or abandon damaged conduit within the slab at the discretion of the Consultant. Owner to pay for repairs provided that damage did not result from Contractor's negligence.

.4 Contractor to coordinate required repairs with designated Electrical Sub-Contractor. Contractor shall designate Electrical Sub-Contractor for the Work.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to clean and prepare existing reinforcement exposed within concrete repairs and where otherwise designated by the Consultant.

.2 Provide all labour, materials, equipment, supervision, and services necessary to supplement corroded or damaged reinforcement with new reinforcing steel and accessories, including supply, fabrication, handling, and placing.

1.2 Reference Standards

.1 All Reference Standards are latest editions referenced by the building code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CSA A23.1/CSA A23.2	Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
.4	CSA G30.18	Carbon Steel Bars for Concrete Reinforcement
.5	ACI Manual of Standard Practice for Detailing – 28th Edition	
.6	CSA W186	Welding of Reinforcing Bars in Reinforced Concrete Construction
.7	Reinforcing Steel Institute of Canada (RSIC) Manual of Standard Practice	
.8	SP-71 (08)	ASTM Standards in 318-08
.9	ASTM A775/A775M	Standard Specification for Epoxy-Coated Reinforcing Steel Bars

1.3 Product Handling

.1 Protect reinforcement in a manner that prevents excessive rusting and fouling with dirt, grease, form oil, and other bond-breaking coatings.

.2 Reinforcement shall be free from excessive corrosion, mud, oil or other coatings that adversely affect its bonding capacity at the time concrete is placed.

2.0 PRODUCTS

2.1 New Concrete Reinforcement and Accessories

.1 New reinforcing steel bars and accessories shall conform to Specification Section 03 20 00 – Concrete Reinforcement.

3.0 EXECUTION

3.1 Preparation - Reinforcement in Place

.1 Exposed reinforcement and steel shall be completely cleaned of cement paste, corrosion, oil, and contaminants. Dry abrasive-blast clean to near-white blast, completely cleaned of all grease, oil, dirt, mill scale, cement paste, debonded epoxy, etc. Additional cleaning shall be performed if subsequent corrosion occurs after initial cleaning.

.2 Wire brush, grinding, and similar hand-cleaning methods shall not be permitted in lieu of abrasive-blast cleaning of reinforcement, unless approved by the Consultant.

.3 The Contractor may elect to cut, remove, and replace damaged or corroded reinforcement with new reinforcement in lieu of cleaning existing exposed reinforcement, subject to approval of the Consultant. Provide required tension lap splices with existing cleaned reinforcement at no additional cost to the Owner and Consultant’s approval.

3.2 Installation

.1 Replace or supplement damaged or severely corroded reinforcement exposed in concrete delamination repair patches with new reinforcement where existing reinforcing steel has a section loss of 20% or greater.

.2 Replace or supplement damaged or severely corroded reinforcement where otherwise directed by the Consultant.

.3 Replacement or supplemental reinforcing bars shall be the same bar size or greater than the original bar.

.4 Additional concrete removal may be required to allow for placement of supplemental reinforcing bars. The length of the supplemental bars shall be equal to the length of the deteriorated segment of the existing bars, plus the required lap splices at each end. Splicing requirements shall be in accordance with indicated Reference Standards. Supplemental bars shall be placed parallel to, and approximately 20 mm from, the existing bars.

.5 Additional concrete removal required for supplemental reinforcement placement will be paid by Owner except where Contractor elects to replace bars in lieu of abrasive-blast cleaning.

.6 Reinforcement that is fully exposed in repair areas for the entire bar length shall be removed and replaced with new reinforcement of the same bar size or greater at no additional cost to the Owner.

.7 Accurately place supplemental reinforcement and secure existing reinforcement exposed in the delamination repair patches to maintain original design layout.

.8 Reinforcement shall be firmly tied and supported by bar supports and side form spacers to ensure proper concrete cover and spacing within allowable tolerances before and during concrete placement.

.9 Bar supports shall be sufficient in number and strength to carry the reinforcement they support and prevent displacement by workers or equipment before and during concrete placement.

.10 Bars shall be tied at all intersections where spacing is greater than 250 mm in each direction and at alternate intersections where spacing is less than 250 mm in each direction.

.11 Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, and embedded items. If bars are moved more than one bar diameter, or enough to exceed specified tolerances, the resulting arrangement of bars shall be subject to Consultant’s approval.

3.3 Welding

.1 Any welding of reinforcing steel shall be in accordance with CSA W186.

.2 Copies of the Canadian Welding Bureau approved welding procedure and certificate of current operator qualification shall be submitted to the Consultant prior to commencement of welding.

3.4 Inspection and Testing

.1 No concrete shall be placed until Consultant has reviewed reinforcing in-place. Provide minimum 72 hours of notice of time when reinforcement will be substantially in place and ready for Consultant’s review.

END OF SECTION

1.0 General

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to supply, erect, maintain, and strip all formwork and falsework for poured-in-place concrete shown or indicated on the Contract Drawings and Specifications.

1.2 Reference Standards

.1 All Reference Standards are latest editions referenced by the building code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CSA A23.1/CSA A23.2	Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
.4	CSA S269.1	Falsework and Formwork
.5	ACI SP-004	Formwork for Concrete
.6	ACI 347	Recommended Practice for Concrete Formwork
.7	CSA O86	Engineering Design in Wood (Limit States Design)
.8	CSA O121	Douglas Fir Plywood
.9	CSA O153	Poplar Plywood

1.3 Submittals

.1 Submit shop drawings for falsework and formwork that indicate the method, sequence, and schedule of construction shoring, stripping, and re-shoring.

.2 Indicate formwork and falsework design data, including design loads, for Consultant review. Consultant review does not relieve the Contractor of responsibility for formwork and safety during construction.

.3 Shop drawings submittals shall bear the stamp and signature of a qualified Professional Engineer registered or licensed in the Province of Ontario.

1.4 Handling Requirements

.1 Protect formwork materials before, during, and after installation. Protect installed work and materials of other Sections.

.2 In the event of damage, make required repairs or replacements to Consultant's requirements at no additional cost to the Owner.

2.0 PRODUCTS

2.1 Formwork Materials

.1 Form Material:

.1 Exposed Surfaces: Use metal forms, plywood forms, or plywood lined forms of sufficient structural strength. Plywood to be to CSA O121 or CSA O153. Plywood lining to be new GIS exterior grade fir plywood manufactured with waterproof glue.

.2 Unexposed Surfaces: Use metal forms, plywood forms, or wood lumber. Plywood to be to CSA O121 or CSA O153. Wood lumber to be to CSA O86.

.3 Plywood and Wood Formwork Materials: Material to be to CSA S269.1. Material is to be free from warping and sawn straight so that lines and shapes are accurately retained.

.4 Formwork for unexposed surfaces shall be made with a good grade of lumber or plywood and fitted so that there is no leakage of mortar.

.2 Ties and Spreaders:

.1 Form ties shall be adjustable in length to permit tightening of forms. Use only the snap-off type of form tie that will leave no metal within 25 mm of the concrete surface after removal. Twisted wire form ties are not acceptable.

.3 Form Release Agent:

.1 Form release agent shall be a Consultant-approved chemical agent that is not an oil-based product.

3.0 EXECUTION

3.1 Formwork

.1 Lines and Levels

.1 Verify lines, levels, and column/ wall centers before proceeding with work and ensure that dimensions agree with Drawings.

.2 Coordinate forming and setting of recesses, chases, sleeves, inserts, bolts, and hangers.

.2 Design

.1 Design, construct, and erect formwork in accordance with CSA A23.1, CSA S269.1, ACI 347R, and all applicable construction safety regulations at the Place of Work.

.2 Build forms sufficiently strong and rigid to sustain the weight or fluid pressure of the concrete without noticeable deflection. Ensure forms are fitted sufficiently tight to prevent mortar leakage.

.3 The Contractor shall be responsible for design and construction of falsework.

.4 Do not exceed the safe live load of the structure, considering the strength and age of the concrete, with any construction or shoring loads.

.5 Provide 20 mm x 20 mm chamfer strips at exposed corners or edges of columns, walls, beams, and slabs.

.3 Construction:

.1 Construct forms so that the finished concrete will conform to the shape and dimensions shown on the Drawings.

.2 Construct forms so that they may be dismantled and removed without damaging the concrete or adjacent finishes, fixtures, structure, etc.

.3 Set shores on wedges or use adjustable shores so they may be removed without causing undue strains in the concrete.

.4 Provide temporary openings at the bottom of wall forms to facilitate cleaning and review. Use water to flush out cuttings, shavings, debris, snow and ice, and foreign matter. Ensure that water and debris fully drain to the exterior through clean-out ports, and close the openings with a patch, flush on the inside.

.5 Notify the Consultant when formwork is completed and cleaned to allow for review.

.4 Treatment of Forms:

.1 Install form release agent on form surfaces and allow to dry before placing reinforcing steel, anchoring devices, and embedded parts.

.2 Keep untreated forms wetted down to prevent shrinkage before placing concrete and wet surfaces without allowing ponding at time of placing concrete.

.5 Alignment:

.1 Provide suitable means for checking the alignment and elevation of formwork and check frequently during concrete placement.

.2 Carry out corrective wedging as required until concrete is in place.

.3 Remove concrete that becomes misaligned during placing to satisfaction of Consultant.

.4 Align forms to ensure movement and deflections of the finished product are confined.

.5 Tolerances for all concrete work shall conform to the requirements of CSA A23.1 and ACI 347.

.6 Camber formwork for slabs to provide cambers shown on Drawings. Make allowances for settlement of forms, closure of form joints, and elastic shortening of forms and add to indicated camber requirements.

.6 Stripping:

.1 Do not remove shoring or strip formwork until the concrete has gained sufficient strength to carry dead loads and construction loads that are likely to be imposed. Notify the Consultant before removing formwork.

.2 Remove falsework progressively in accordance with CSA S269.1. Ensure that no shock loads or unbalanced loads are imposed upon the structure during removal.

.3 Loosen forms carefully using a method that prevents spalling and damage to the concrete surface and edges. Do not use wedge pry bars, hammers, or other tools against exposed concrete surfaces.

.4 Leave forms loosely in place for protection until curing requirements are complete.

.5 Completely remove forms from under steps and within void spaces. Provide temporary openings, if necessary.

.6 Remove metal spreader ties on exposed concrete by removing or snapping off inside the wall surface. Point up and patch the resulting pockets flush to surrounding areas.

.7 Re-Use of Formwork:

.1 Forms may be re-used after adequate cleaning if the surfaces are not cracked or roughened. The formwork shall be trimmed and properly patched to provide a smooth surface.

3.2 Inserts and Embedded Items

.1 Confirm the location of sleeves, openings, inserts, etc. that are shown on the Structural Drawings against Architectural and Mechanical drawings. Any sleeves, openings, inserts, etc. that are not shown on the Structural Drawings must be approved by the Consultant.

.2 Accurately locate and set in place items that are to be cast directly into concrete slabs and walls. Coordinate forming and setting of ties, anchor bolts, pipe hangers, accessories, inserts, recesses, openings, sleeves, etc., as required by work of other Sections.

.3 No sleeves, ducts, pipes, or other openings shall pass through structural elements unless detailed on the Structural Drawings.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to supply and install new reinforcing steel work shown on and indicated in all the Contract Drawings and Specifications, including accessories such as hanger bars, spirals, wire ties, support bars, chairs, spacers, supports, or other devices required to position reinforcing properly.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not reference by Code.

.2 Ontario Building Code

.3	CSA A23.1/CSA A23.2	Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
.4	CSA A23.3	Design of Concrete Structures
.5	CSA G30.5	Welded Steel Wire Fabric for Concrete Reinforcement *(Withdrawn)*
.6	CSA G30.18	Carbon Steel Bars for Concrete Reinforcement
.7	ASTM A767/A767M	Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
.8	ASTM A775/A775M	Standard Specification for Epoxy-Coated Steel Reinforcing Bars

.9 American Concrete Institute (ACI) Manual of Standard Practice for Detailing Reinforced Concrete Structures

.10 Reinforcing Steel Institute of Canada (RSIC) Manual of Standard Practice

.11	SP-71	ASTM Standards in 318-08
.12	CSA W186	Welding of Reinforcing Bars in Reinforced Concrete Construction

1.3 Submittals

.1 Mill Tests:

.1 Upon request, provide the Consultant with a certified copy of mill tests of steel supplied, showing physical and chemical analysis, minimum two weeks prior to commencing reinforcing work.

.2 Shop Drawings:

.1 Prepare shop drawings for concrete reinforcement, bar support and accessories in accordance with RSIC Manual of Standard Practice.

.2 If requested by the Consultant, submit shop drawings in accordance with the General Requirements.

.3 Shop drawings shall clearly indicate bar sizes, grades, spacing, location, bending details, quantities of reinforcing mesh, bar supports, mechanical splices, accessories, and identifying code marks to permit correct placement without reference to structural drawings.

.4 Placing drawings and bar lists will be reviewed for number and size of bars only. The Consultant's review of reinforcing shall be a visual review of in-situ work as required to determine general conformity to the engineering drawings. The Consultant’s review shall in no way relieve the Contractor of their responsibility for carrying out the Work in accordance with the drawings.

.5 Substitution of imperial reinforcing sizes and grades will only be accepted if drawings showing imperial sizes are submitted to the Consultant for review. Approval must be obtained before any work is commenced.

1.4 Product Delivery, Storage, and Handling

.1 Store and protect reinforcement in a manner to prevent excessive rusting and fouling with dirt, grease, form-oil, and other bond-breaking coatings.

.2 Reinforcement at the time concrete is placed shall be free from excessive rusting, mud, oil, or other coatings that adversely affect its bonding capacity.

.3 Special care shall be taken when handling epoxy-coated reinforcing steel to prevent damage to the epoxy coating. Bundle and transport epoxy-coated reinforcement in accordance with ASTM A775/A775M. Epoxy-coated reinforcing bars shall not be dropped or dragged, and shall be lifted with spreaders and non-metallic slings. Bar-to-bar abrasion and excessive handling of bundles must be prevented.

.4 The contractor shall repair all damages to the epoxy coating using a manufacturer's approved epoxy patching materials. If damaged areas rust before being repaired, the rust shall be completely removed before the steel surfaces are repaired.

.5 Coat cut ends of epoxy coated reinforcing with approved epoxy patching material.

2.0 PRODUCTS

2.1 Materials

.1 Reinforcing steel bars shall conform to CSA G30.18 (grade 400 MPa) unless otherwise specified herein or on the drawings. Epoxy-coated finish. If epoxy-coated reinforcing bars are unavailable or have excessive lead times, galvanized or stainless steel reinforcing bars shall be used at no additional cost to the Contract.

.2 Reinforcing bars to be welded shall conform to CSA G30.18.

.3 Welded wire fabric shall conform to CSA G30.5. Sizes and gauges as shown on the drawings.

.4 Bar supports shall conform to ACI 316 unless otherwise approved by the Consultant.

.5 Chairs, bolsters, bar supports, and spacers shall be epoxy coated or plastic. The use of pebbles, pieces of broken stone or brick, pipe, or wooden blocks will not be permitted.

.6 Tie wire for coated reinforcing shall be plastic-coated.

.7 Mechanical splices are not permitted.

2.2 Fabrication

.1 Fabricate reinforcing to CSA A23.1 and reviewed shop drawings.

.2 Fabricate reinforcing steel within the following tolerances:

.1	Sheared length plus or minus	25 mm
.2	Depth of truss bar plus or minus	10 mm
.3	Outside dimension of stirrups, ties and spirals, plus or minus	10 mm
.4	Other bends plus or minus	25 mm

.3 Colour-code each bar to correspond with code mark appearing on bar list.

.4 Ship bundles of bar reinforcement clearly identified in accordance with bar lists.

.5 Bars shall not be field bent, straightened, or re-bent, except where indicated or authorized by the Consultant. When field bending is authorized, bend without heat, applying slow and steady pressure. Replace bars that develop cracks or splits.

.6 Splicing of reinforcing bars, unless indicated on the drawings, is prohibited except with the written approval of the Consultant. Such splices shall conform to the splice length for that class of splice according to CSA A23.3. Splices, where possible, shall be staggered.

.7 Fabrication, handling, and shipping of epoxy-coated steel shall conform to CSA S413.

2.3 Epoxy-Coated Steel

.1 All new reinforcing steel shall be coated with a fusion-bonded epoxy coating in accordance with CSA G30.18 and ASTM A775/A775M. Approved factory applied epoxy coating to be Scotchkote 413.

.2 With each batch of coating material, provide a written certification properly identifying batch number, material, quantity represented, date of manufacture, name and address of manufacturer, and a statement that supplied coating material is the same composition as that pre-qualified. A batch is defined as quality of coating material designated by the manufacturer in their production quality control program.

2.4 On-Site Applied Epoxy Coating

.1 If epoxy-coating is damaged on site, it is to be coated on site.

.2 On-site applied 100% solids epoxy coatings to be Type II, Grade 2, Class B conforming to ASTM C881/C881M. Rapid set formulation adjusted to meet site conditions (temperature, humidity, etc.) Approved Products:

.1 3M Scotchkote Liquid Epoxy 413/215

.2 3M Scotchkote Liquid Epoxy 413/215 Cold Weather

.3 BASF MasterEmaco ADH 326

.4 Sika Dur 32 Hi-Mod

.5 Fosroc NitoBond EP

.3 Pigment is to be added to all epoxy coating to obtain an opaque or solid colour (white, green, orange, etc.) finish to facilitate inspection.

3.0 EXECUTION

3.1 Installation

.1 Reinforcement shall be accurately placed in the positions shown on the drawings, firmly tied, and supported by bar supports and side form spacers to assure proper concrete cover and spacing within allowable tolerances before and during placing of concrete.

.2 Bar supports shall be sufficient in number and strength to carry the reinforcement they support and prevent displacement by workers or equipment before and during concreting. Bars shall be tied at all intersections, except where spacing is less than 250 mm in each direction, when alternate intersections shall be tied.

.3 Bars shall be placed to the following tolerances unless noted otherwise.

.1 Clear concrete protection of reinforcement 5 mm ±.

.2 Where the depth of a flexural member or thickness of a wall or smallest dimension of a column is:

.1 200 mm or less 5 mm ±.

.2 larger than 200 mm but less than 600 mm 10 mm ±.

.3 600 mm or larger 20 mm ±.

Lateral spacing of these bars shall be within 30 mm ± of the specified spacing.

.3 For longitudinal location of bends and ends of bars 50 mm ±.

.4 As Item 3 at discontinuous ends of members 20 mm ±.

.5 Specified spacing between bars 10 mm ±.

.4 Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits or embedded items. If bars are moved more than one bar diameter or enough to exceed the specified tolerances, the resulting arrangement of bars shall be subject to approval of the Consultant.

3.2 Welding

.1 Any welding of reinforcing steel shall be in accordance with CSA W186.

.2 Copies of the Canadian Welding Bureau approved welding procedure and certificate of current operator qualification shall be submitted to the Consultant prior to commencement of welding.

3.3 Inspection and Testing

.1 No concrete shall be placed until the Consultant has completed their review of reinforcing in place. The Contractor shall provide a minimum of 72 hours notice of the time when the reinforcement will be substantially in place and ready for the Consultant’s review.

.2 Inspection and testing of factory-coated reinforcement to be conducted by a testing agency designated by the Consultant. The Owner will pay cost of inspection and testing described in this Section.

.3 Inspection and testing of reinforcement coated in place shall include visual inspection with flashlight and mirror.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary for the complete production, mixing, handling, testing, transporting, placement, and curing of cast-in-place concrete material, as indicated on the Drawings and described herein. Work also includes:

.1 Requirements for construction joints and slabs-on-grade.

.2 Requirements for construction joints, foundation walls, and footings.

.3 Fabricated components, anchor bolts, bearing sleeves, plates, and other inserts to be built into concrete.

.4 Incorporation of low-permeability silica-fume-enhanced concrete in footing, foundation wall, pier, and slab-on-grade concrete elements.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CSA A23.1/CSA A23.2	Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
.4	CSA A23.3	Design of Concrete Structures
.5	CSA A3000	Cementitious Materials Compendium
.6	ASTM C1202	Standard Test Method for Electrical Indication of Concrete’s Ability to Resist Chloride Ion Penetration
.7	ACI 305R	Guide to Hot Weather Concreting

1.3 Work Installed but Furnished by Others

.1 Anchor bolts, hangers, sleeves, and other inserts for casting into concrete shall be supplied by applicable trades. Build in and / or set these items and assume full responsibility for correct positioning.

1.4 Submittals

.1 Concrete Mix Design:

.1 The Contractor shall be responsible for mix designs per CSA A23.1 Table 11, Alternate 1. The minimum requirements are indicated herein.

.2 Submit proposed mix designs to the Consultant a minimum of two weeks prior to placement for review. Do not proceed with concrete placement until the Consultant's review is complete and the mix design is in conformance with specified requirements.

.3 Concrete mix designs shall note concrete constituents by weight, the specified properties to be achieved, and the structural elements for which the mix is to be used.

.4 Provide concrete to meet the minimum structural design requirements and the minimum durability requirements defined in CSA A23.1 or indicated on the Drawings. The most severe exposure requirement governs between the indicated design requirements and those outlined in CSA A23.1.

.2 Concrete Test Results:

.1 Testing Agency to provide copies of test results directly to the Consultant, Owner, and Contractor.

.3 Transit Mix Delivery Slips and Placing Records:

.1 Maintain a record of the time and place of each concrete pour with the transit mix delivery slip that certifies the pour contents. Make the record available for viewing by the Consultant and Owner on request. Provide electronic copies of the record to the Consultant upon completion of the concrete placement work.

.4 Curing Procedures:

.1 Submit proposed methods and details of concrete curing and provisions for weather protection to the Consultant for review.

.5 Construction Joints:

.1 Submit planned locations and details of construction joints to the Consultant for review.

.6 Mix Design and Testing Requirements for Low-Permeability, Silica-Fume-Enhanced Concrete:

.1 Low permeability concrete shall meet the requirements of CSA S413. It shall have a Coulomb rating not exceeding 1500 after 56 days, based on three specimens tested in accordance with ASTM C1202 and CSA S413.

.2 Submit samples of proposed low-permeability concrete mixes for 28-day and 56-day permeability testing to confirm samples meet low-permeability requirements. The qualification of low-permeability concrete shall be established prior to construction.

.3 The Contractor shall be responsible to ensure that sufficient time is provided in the project schedule for testing and qualification of the low-permeability concrete mix.

.4 Samples will also be tested to ensure adequacy of slump, air content, and 28-day compressive strength.

.5 Submit mix designs for qualified concrete mixes with the 28-day and 56-day permeability testing results for Consultant's review a minimum of two weeks prior to placement.

.6 The constituents and proportions of the qualified concrete mix shall not be changed without the Consultant's approval.

2.0 PRODUCTS

2.1 General

.1 Cast-in-place concrete shall meet or exceed the more stringent requirements outlined in the Reference Standards and the Contract Documents.

2.2 Materials

.1 Materials shall conform to the following requirements:

.1 Portland Cement: Type GU to CSA A3000.

.2 Aggregate: Natural stone to CSA A23.1.

.3 Water: Potable and to CSA A23.1.

.4 Air Entraining Agents: To ASTM C260/C260M.

.5 Chemicals Admixtures: To CSA A3000. Calcium chloride is not permitted.

.6 Pozzolanic Mineral Admixtures: To CSA A3000.

.7 Curing Materials: To CSA A23.1.

.8 Blended Hydraulic Cementing Material: Type 10SF to CSA A3000.

.9 Supplementary Cementing Material: To CSA A3000.

.10 Superplasticizing Admixture: To CSA A3000.

2.3 Mix Proportion

.1 Concrete shall be homogeneous for all parts of the Work and, when hardened, shall have the required strength, resistance to deterioration, durability, abrasion resistance, water-tightness, appearance, and other specified properties.

.2 The supplier shall proportion concrete mixes to meet the cement type, compressive strength, class of exposure, maximum aggregate size, slump, air content, and admixture requirements specified herein.

.3 Proportioning mixing and delivery to the site shall meet the requirements of CSA A23.1.

.4 Add dispersing agent to concrete according to manufacturer’s recommendations.

.5 Do not add calcium chloride to concrete.

.6 Specified concrete requirements may require the use of superplasticizers, set retardants, or silica fume. Include for costs associated with the use of these materials in the contract price.

.7 Pump mix slump requirements shall also conform to the above requirements, and the slump shall be tested prior to the addition of superplasticizers.

.8 Pump mixes designed for use in parking slabs shall not contain superplasticizers. The concrete shall be tested for a satisfactory air void system at the point of discharge in accordance with the standard.

.9 Addition of water to the concrete mix shall not be permitted on-site. The Contractor shall be permitted to adjust only the quantities of superplasticizer and air entraining agent on-site.

2.4 Concrete Mix Design Requirements (All New Concrete Elements Excluding Interior Slab-On-Grade and Exterior Sidewalk):

.1 Normal weight “ready mixed” Portland cement/silica fume modified concrete mixed in accordance with CSA A23.1 class of exposure C-1 with the following requirements:

	Description	Requirements
.1	Compressive Strength (28 days)	35 MPa minimum
.2	Air Content	6.0% to 9.0%
.3	Aggregate Size	13 mm
.4	Slump	
	- Prior to Superplasticizer	50 mm maximum ± 20 mm
	- After Superplasticizer	125 mm maximum ± 25 mm
.5	Water/Cementing Materials Ratio	0.40 maximum
.6	Cement Content	335 kg/m^3 minimum
.7	Cement – Type GU	Normal Portland Cement
.8	Silica Fume – Type U	Minimum 7.5% Silica Fume by mass of cement (25 kg/m^3)
.9	Fly Ash – Type F or Type CI	Maximum 15% by mass of cement (45 kg/m^3) for Type F and 10% by mass of cement (30 kg/m^3) for Type C
.10	Concrete Density	Normal weight (2,360 kg/m^3)

.2 The intent of this mix design is to provide a low permeability, high electrical resistivity concrete mix with a coulomb rating less than 1500 when 28-day samples are tested using rapid chloride permeability testing.

.3 Non-chloride based plasticizers shall be used to facilitate concrete placement as required. Costs associated with the use of such materials shall be included in the contract price. Plasticizer shall be compatible with the air entrainment agent.

.4 Note that although a maximum slump is specified, the Contractor shall endeavour to provide concrete at the minimum slump that permits placement and handling.

.5 Mix design is the responsibility of the Contractor.

.6 The Contractor shall use superplasticizers to facilitate concrete placement and must demonstrate to the satisfaction of the Consultant that such admixtures will have no deleterious effect on the durability or strength of the proposed concrete mix (i.e. freeze/thaw durability).

2.5 Concrete Mix Design Requirements – Slab-on-Grade and Exterior Sidewalk

.1 Normal weight “ready mixed” Portland cement concrete mixed in accordance with Section 4, Durability Requirements, Class of Exposure C-2 of CSA A23.1, with the following requirements:

	Description	Requirements
.1	Compressive Strength (28 days)	32 MPa minimum
.2	Air Content	5.0% to 8.0%
.3	Aggregate Size	20 mm
.4	Slump	
	- Prior to Superplasticizer	50 mm maximum ± 20 mm
	- After Superplasticizer	125 mm maximum ± 25 mm
.5	Water/Cementing Materials Ratio	0.45 maximum
.6	Cement Content	335 kg/m^3 minimum
.7	Cement – Type GU	Normal Portland Cement
.8	Concrete Density	Normal weight (2,360 kg/m^3)

.1 Non-chloride based plasticizers shall be used to facilitate concrete placement as required. Costs associated with the use of such materials shall be included in the contract price. Plasticizer shall be compatible with the air entrainment agent.

.2 Note that although a maximum slump is specified, the Contractor shall endeavour to provide concrete at the minimum slump that permits placement and handling.

.3 Mix design is the responsibility of the Contractor.

.4 The Contractor shall use superplasticizers to facilitate concrete placement and must demonstrate to the satisfaction of the Consultant that such admixtures will have no deleterious effect on the durability or strength of the proposed concrete mix (i.e. freeze/thaw durability).

2.6 Air Entrainment

.1 Air entraining chemical admixtures shall be according to ASTM C260. Ensure chemical admixtures are compatible with each other and that they will not negatively impact performance of the concrete.

.2 The total fresh air content of air entrained concrete will be tested via the pressure method with an air meter prior to the placement of concrete in accordance with CSA A23.2.

.3 Air content in hardened concrete shall meet the requirements of CSA A23.1 and this specification and, if directed by the Consultant, will be tested and determined in accordance with ASTM C457 as outlined in CSA A23.1.

2.7 Cement Slurry Bonding Agent

.1 Cement slurry grout consisting of a mixture of one part cement to one part fine aggregate and enough water to make a “heavy cream” consistency. Aggregate to conform to CSA A23.1 Clause 4.2.3.

2.8 Accessories

.1 Polyethylene Film/ Vapour Barrier: refer to Specification Section 07 26 00 – Sheet Vapour Retarder.

.2 Asphalt-Impregnated Fibre Board: Compressible bitumen-impregnated joint filler to ASTM D994. 12.7mm (0.5 inches) thick, height to match thickness of concrete element.

3.0 EXECUTION

3.1 General

.1 All concrete work shall be in accordance with the standards unless otherwise specified herein or on the Drawings.

.2 Work shall be undertaken by workers who are skilled and experienced in their trade.

.3 Notify the Consultant at least 72 hours before concrete placement. No work is to proceed without such notification unless otherwise indicated by the Consultant in order to allow for proper coordination and review of the Work.

3.2 Mixing and Placing

.1 Concrete shall be machine mixed. Mixing and placing shall be in accordance with CSA A23.1.

.2 Pre-wet formwork prior to concrete placement. Ponding and standing water shall be removed from the formwork surface prior to concrete placement.

.3 Cement slurry used to prime the concrete pump shall be discarded and not placed into the structure.

.4 Convey concrete from the mixer to the place of deposit by methods that ensure the required concrete quality. Equipment for conveying concrete shall be of adequate size and design to ensure a practically continuous flow of concrete at the delivery end without separation of material.

.5 Deposit concrete in the forms as nearly as practicable to its final position to avoid re-handling. Do not allow vertical free fall of materials to exceed 3 m utilizing special precautions that are approved by the Consultant.

.6 Continuously deposit concrete throughout each division and place and work the concrete to produce a uniform texture.

.7 Depositing shall be continuous until complete within each unit of operation approved by the Consultant, and shall be sufficiently rapid to ensure bonding of successive layers.

.8 No concrete shall be placed later than 30 minutes after leaving the mixer. Re-tempered concrete is not permitted.

.9 No concrete shall be placed later than two hours after the time of batching. No re-tempered concrete shall be allowed.

3.3 Addition of Water

.1 Addition of water to the concrete mix shall not be permitted on-site. The Contractor shall be permitted to adjust only the quantities of superplasticizer and air entraining agent on-site.

3.4 Compaction

.1 All concrete shall be thoroughly consolidated by internal vibration during, and immediately after, depositing. Concrete shall be consolidated using sufficient vibrators of adequate size that are operated by competent workers who have been instructed in their use.

.2 The use of vibrators to move concrete horizontally shall not be permitted.

.3 Concrete shall be thoroughly worked around reinforcement, around embedded items, and into corners of forms eliminating all air or stone pockets that may cause honeycombing, pitting, or planes of weakness.

3.5 Curing

.1 Incorporate fog-mist curing methods in all rapid-drying conditions to prevent loss of moisture from placed concrete surfaces. Rapid-drying conditions may include high concrete ambient temperatures, low humidity, high winds, direct sunlight, and heated interiors during cold weather. Fog-mist curing shall be initiated immediately in these conditions after initial finishing, and is to be continued until concrete is covered with wet-curing mats as outlined in the clause below.

.2 Incorporate wet curing on the concrete surfaces with pre-saturated mats as soon as possible after the concrete has sufficiently set and no later than 30 minutes after finishing.

.1 Wet curing procedures shall ensure the concrete surfaces are kept continuously wet for a minimum period of seven consecutive days at a minimum temperature of 10°C. No part of the concrete surface is permitted to dry any time within the wet cure period.

.2 Wet curing is to include, as a minimum, installation of pre-saturated filter fabric, burlap, or cotton mats that are covered with plastic sheeting. Provide soaker hoses where necessary to ensure the installation is kept continuously wet. Overlap wet-curing mats 150 mm and secure with ballast without marring the concrete surface.

.3 Prevent airflow between wet-curing mats and the plastic sheeting. Prevent freezing of the wet-curing assembly during cold weather.

.3 Vertical surfaces are also to be wet cured for the duration of the 7-day wet-curing period by either:

.1 Maintaining formwork in place with form ties loosened and water applied to run down the inside form face after the concrete has hardened to keep the repair surfaces wet.

.2 Removing formwork from vertical surfaces and providing fog misting, light water spray, or application of wet burlap covered with polyethylene to keep the repair surfaces continually wet.

.4 Use of chemical curing compounds shall not be permitted.

.5 Concrete shall be protected from harmful effects of heat, cold, running or surface water, and mechanical shock.

.6 No concrete shall be placed when the air temperature is below 10°C or when -- in the opinion of the Consultant -- there is a possibility of its falling below 10°C, until the Consultant has reviewed provisions made to ensure proper curing. These provisions are to conform to CSA A23.1.

.7 Provide adequate equipment to protect concrete and concrete materials from freezing or near freezing temperatures. Do not use frozen material or material containing ice.

.8 All concrete material and all reinforcement, forms, existing concrete, and ground that is to contact new concrete material shall be free from frost.

.9 All concrete material placed when the surrounding air is below 5°C shall have a temperature between 15°C and 32°C, and adequate means shall be provided to maintain a minimum material temperature of 10°C for 10 days, unless longer curing periods are required to ensure proper curing of the concrete.

.10 Do not use dry heat to maintain adequate curing temperatures under any circumstances. Humidify the air within the enclosure to ensure that moisture requirements for curing are maintained.

.11 Make provisions to ensure proper protection of the concrete during mix production, delivery, field placement, and curing when the air temperature is above 27°C or when – in the opinion of the Consultant -- there is a possibility of it rising above 27°C during placing. Provisions shall conform to the requirements of CSA A23.1 and ACI 305R.

.1 The temperature of the placed concrete shall be as low as practicable. All practical means shall be employed by the Contractor for cooling aggregates, chilling batch water, and cooling concrete mix with ice or liquid nitrogen. Under extreme hot weather conditions, the Contractor shall schedule concrete placements at times other than daytime hours as necessary to protect the concrete during mix production, delivery, field placement, and curing.

3.6 Loading

.1 Do not permit undue loading on new structure by Contractor operations, materials, or equipment. Distribute loads to the approval of the Consultant.

3.7 Inserts and Embedded Items

.1 Provide all trades with sufficient advance notification of concrete placement to ensure provisions are made for openings, inserts, and fasteners. Cooperate with all trades in the forming and setting of all slots, sleeves, bolts, dowels, hangers, inserts, conduits, clips, etc. Ensure that all of these inserts are secure and not displaced during concrete placement.

.2 Provide all necessary chases, grooves, and reglets that are required for work of other trades. Set all bolts as shown or as required for mechanical equipment.

.3 Use plastic or galvanized metal junction boxes, fixture boxes, and other services cast in the concrete. Embedding electrical conduit is not permitted.

.4 Embedded metal sleeves shall be fusion-bonded epoxy coated.

3.8 Construction Joints

.1 Submit the proposed location and detailing of construction joints not indicated on the Drawings to the Consultant for review.

.2 Construction joints shall be designed and located in a manner that minimizes impacts on the strength and appearance of the structure. Reinforcement shall continue through construction joints unless otherwise noted.

.3 Bearing strength shall be provided at the joint using mortises or keys formed in the concrete, by inclined reinforcement, or by other means satisfactory to the Consultant.

.4 Locate construction joints in walls at the underside of floor members. Allow at least two hours to elapse after depositing concrete in columns or walls before depositing concrete in the floor system.

.5 Locate construction joints in the floor system at or near the middle of the span in slabs. Make a provision for shear by using inclined reinforcement and keys, or as otherwise directed by the Consultant.

.6 Thoroughly wet the existing concrete surface at construction joints prior to placement of new concrete.

.7 Take special care in compacting new concrete at construction joints to avoid damage to joint detailing.

3.9 Tolerances

.1 Float and trowel the concrete surfaces to produce a smooth surface that does not vary more than 3 mm under a 3 m long straightedge.

3.10 Finishing

.1 Finish concrete in accordance with CSA A23.1/A23.2. Initial finish shall be completed before any bleeding or free water is present on the surface of the concrete. Final finishing shall commence after the bleed water has disappeared and when the concrete has stiffened sufficiently to prevent the working of excess mortar to the surface. Do not add water to finish.

.2 Do not overwork concrete surface. Wood float finish is acceptable.

.3 Do not use steel trowels with air-entrained concrete. For air-entrained concrete, the surface can be further leveled and consolidated with a magnesium bull float for larger repairs or a magnesium trowel for smaller repairs. One or more passes shall be made at suitable time intervals to obtain a level finish free of float marks. Do not work bleed water on the concrete surface into the concrete during finishing.

.4 If mechanical floats are to be used for final finishing of larger air entrained concrete surfaces, the mechanical floating of the concrete surface shall commence as soon as the concrete surface has reached initial set and will support the weight of a power float machine equipped with magnesium float blades and the operator.

.5 Surface finishes to be as follows:

.1 New foundation walls and footings: formed finish

.2 Interior slab-on-grade: trowel finish

.3 Exterior sidewalk and ramp slab-on-grade surface: broom finish perpendicular to typical direction of travel, with tooled edges.

.6 Tool crack control joints and edges as indicated on the Drawings.

.7 Finished surfaces shall have gaps of 8 mm or less under a 3 m straight edge, unless noted otherwise. Only a single curvature is allowed within the 3 m distance.

.8 All formed surfaces shall be treated in accordance with CSA A23.1 as a minimum.

3.11 Openings Through Structural Work

.1 Inform the Consultant if any openings are required through completed parts of the structural work. No openings -- including cored sleeves -- shall be made through completed structural work without written authorization from the Consultant.

3.12 Patching and Cutting

.1 Patch defects that have occurred as a result of poorly consolidated concrete that the Consultant deems are of a minor nature – such as honeycombing, exposed reinforcement, deviations in formwork, and other defects – using materials and procedures approved by the Consultant. Remove defective areas to sound concrete and fill with an approved pre-manufactured repair material.

.2 Remove or cut back all bolts, ties, nails, or other metal not specifically required for construction purposes immediately after the removal of forms. Remove or cut back the items to a minimum depth of 25 mm from the surface of the concrete and patch with cement mortar. Mortar shall not be more than one hour old and is to be cured as outlined in clause **Error! Reference source not found.** – **Error! Reference source not found.**.

.3 Grind off or otherwise remove fins, ridges, and other imperfections from exposed concrete surfaces immediately after removal of forms. Remove segregated concrete aggregate to sound material. Repair these areas as directed by the Consultant.

.4 Prepare and patch walls and other surfaces where plywood joints have vertical deviations in excess of 3 mm.

.5 Obtain approval from the Consultant prior to drilling or coring holes through in-place concrete. Take precautions to ensure that no reinforcement is damaged.

3.13 Rejection of Defective Work

.1 Test portions of the structure where concrete tests do not conform to the requirements of the Contract Documents, or where conditions cause doubt about the safety of the structure in accordance with CSA A23.1 and CSA A23.2. Such tests shall be made at the expense of the Contractor and to the satisfaction of the Consultant.

.2 Replace or repair work where the Consultant deems that the material or workmanship fails to meet the requirements of the Contract Documents. This work shall be repaired to the approval of the Consultant at no additional cost to the Owner.

3.14 Testing

.1 Concrete testing is to be undertaken per CSA A23.1 unless noted otherwise. Testing methods shall conform to CSA A23.2.

.2 Testing agency will be selected and paid for by the Owner. The Contractor shall arrange and schedule all required testing with the testing agency.

.3 Testing shall include:

.1 Preparation and testing of concrete cylinders for compressive strength.

.2 Establishment of slump and the percentage of entrained air for **each concrete truck**, unless otherwise directed by Consultant.

.3 Review of concrete mix designs submitted by the Contractor.

.4 Bond testing of concrete repair patches to existing concrete where designated by the Consultant.

.5 Submission of test results to the Owner, Consultant, and Contractor.

.6 A minimum of one set (4 cylinders) of concrete cylinders shall be taken for compressive strength testing of concrete patch material used each day unless otherwise directed by Consultant. Concrete cylinders are to be placed in an area with similar curing conditions to that of the cast concrete.

.4 The Contractor shall notify the Consultant at least 72 hours in advance of concrete placement to allow the Consultant to review the Work.

.5 Contractor shall provide casual labour to obtain and handle sample materials for the testing agency field personnel. Provide suitable access to the Work for obtaining samples.

.6 The Contractor shall provide at no additional costs to the Owner:

.1 Samples of all material required for testing.

.2 Cooperation with the execution of concrete testing, which shall include protection against injury or loss of cylinders.

.3 Access for the testing agency to test and/ or inspect materials.

.4 Site storage facilities meeting requirements of CSA A23.2 for concrete test specimens prior to removal to laboratory.

.7 Testing procedures for concrete shall conform to the following requirements:

.1 Compression tests on concrete shall be carried out in accordance with CSA A23.2 and A23.1 except that a Strength Test shall consist of four test cylinders and one cylinder shall be tested at the age of 3 days, the second cylinder shall be tested at the age of 7 days, and the remaining two at an age of 28 days.

.2 Slump and air entrainment test shall be conducted at the time of sampling concrete for compressive tests and shall be conducted in conformity with CSA A23.2. Slump and air entrainment tests shall be performed on all loads used each day.

.8 Forward concrete test results to the Consultant, Owner, and Contractor. Include the following information:

.1 Project name

.2 Sampling date

.3 Supplier

.4 Delivery truck identification number

.5 Sampling and testing technician names

.6 Precise installation location of the sampled concrete batch

.7 Air and concrete temperatures

.8 Concrete design strength

.9 Admixtures

.10 Cement type

.11 Maximum aggregate size

.9 Testing agency personnel are not authorized to revoke, relax, enlarge, or release any requirements of the Specifications, nor to approve or disprove any portion of the Work.

.10 Contractor shall pay for costs of additional testing as follows:

.1 Additional standby time required due to late delivery by concrete supplier.

.2 Additional slump and/or air tests if first tests indicate that concrete properties are outside of specified requirements and the Contractor wishes to modify the mix and retest. All modifications are to be approved by the Consultant.

.3 If the Contractor fails to notify the testing agency of pour cancellation.

END OF SECTION

1.0 GENERAL

1.1 Section Includes

.1 Provide all labour, materials, equipment, supervision, and services necessary to perform the following scope of work:

.1 Visually review for deteriorated masonry mortar. Testing/verification of masonry joint condition. Raking identified unsound joints.

.2 Preparation of masonry surfaces, including joint surface cleaning, flushing of voids and open joints, and masonry wetting.

.3 Repointing of identified masonry joints with new historic mortar as outlined in this Section and as indicated on the Drawings.

1.2 Measurement

.1 Work of this Section will be measured to the nearest linear foot (lin.ft.) as measured by the Consultant.

1.3 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CSA A23.1/A23.2	Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete
.4	CSA A371	Masonry Construction for Buildings
.5	CSA A179	Mortar and Grout for Unit Masonry
.6	CSA A370	Connectors for Masonry
.7	CSA A82	Fired Masonry Brick Made from Clay or Shale
.8	ASTM C5	Standard Specification for Quicklime for Structural Purposes
.9	ASTM C144	Standard Specification for Aggregate for Masonry Mortar

.10	ASTM C207	Standard Specification for Hydrated Lime for Masonry Purposes
.11	ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete
.12	ASTM C270	Standard Specification for Mortar for Unit Masonry
.13	ASTM C780	Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
.14	ASTM C1072	Standard Test Method for Measurement of Masonry Flexural Bond Strength
.15	CSA A3000	Cementitious Materials Compendium

.16 NPS Preservation Brief #2 – Repointing Mortar Joints in Historic Buildings.

.17 Standards and Guidelines for the Conservation of Historic Places in Canada.

1.4 Submittals

.1 Submit labelled samples of materials used on project for approval before work commences.

.2 Submit mortar design mix, product literature, and required ambient conditions.

.3 Submit at least two (2) samples of each type and colour of mortar to be used. Each sample shall be installed on the masonry to be used in the Work. Samples to be sufficient size and quantity to allow review of colour range.

.4 Submit mortar properties including:

.1 Mix proportions

.2 Compressive strength of mortar

.3 Mortar type

.4 Pigment

1.5 Installer Qualifications

.1 Work of this Section shall be performed by a single masonry trade contractor with:

.1 a minimum of 5 years experience in historic masonry work, and

.2 a good level of understanding of structural behaviour of masonry walls.

.2 Masons shall be journeymen and have:

.1 An Interprovincial Trade Certificate with 5 years minimum experience in historic brick masonry work, and

.2 proof of licence or certification for propriety restoration mortars.

.3 Obtain written approval from Consultant prior to changes of qualified personnel.

1.6 Mock-Ups

.1 Construct a mock-up at area of deterioration/ repair to show the following:

.1 Cut and cleaned mortar joint to required depth

.2 Filled and tooled joint

.3 Selected mortar colour

.2 Mock-up to be within an area selected by the Consultant, for each masonry material, and shall demonstrate a full understanding of specified procedures, techniques, and formulations before work commences.

.3 Allow 72 hours for review of mock-up by Consultant before proceeding with remainder of mortar repair/ repointing work.

.4 When accepted by Consultant, mock-up will demonstrate minimum standard for the work of this Section.

1.7 Delivery, Storage, and Handling

.1 Deliver, store, handle, and protect materials in accordance with written manufacturer’s instructions.

.2 Store cementitious materials and aggregates in accordance with CSA A23.1.

.3 Keep material dry. Protect from weather, freezing, and contamination. Store above ground on raised platforms.

.4 When temperature is 10°C or less, store cements and sands for immediate use within heated enclosure.

.5 Ensure that manufacturer's labels and seals are intact upon delivery.

.6 Remove rejected or contaminated material from site.

2.0 PRODUCTS

2.1 Mortar

.1 Sand: To ASTM C144. Passing a 1.18 mm sieve.

.2 Water: Clean and potable

.3 Lime:

.1 Processed Lime (Quicklime): To ASTM C5.

.2 Hydrated Lime: ASTM C207.

.4 Portland Cement: CSA A3000.

.5 Masonry Cement: CSA A3000.

.6 White cement: Use white silica sand and white Portland cement and lime or white masonry cement.

.7 Colour: Coloured sand to match existing.

.8 Air Entrainment: Factory processed lime or cement with agents for air entrainment not to exceed recommended percentage of total weight of lime or cement.

2.2 Mix Proportions

.1 Cement Mortar: Proportion mortar by volume as follows:

.1 Type N: 1 Type N Portland Cement, 1 hydrated lime, 6 sand

.2 For Normal Exterior Pointing and Bedding: Based on proportion specifications consisting of 1 part white Portland cement, 1 parts lime, and 6 parts sand with enough water to make as stiff as can be worked.

.3 Obtain written approval of Consultant before changing mix proportions.

2.3 Remixed Mortar

.1 Type N: Compressive strength 3.5 MPa to 7.5 MPa.

2.4 Masonry Mortar

.1 Mix masonry mortar with sand in proportion of 1:3 and with enough water to make as stiff as can be worked.

.2 Mortar used in repointing shall match the existing mortar.

.3 Discard mix not used and placed within 1.5 hours.

.4 Colouring Pigments: Metallic oxide composition not exceeding 15% of weight of binder materials.

2.5 Coloured Mortar

.1 Mortar Colour: Colour to match existing, as selected by the Owner and Consultant.

.2 Maintain one mortar mixer exclusively for coloured mortar.

.3 Allow mortar to set for 72 hours before subjecting to load.

2.6 Admixtures

.1 Do not use admixtures.

3.0 EXECUTION

3.1 Examination

.1 Investigate possible structural problems and report to Consultant before beginning work.

.2 Study existing pointing styles and methods of reproducing them, and submit sample for approval before starting work.

.3 Examine horizontal and vertical joints to determine which were struck first and whether they are same style, as well as other aspects of workmanship that establish authenticity of original work.

.4 Report, in writing, to Consultant areas of deteriorated mortar revealed during work. Obtain Consultant's approval and instructions for mortar mix required for deteriorated mortar areas revealed during work before proceeding with work.

.5 Examine joints visually for obvious signs of deteriorated masonry.

.6 Immediately report to Consultant evidence of moisture damage or structural distress and stop work in that area.

3.2 Work in Cold or Hot Ambient Conditions

.1 Comply with requirements of CSA A371.

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

.3 Maintain dry beds for masonry and use dry masonry units only. Do not wet masonry units in winter.

.4 For masonry work which will be done below 5°C:

.1 Measure temperatures of masonry material prior to use.

.2 Maintain temperatures as close as possible for mortar batches.

.3 Ensure mortar temperature on mortar boards does not exceed 50°C.

.4 Use dry masonry units.

.5 Lay masonry on unfrozen surfaces free from snow and ice.

.6 Use windbreaks when laying masonry not protected by enclosures.

.7 Provide a high-low registering thermometer where directed on site.

.5 When mean air temperature will, over a 24-hour period, go below 5°C but not below 0°C, conduct masonry work as for normal temperatures except heat water or sand to produce mortar temperatures between 5°C and 50°C. Protect entire constructed masonry by enclosing within weatherproof membrane for 72 hours.

.6 When mean air temperature will, over a 24-hour period, go below 0°C but not below -4°C, conduct masonry work as for normal temperatures except heat water and sand to produce mortar temperatures between 5°C and 50°C and maintain temperature of mortar boards above 0°C. Protect entire constructed masonry by enclosing within weatherproof membrane for 7 days and maintain air temperature within enclosure at minimum 10°C.

.7 When mean air temperature is below -4°C, conduct laying of masonry in enclosures heated to maintain air temperature above 0°C. Conduct masonry work as for normal temperatures except heat water and sand to produce mortar temperatures between 5°C and 50°C and heat units if necessary so that temperature of units at time of laying is minimum 7°C. Maintain enclosure in position for 7 days and maintain air temperature within enclosure at minimum 10°C.

.8 When mean air temperature will, over a 24-hour period, go above 38°C (or 32°C with a 3.6 m/s wind), maintain mortar and grout at a temperature between 21°C and 49°C and limit spread of mortar bed to 1.22 m (4 ft.) Place units within one minute of spreading mortar. Provide shade and air breaks as required.

3.3 Mixing

.1 Prepare mortar by mixing dry materials; add water; mix whole measures, or as per manufacturer’s written instructions.

.2 Mix mortar ingredients in quantities for use in 1.5 hours.

.3 Use manual mixing, provided quantities of materials and water are accurately controlled and the method of mixing is approved by the Consultant.

.4 Operate power-driven mixer when fully charged.

.5 Add water slowly while mixing until all lumps are eliminated.

3.4 Mortar Strength Tolerances

.1 Mortar Compression Strength: Mortar strength shall not exceed 25% of stone strength.

.2 If mortar fails to meet the 7-day compressive strength requirement but its strength at 7 days exceeds two-thirds of the value required for the 7-day strength, the Contractor may elect to continue work at its own risk while awaiting the results of the 28-day tests or take down the affected work.

3.5 Raking Joints

.1 Use manual raking tool to remove deteriorated mortar a minimum of 2x the joint thickness leaving square corners and a flat surface at back of cut. Clean out voids and cavities encountered.

.2 Ensure that no masonry is chipped, altered, or damaged by work to remove mortar. Repair or replace masonry damaged during removals at no additional cost to the Owner. The Consultant will review damage and direct repair or replacement.

.3 Notify Consultant if mortar is unsound past the raking depth.

.4 Clean surfaces of joints with non-ferrous brush and compressed air without damaging texture of exposed joints or masonry units.

.5 Flush open joints and voids. Clean open joints and voids with low-pressure water and, if not free draining, blow clean with compressed air.

.6 Leave no standing water.

3.6 Repointing

.1 Dampen joints prior to repointing.

.2 Keep masonry damp while pointing is being performed.

.3 Completely fill joint with mortar. If surface of masonry units has worn rounded edges, keep pointing back from surface to keep same width of joint. Avoid feather edges. Pack mortar solidly into voids and joints.

.4 Tool and compact using jointing tool to force mortar into joint.

.5 Build-up pointing in layers not exceeding 12 mm in depth. Allow bottom layers to set before applying subsequent layers. Maintain joint width.

.6 Tool joints to match existing profile using suitable jointing tool.

.7 Remove excess mortar from masonry face before it sets. Finish jointing neatly to specified profile.

3.7 Field Quality Control

.1 Use batching box.

.2 Monitor mixing time.

3.8 Cleaning

.1 Clean surfaces of mortar droppings stains and other blemishes resulting from Work, with natural bristle brush, clean sponge, and water after initial set.

.2 Do not smear wet mortar.

.3 Review with Consultant prior to using other cleaning methods for persistent stains.

3.9 Protection

.1 Protect adjacent finished work against damage that may be caused by the work of this Section.

.2 At end of each working day, cover unprotected work with waterproof tarps. Extend tarps to 0.5 m over surface area of work and install tightly to prevent finished work from drying out too rapidly and to prevent weather from eroding recently repointed material.

.3 Maintain tarps in place for a minimum of two weeks after repointing.

.4 Ensure that bottoms of tarps permit airflow to reach mortar in joints.

.5 Anchor coverings securely in position.

.6 Install and maintain wetted burlap protection during the curing process:

.1 Minimum of 7 days in summer.

.2 Minimum of 15 days in cold weather conditions using dry heated enclosures.

.7 Wet mist burlap only. Ensure no direct spray reaches surface of curing mortar.

.8 Shade areas of work from direct sunlight during periods over 25°C and maintain constant dampness of burlap.

.9 Maintain ambient temperature of 10°C for minimum of 15 days after repointing masonry.

.10 No exhaust products shall enter the curing area.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to remove and replace damaged, spalled, cracked, and otherwise deteriorated brick masonry units where directed by the Consultant and as described herein.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3 CSA A82 Fired Masonry Brick Made from Clay or Shale

.4 CSA A179 Mortar and Grout for Unit Masonry

.5 CSA S304 Design of Masonry Structures

.6 CSA A370 Connectors for Masonry

.7 CSA A371 Masonry Construction for Buildings

.8 Standards and Guidelines for the Conservation of Historic Places in Canada.

1.3 Samples

.1 Submit samples in accordance with Section 01 33 00.

.2 Submit samples for review and testing as follows:

.1 Three of each type of masonry unit specified.

.2 One of each type of masonry accessory specified.

.3 One of each type of masonry reinforcement and tie proposed for use.

.4 As required for testing purposes.

1.4 Mock-Ups

.1 Construct mock-ups in accordance with Section 01 33 00.

.2 Construct mock-up/ sample replacement of masonry showing masonry colours, textures, special patterns, use of reinforcement, ties, through-wall flashing, weep holes, jointing, coursing, mortar and workmanship.

.3 Construct mock-up where directed.

.4 Allow 72 hours for inspection of mock-up by the Consultant. Accepted mock-up becomes standard for this Work.

.5 When mock-up is accepted, proceed with masonry repointing and repair work. Mock-up may remain as part of finished Work. Remove mock-up when directed.

1.5 Storage and Protection

.1 Deliver, store, handle, and protect materials in accordance with manufacturer's written instructions.

.2 Provide weather protection and construction protection in accordance with CSA S304.

.3 Provide weather protection to newly opened sections in assembly.

.4 Protect bricks and store bricks prior to installation:

.1 Store dismantled masonry units on wood platforms or pallets such that they are not in contact with the ground and protected from exposure to water, elements, and potential mechanical damage within storage sheds or fully covered under polyethylene.

.2 Submit storage and identification system for Consultant review.

.5 Place detached bricks on wood surfaces during handling. Prevent contact with metal.

.6 Transport and keep bricks on wooden platforms.

.7 Ensure that sharp edges of bricks do not come into contact with hard objects.

1.6 Existing Conditions

.1 Review brick and openings for evidence of repairs, cracks, moisture, and dampness and report to the Consultant before starting Work or if conditions develop during the project.

2.0 PRODUCTS

2.1 Face Brick

.1 Replacement bricks are to match the existing bricks through careful analysis of their visual, physical, performance and chemical properties. Replacement bricks should be taken from the same batch for consistent performance.

.2 Burned Clay Brick: To CSA A82.

.1 Type: I

.2 Compressive Strength: To match existing

.3 Size: To match existing.

.4 Colour and Texture: To match existing, accepted by the Owner and Consultant.

.5 Porosity: To match existing.

.3 Calcium Silicate Brick: To CSA A82.

.1 Grade: SW

.2 Size: To match existing.

.3 Colour and Texture: To match existing, accepted by the Owner and Consultant.

2.2 Back-Up Brick

.1 Burned Clay Brick: To CSA A82.

.1 Type: II

.2 Compressive Strength: To match existing

.3 Size: To match existing.

.4 Colour and Texture: To match existing, accepted by the Owner and Consultant.

.5 Porosity: To match existing.

.2 Calcium Silicate Brick: To CSA A82.

.1 Grade: MW

.2 Size: To match existing.

.3 Colour and Texture: To match existing, accepted by the Owner and Consultant.

2.3 Mortar

.1 Mortar: In conformance with Section 04 01 25.

.2 Proportions: In conformance with Section 04 01 25.

.3 Coloured Lime Mortar: In conformance with Section 04 01 25.

3.0 EXECUTION

3.1 Preparation

.1 Place safety devices and signs near work area as directed in accordance with Section 01 56 00.

.2 Install and remove shoring or other supports in accordance with Specifications.

.3 Install and remove self-supporting scaffolding in accordance with Section 01 56 00.

3.2 Brick Removal

.1 Verify locations and dimensions of areas of Work with the Consultant prior to removals.

.2 During removal, protect sound areas to remain. Use mechanical hand methods of removal. Obtain the Consultant's approval for use of power tools before commencing work.

3.3 Brick Replacement

.1 Clean dust and brick fragments from areas to be replaced. Before proceeding with Work, inspect cleaned surface with the Consultant.

.2 Dampen area’s surfaces before applying mortar.

.3 Apply mortar and lay bricks to match existing line and level.

.4 Finish joint profiles to match those of existing brickwork.

.5 Cure mortar in accordance with Section 04 01 25.

.6 Clean finished brickwork in accordance with Section 04 03 06.

.7 Inspect finished brickwork with the Consultant.

END OF SECTION

1.0 GENERAL

1.1 Section Includes

.1 Provide all labour, materials, equipment, supervision, and services necessary to clean brick masonry in accordance with this Section.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Standards and Guidelines for the Conservation of Historic Places in Canada.

1.3 Definitions

.1 Low Pressure: Less than 300 psi.

.2 Medium Pressure: 300 to 750 psi.

.3 High Pressure: Greater than 750 psi.

1.4 Submittals

.1 Submit description of cleaning methods, including product data on tools, equipment, compressor equipment, nozzles, etc. Data is to indicate water pressure at compressor, nozzle size and distance from masonry surface used for cleaning of mock up areas. Include abatement and disposal procedures and environmental management plan.

.2 No full-scale cleaning is to be permitted until all required submittals and mock-ups are provided, including product information and methodology description, and have been reviewed by the Consultant.

.3 Proceed with cleaning only upon written acceptance by the Consultant concerning tested cleaning methods.

1.5 Quality Assurance

.1 Applicator: Successful completion of at least three projects of similar scope and complexity within past five years.

.2 All work to be performed in accordance with the Standards & Guidelines for the Conservation of Historic Places in Canada, Department of Canadian Heritage.

.3 Contractor shall ensure selected cleaning materials and cleaning process are not harmful to historic materials including masonry, stucco, window and door glass and components, window and door frames, and caulking.

1.6 Test Cleaning

.1 Conduct multiple tests on building to determine effectiveness of low-, moderate-, and high-pressure wash cleaning methods.

.2 Conduct tests to determine effectiveness of water pressures, time periods, flow rates, water temperatures, types of nozzles, and spraying distances from wall surface.

.3 Test pressure at each level to determine effect of "line drop" on water jet pressure.

.4 Test brushing and spraying as alternative to pressure washing. Consultant to review test results. Use method acceptable to the Consultant.

.5 Add increasing amount of surfactant until cleaning can be done efficiently.

.6 Areas to be test cleaned include areas of the exterior walls specified by the Consultant.

.7 Locate test patches in inconspicuous places, as directed by the Consultant.

.8 Test patches shall be 4 sq. m.

.9 Allow for three alternate test cleaning tests per area.

.10 Notify Consultant 48 hours before commencing cleaning of each test patch. Obtain approval from the Consultant before commencing test.

.11 Allow test panels to dry for three to seven days before Consultant’s review.

.12 Stop work if cleaning has detrimental effect on surrounding materials.

.13 Proceed with cleaning upon written instructions of methods, systems, tools, and equipment approved by the Consultant.

1.7 Waste Management and Disposal

.1 Contain, collect, neutralize, and dispose of water and chemicals in accordance with applicable laws and regulations.

1.8 Ambient Conditions

.1 Do not use wet cleaning methods when there is threat of frost.

.2 Do not clean if there is risk of chemical spray being blown into accessible areas.

2.0 PRODUCTS

2.1 Water

.1 Use 50°C water.

.2 Hot water shall be generated in flash boilers or other suitable appliance.

.3 Use clean potable water.

2.2 Tools and Equipment

.1 Use brushes with natural or soft plastic bristles.

.2 Use scrapers of wood or plastic.

.3 Use water pumps fitted with accurate pressure regulators and gauges capable of being pre-set and locked at maximum specified levels.

.4 Use air compressors equipped with online oil filters to avoid spraying oil onto masonry.

.5 Use nozzle equipped with pressure gauge at end.

.6 Use plastic or non-ferrous metal piping and fittings.

.7 Use nozzles that give nebulized droplet spray.

.8 Use compressed air free from oil or other contaminants.

.9 Use aluminum oxide or organic grits for localized cleaning of aggressive staining of areas up to 0.5 sq. m.

.10 Use non-siliceous 70 mesh grit free from iron oxide.

3.0 EXECUTION

3.1 Examination

.1 Record existing condition, by means of photographs and videos, before and after cleaning. Advise Consultant of potential complications.

.2 Report to Consultant conditions of deteriorated masonry or pointing not noted on Drawings that are found before and during cleaning.

.3 Obtain written acceptance of Consultant before cleaning areas of deteriorated masonry.

3.2 Preparation

.1 Seal or repair openings and joints where there is potential risk of water/chemical infiltration.

.2 Dry brush or scrape accumulations of existing non-masonry materials and mortar droppings from existing masonry.

3.3 Protection

.1 Cover and mask surfaces and finishes not to be cleaned.

.2 Protect masonry openings from water/chemical infiltration.

.3 Mask or seal vents, windows, and other openings to prevent water entry.

.4 Protect plants, gardens, and shrubs from excessive watering and chemicals.

.5 Hang sheeting material from scaffolding to enclose water spray.

.6 Protect cleaned surfaces that are to be painted from contact with rain and snow.

.7 Protect rainwater leaders, eavestroughs, and gutters from being adversely impacted by the work.

.8 Protect finished work from damage.

.9 Protect adjacent work from spread of dust and dirt beyond work areas.

3.4 Cleaning Methods

.1 Do not sandblast or use other abrasive cleaning methods.

.2 Perform cleaning with process established through the test cleaning process.

.3 Pressure Water Cleaning:

.1 Perform cleaning with process established through the test cleaning process.

.2 Carefully remove exfoliating material by scraping and brushing.

.3 Soften and loosen heavy deposits with prolonged water spray, then brush. Remove thick incrustations with wooden or plastic scrapers.

.4 Start with low-pressure water and progress to medium-pressure in areas, as agreed during test cleaning stage.

.5 Scrub area using natural bristle or synthetic bristle brushes.

.6 Work from bottom of wall up.

.7 Hold nozzle perpendicular to surface; work at uniform rate and uniform distance from surface.

.8 Do not exceed maximum pressure at nozzle or have nozzle closer to masonry than established during the test cleaning.

.9 Repeat process if required until masonry is clean.

.10 Carry out a final thorough water rinse with clean water.

.4 Water Washing with Non-Ionic Detergent:

.1 Perform cleaning with process established through the test cleaning process.

.2 Carefully remove exfoliating material by scraping and brushing.

.3 Soften and loosen heavy deposits with prolonged water spray, then brush. Remove thick incrustations with wooden or plastic scrapers.

.4 Commence using a detergent only once agreed with Consultant.

.5 Add non-ionic detergent diluted to manufacturer's recommendation in water.

.6 Start with low-pressure water and progress to higher pressure in areas, as agreed with Consultant during test cleaning stage.

.7 Scrub area using natural bristle or synthetic bristle brushes.

.8 Work from bottom of wall up.

.9 Hold nozzle perpendicular to surface; work at uniform rate and uniform distance from surface.

.10 Do not exceed maximum pressure at nozzle or have nozzle closer to masonry than established during the test cleaning.

.11 Repeat process until masonry is clean.

.12 Carry out a final thorough water rinse with clean water.

3.5 Clean-Up

.1 Rinse off masonry until no indications of chemicals are present, to the satisfaction of the Consultant.

.2 Rinse from top to bottom.

.3 Clean up work area as work progresses. At end of each workday, remove debris and waste from site.

.4 Upon completion, clean and restore areas used for work to condition at least equal to that previously existing and to the satisfaction of the Owner.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to supply and erect new structural steel as indicated on the Drawings and described herein.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CSA S16	Design of Steel Structures
.4	CSA S136	North American Specification for the Design of Cold-Formed Steel Structural Members
.5	CSA W47.1	Certification of Companies for Fusion Welding of Steel Structures
.6	CSA W59	Welded Steel Construction (Metal-Arc Welding)
.7	CSA G40.20/G40.21	General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel

1.3 Qualifications

.1 Structural steel fabricator shall have not less than five years experience in the fabrication of structural steel.

.2 Erector shall have not less than five years experience in erection of structural steel.

.3 Steel fabricators and erectors must be certified under the requirements of CSA W47.1 as required by CSA S16.

.4 Welding procedures, welders, and welding operations shall be qualified in accordance with the Canadian Welding Bureau Standards.

.5 All connections shall be designed by a CISC-approved Fabricator unless otherwise noted.

1.4 Examination

.1 All dimensions taken from the Drawings are to be confirmed on site prior to fabrication. Contractor is to 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.

.2 Contractor to locate all mechanical/electrical openings required in structural members for existing systems prior to fabrication.

.3 Contractor responsible for all costs associated with site location of existing strands and embedded conduits.

1.5 Shop Drawings

.1 Drawings, which accompany these specifications, are to be used for estimating purposes only, and show in general the type of construction that shall be followed, but must not be considered as fabrication drawings.

.2 Submit detailed erection and shop drawings prepared under the supervision of a Registered Professional Engineer in accordance with the General Requirements. Where pre-engineered or fabricator designed elements are part of the shop drawings, the shop drawings shall be stamped by a Professional Engineer licensed in Ontario.

.3 The shop drawings shall clearly show all shop and erection details, including cuts, copes, connections, holes, threaded fasteners, splices, and welds. All welds, both shop and field, shall be indicated by AWS welding Symbols as specified in CSA W59 Appendix D and E.

.4 Shop drawings shall be submitted in an orderly sequence and sufficiently in advance of the work proceeding so as to not affect the schedule of the Work. The Contractor and the Consultant shall jointly determine the schedule for which the shop drawing submissions shall occur.

.5 The Consultant’s review of the shop drawings is for general conformance only and does not relieve the Contractor of the responsibility for errors or omissions that may be present in the shop drawings.

.6 Upon request by the Consultant, the Contractor shall revise and resubmit the shop drawings.

.7 Provide setting drawings, templates and directions for the installation of anchor bolts, plates and other devices.

.8 Structural drawings are not prepared to be used in sepia form as erection drawings.

.9 Shop drawings shall show complete details necessary for fabrication and erection of the component parts of the structure, including location, type, size and extent of all welds, as well as all mechanical/electrical openings required. Splices not shown on the shop drawings will not be accepted.

.10 Prior to starting erection work, submit a description of the methods, sequence of erection and type of equipment proposed for use in erecting structural steel.

1.6 Inspection and Testing

.1 The Owner will engage and pay for the services of a welding Engineer and a testing agency.

.2 Allow free access to all parts of the work area for the purposes of inspection at all times.

.3 Prior to commencement of work, provide a schedule of shop fabrication.

.4 Submit certified results of testing in accordance with CSA G40.20 properly correlated to the elements being fabricated.

.5 High tensile bolts will be tested in accordance with Section 23 of CSA S16.

.6 For the purpose of bidding, assume all welds will be examined by a non-destructive testing method.

.7 Testing of all connections and splices not indicated on the design drawings shall be undertaken by the Owner’s testing agency and will be to the Contractor’s account.

.8 The Contractor shall advise the testing agency of the scheduling of all shop and field work pertaining to this Project. The Contractor shall permit the testing agency full access to the fabrication shop and the site for the purpose of carrying out their work and he shall provide assistance required to aid in the performance of the inspection and testing.

.9 If more than 5% re-inspection is required due to faulty workmanship, the Contractor will be required to pay for this re-inspection.

.10 The Engineer may reject at any time during the progress of the work a piece of material for any member found defective or not in accordance with the detailed drawings. This material may be rejected notwithstanding any previous acceptance and components so rejected shall be replaced at no expense to the Owner. In case of dispute, the decision of the Engineer shall be final.

1.7 Storage and Handling

.1 The Contractor shall be responsible for the protection of all steel work during fabrication, shipping, storage, and construction. All small bends and damage shall be reported to the Engineer for instruction. Steel work that is bent, broken, or otherwise damaged shall be replaced by the Contractor prior to erection, to the satisfaction of the Engineer, at no cost to the Owner.

.2 The Contractor shall be responsible for proper scheduling of delivery and erection for the structural steel, all in accordance with the construction schedule.

.3 Structural steel members shall be stored at the site above ground on platforms, skids, or other devices.

.4 Steel shall be protected from corrosion.

.5 Other material shall be stored in a weather tight and dry place until ready for use in the Work.

.6 Package materials shall be stored in their original unbroken packages or container.

1.8 Supply of Alternate Products

.1 Should the rolled sections shown on the drawings not be procurable from Canadian Mills, or should substitution for those sections be desired, sections of equivalent strength may be substituted if approved by the Consultant. In each case, full particulars thereof must be submitted prior to the closing of Bid. Material substitutions after the closing of Bid, if accepted, will be at the Contractor’s cost.

1.9 Coordination with Other Trades

.1 Supply all necessary instructions and drawings to other trades for setting bearing plates, anchor bolts, and other members that are built in with the work of other trades. Supply the necessary material in accordance to the construction schedule.

2.0 PRODUCTS

2.1 Materials

.1 Rolled shapes, rolled plate, and welded wide flange sections to CSA G40.21 300W.

.2 Hollow structural sections shall be to CSA G40.21 350W Class C.

.3 High strength bolts shall be to ASTM F3125/F3125M.

.4 Welding material shall be in accordance with CSA W59.

.5 Anchor bolts and nuts to ASTM A307.

.6 Embedment anchors shall be Nelson headed anchors with fluxed ends or approved equal conforming to ASTM A108.

.7 Bar anchors shall be Nelson deformed bar anchors or approved equal conforming to ASTM A1064/A1064M.

.8 Structural steel (exterior exposure) not to receive shop or field paint shall be hot-dip galvanized to Z275 G90 designation.

.9 Touch-up primers for exterior exposure not to receive a shop or field paint finish shall be zinc chromate Type 1, conforming to CGSB 1-GP-40D.

.10 Primers used in a multi-coat system where a final shop or field paint finish is to be applied shall be selected and pre-approved based on surface preparation, exposure conditions, and compatibility with subsequent coatings.

2.2 Design

.1 All connections and beam web openings shall be designed by the fabricator to the reference standards unless otherwise noted.

3.0 EXECUTION

3.1 Fabrication

.1 Verify all dimensions and take necessary field measurements before fabrication.

.2 All fabrication shall be to CSA S16.

.3 All welding shall be to CSA W59.

.4 All fabricated units shall be straight and true and without sharp kinks or bends.

.5 All hollow structural sections shall be closed airtight with end plates sealed with welds.

.6 All plates and shapes shall be inspected visually for laminations. Repair plates or shapes that contain laminations in a manner approved by the Consultant.

.7 Provide punched holes for the convenience of other trades in attaching wood blocking or other materials. Coordinate with drawings of other disciplines for location and details.

.8 Obtain Consultant's approval for holes required through structural steel that are not shown on the drawings.

3.2 Cleaning and Priming

.1 All steel shall be thoroughly cleaned of loose mill scale, loose rust, oil, or dirt.

.2 All steel shall be primed (exterior exposure) except for steel to be encased in concrete, steel to be fireproofed, steel that will receive shear studs, and faying surfaces of friction connections.

.3 Structural steel to be primed for exterior exposure or to receive a shop or field paint finish shall be cleaned in accordance with SSPC-SP6 "Commercial Blast Cleaning".

.4 All primers shall be applied strictly in accordance with the manufacturer's instructions. Apply one coat of primer thoroughly and evenly and work well into the joints and other open spaces.

.5 After erection and after connections are completed, provide a field touch-up coat of primer to all surfaces that had no shop coat, or have been chipped or scraped.

3.3 Shop Painting

.1 Steel shall be painted with shop primer meeting the requirements of CSA S16 unless noted otherwise.

3.4 Columns and Bases

.1 All flame cut steel columns shall have their ends milled. Steel base plates supporting columns shall be flat.

.2 Base plates and cap plates are to be seal welded to HSS columns.

3.5 Connections

.1 Use connections of type and detail shown on the Drawings. Modifications to the specified connection types and details will not be permitted without prior approval from the Consultant.

.2 Connections designed by the fabricator shall be in accordance with CSA S16.1 and stamped and sealed by a Professional Engineer registered in the Province of Ontario.

.3 All connections shall be designed to carry the loads specified on the Drawings. If loads are not given, the connection shall have the capacity not less than the members being connected.

.4 Column to beam and girder connections shall allow for a horizontal stability force in all directions equal to 2% of the design column axial load in addition to all other loads.

.5 Structural steel members spliced for ease of fabrication or transportation shall have splices designed to develop the full strength and stiffness of the member. Splices shall be subject to non-destructive testing as directed by the Consultant. The cost for such testing shall be borne by the Contractor.

.6 Use standard connection types where possible.

.7 Provide stiffeners in beam webs at all locations of beam continuity. Unless noted otherwise web stiffeners shall be 12 mm thick minimum.

.8 All bolted connections may be snug tight except connections for:

.1 Bracing, trusses, and drag struts.

.2 Elements resisting crane loads.

.3 Supports for running machines or loads that produce impact or cyclic load.

These shall be designed as slip connections and pretensioned.

.9 Connections for seismic lateral load resisting elements, bolts in tension and elements connected with oversize or slotted holes unless designed to accommodate movement may be bearing connections but shall be pretensioned.

.10 Truss diagonal members shall be connected to truss chord for the loads indicated or 50% of the diagonal member axial capacity (TENSION), whichever is greater.

3.6 Separators and Miscellaneous Supports

.1 Provide separators for all double members in accordance with CSA S16.

.2 Provide plates and / or angles for support of masonry where required.

3.7 Erection

.1 Supervise the setting of bases, anchor bolts, and other steel to concrete connections. Cutting of base plates to accommodate anchor bolts shall be cause for rejection of base plates.

.2 Install all temporary bracing that is required to stabilize the work against wind, earthquake, and construction loads. Keep structure true and plumb until completion of the building.

.3 As erection progresses, the work shall be securely bolted up to take care of all dead loads, wind, and erection stresses. Any failure to make proper and adequate provisions for stresses during erection shall be solely the responsibility of the Contractor.

.4 The structural steel erector shall be responsible for the design of all hooks, erection connections, and handling gear.

.5 Whenever piles of materials, erection equipment, or other loads are carried during erection, proper provision shall be made to take care of stresses resulting from it.

.6 All structural steel shall be assembled and erected in accordance with the approved erection drawings and specified reference standards.

.7 Structural steel work shall be carefully located at the proper grade and rigidly secured in place using steel shims. All spaces under the steel shall then be filled with non-shrink pre-mix grout.

.8 Plumb, level, and align individual members of steel work as specified in CSA S16.

.9 Structural steel frames shall be accurately assembled to the lines and elevations indicated within the specified tolerances.

.10 The various members forming parts of complete frame of structure after being assembled shall be aligned and adjusted accurately before being fastened.

.11 Bearing surfaces and surfaces that will be in permanent contact shall be cleaned before the members are assembled.

.12 Temporary bolts, clips, angles, etc. used to facilitate the erection shall be removed unless noted otherwise on the drawing.

3.8 Temporary Flooring

.1 Provide all temporary flooring, planking, and scaffolding necessary in connection with erection of structural steel, or support of erection machinery in accordance with governing regulations or by-laws.

3.9 Completion

.1 The Registered Professional Engineer responsible for the shop drawings, or their representative shall visit to review in place connections and components designed by that Registered Professional Engineer as required to substantiate compliance with their sealed shop drawings. He shall then submit a letter of compliance provide a seal and signed letter to the Consultant and Engineer.

.2 On completion of the work of this section, all protection erected in conjunction with the structural steel work shall be removed, all damage to this work and adjoining work shall be made good, and all surplus materials, debris, tools, and equipment shall be removed from the site.

3.10 Welding

.1 All welding shall be done by the shielded metal-arc method in accordance with the requirements CSA W59. The welding operators shall have passed, within the preceding six months, the qualifications test as set forth in CSA W47.1.

.2 Submit welding procedures prepared and sealed by a Professional Engineer registered in Ontario and familiar with this discipline to the Consultant for their examination and comments.

.3 Surface to be welded shall be free from loose scale, rust, paint, or other foreign matter. Where weld material is deposited in two or more layers, each layer shall be cleaned before the next layer is deposited. Take care to minimize stresses due to heat expansion, contraction, and distortion by using proper sequence in welding and by approved methods.

.4 Welding consumables for all processes shall be fully approved by the Canadian Welding Bureau and certified by the manufactures as complying with the requirement of this specification. Such certificates shall be not more than two years old.

.5 Electrode strengths to be equal to E480XX (E70xx) or better.

.6 Embedment anchors, shear stubs, and deformed bar anchors shall be automatically end welded with suitable stud welding in accordance to the manufacture’s recommendations. Fillet welding of anchors will be rejected.

3.11 Field Quality Control

.1 Structural steel work (material and workmanship) shall be subject to review and tested by a testing agency retained by the Owner.

.2 Construction review by the testing agency or the Consultant does not relieve the Contractor of their responsibility to furnish materials and workmanship in accordance with the Drawings and Specifications.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, closures, equipment, and services necessary to design, supply, fabricate, erect, and install the steel deck and field welded shear connectors to structural steel as indicated on the drawings and as hereinafter specified.

1.2 Reference Standards

.1 Structural steel deck shall conform to the requirements of the following standards unless otherwise required by the specification:

.1	Ontario Building Code	
.2	CSA W47.1	Certification of Companies for Fusion Welding of Steel Structures
.3	CSA W59	Welded Steel Construction (Metal-Arc Welding)
.4	CSA S136	North American Specification for the Design of Cold-Formed Steel Structural Members
.5	ASTM A653/A653M	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process
.6	CSSBI 10M	Standard for Steel Roof Deck

.2 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.3 Where the standard is referenced in this specification, it shall mean the documents specified in this clause and their referenced documents.

1.3 Qualifications

.1 All steel deck welders must possess current Canadian Welding Bureau Certificates of Qualification for light gauge structural welding.

.2 Deck erectors must be certified under the requirements of CSA W47.1.

1.4 Examination

.1 Examine and verify all necessary measurements and dimensions of previously executed work that may affect the work of this contract.

.2 Examine surfaces that the work is to be placed on or against to ensure that they are square, true, level, plumb, of correct slope or shape, and of proper surface to receive such work.

.3 Report any discrepancies to the Consultant and Engineer immediately so that instructions may be given for the necessary remedial work.

.4 Commencement of work shall be construed as acceptance of all conditions and surfaces.

1.5 Shop Drawings

.1 Submit shop drawings prepared under the supervision of a Specialty Structural Engineer. Drawings of components designed by the Contractor shall be sealed and signed by this Specialty Structural Engineer.

.2 Shop drawings shall show the position, extent, type, and arrangement of the units, their relationship to other materials, depth, core thickness, coating thickness, connections, openings, accessories, closures, light gauge formwork and reinforcement for openings, and complete stud shear connector details for composite beams.

.3 Calculations and/or test data may be requested with the shop drawings to justify deck design and shear connector design.

.4 Show deck load capacities, including point load capacities, and for composite deck confirm that these load capacities are compatible with the zinc coating.

2.0 PRODUCTS

2.1 General

.1 Products shall satisfy the requirements of the standard unless otherwise specified herein or on the drawings.

2.2 Materials

.1 Steel deck units shall be formed of zinc-coated sheet steel minimum Grade A with a base steel Nominal Thickness of 0.76 mm or greater. Unless noted otherwise, zinc coatings shall be:

.1 Interior Exposure: Floors - ZF075 - wipe coat
Roofs - Z275

.2 Cover plates, cell closures, etc. shall be of the same material as the deck with a minimum nominal thickness of 0.76 mm.

.3 Deck shall conform to the depths shown on the drawings.

2.3 Fabrication

.1 Steel deck shall span over three or more supports unless prevented by the structural steel layout.

.2 Steel deck shall have interlocking male and female side laps.

.3 Provide cell closures where required by the architectural drawings and specifications at the open ends of all cell runs at columns, openings, walls, etc., and where cells change direction.

2.4 Design

.1 All steel deck shall be designed by the Contractor to the reference standards unless otherwise noted.

.2 Deck thickness, spacing of puddle welds, and type and extent of side connections shall be proportioned to resist forces and loads shown on the drawings, or be as designated on the Drawings.

.3 Unless noted otherwise, the deflection under live load alone shall be limited to span/360 for floors; for roof deck, the deflection shall be limited to span/240.

.4 Decking to be used as formwork shall conform to formwork requirements of all applicable governing safety standards.

3.0 EXECUTION

3.1 Erection

.1 Erection of the steel deck shall be carried out by personnel experienced in the installation of steel deck.

.2 Steel deck shall be placed on the supporting steel framework and adjusted to final position before being permanently fastened. Each section shall be brought to proper bearing. If the supporting framework is not in proper alignment or at the proper level, the Contractor shall so advise the Consultant and Engineer of such irregularities and shall not make final placement until corrections are made.

.3 For steel deck that will not receive a concrete topping: immediately after the steel deck is welded in place, the steel deck surface shall be inspected, and all areas where zinc coating has been burned by welding shall be covered by a suitable zinc enriched paint, applied to the paint manufacturer's instructions.

.4 Cut all openings in metal decking at locations shown on the project drawings. These openings shall be located and dimensioned in cooperation with the various trades at the time of erecting the steel deck. Unless noted otherwise, openings up to 150 mm (6") need not be reinforced. Openings between 150 mm (6") to 400 mm (16") in size shall be reinforced by this trade, using 75 mm x 75 mm x 5.0 mm x 1200 mm (48") steel angles welded to the flutes on either side of those cut.

.5 The Contractor shall accommodate the erection and welding sequence of the structural steel as required.

3.2 Cover Plates and Closures

.1 Furnish, install, and weld in position the sheet metal cover plates to close openings between deck sections and columns and to cover gaps where deck sections abut or change direction.

.2 Install all closures as required by the architectural Drawings and Specifications.

3.3 Clean Up

.1 All steel deck cuttings, strappings, packaging material, and other debris pertaining to steel deck units shall be cleaned up.

.2 Remove all debris and excess material at completion of erection of steel deck and leave work ready for other trades.

.3 Repair any defects. Leave steel deck free of all oil, grease, paint, and dirt.

3.4 Testing

.1 The Owner will appoint and pay for a Testing Agency who will inspect and test steel deck and steel deck welding in accordance with the relevant standards.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and install all miscellaneous metal work indicated on drawings and not included in the work of other Sections in addition to items listed in this Section.

.2 Section includes the supply and installation of decorative steel railings, complete with intermediate stanchions, as detailed on the Drawings for use in the following locations:

.1 Guardrail/handrails at exterior ramps and stairs;

.2 Miscellaneous fabrications as scheduled in this section and indicated on drawings

1.2 RELATED REQUIREMENTS

.1 Read carefully all other Sections and review drawings to determine extent of metal work supplied and installed, or installed by others.

.2 Be responsible for co-ordinating this section with all related sections.

1.3 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM):

.1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless

.2 ASTM A325-10, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

.3 ASTM A653/A653M-11, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.4 ASTM C939-10, Standard Test Method for Flow of Grout for Preplaced Aggregate Concrete (Flow Cone Method)

.5 ASTM A1011/A1011M-12b, 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

.6 ASTM C1107/C1107M-11, Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink)

.2 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 or 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

.5 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel

.6 CSA W55.3-08, Certification of Companies for Resistance Welding of Steel and Aluminum

.7 CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding)

.3 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating

.2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type

.3 CGSB 31-GP-105Ma, Zinc Phosphate Conversion Coatings for Paint Base

.4 The Society for Protective Coatings (SSPC):

.1 SSPC1 Solvent Cleaning - 2004

.2 SSPC2 Hand Tool Cleaning - 2004

.3 SSPC-3 Power Tool Cleaning - 2004

.4 SSPC-6 Commercial Blast Cleaning - 2007

1.4 QUALITY ASSURANCE

.1 All Codes and Standards referred to in this Specification shall be current editions including all latest revisions and addenda.

.2 Conform to requirements of CSA-S16, Design of Steel Structures and CAN/CSA-S136, Cold Formed Steel Structural Members.

.3 Architectural metals work shall be of the highest architectural quality, free of scratches, pitting, roughness, marring, discolouration, staining and other imperfections.

.4 Work of this Section to be executed by firm thoroughly conversant with laws, by-laws and regulations which govern, and capable of workmanship of best grade of modern shop and field practice known to recognized manufacturer's specializing in this work.

.5 Work of this Section shall be executed by workers especially trained and experienced in this type of work. Have a full time, senior, qualified representative at the site to direct the work of this Section.

.6 Where required by authorities having jurisdiction, have work of this Section designed by a professional engineer licensed to design structures and registered in the Province of the Work.

1.5 SUBMITTALS

.1 Provide submittals in accordance with Division 01, bearing stamp or seal and signature of the Professional Engineer responsible for the design of the work of this Section.

.2 Shop Drawings:

.1 Make thorough examination of drawings and details, determine the intent, extent, and materials, and be fully cognizant of requirements when preparing shop drawings.

.2 Submit shop drawings showing and describing in detail all work of this Section including large scale detail of members and materials, of connection and interfacing with work of other Sections, jointing details, and of anchorage devices, dimension, gauges, thicknesses, description of materials, metal finishing, as well as other pertinent data and information.

.3 Digital files of design drawings shall not be used in the preparation of shop drawings.

1.6 STORAGE, DELIVERY, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for strategic off the ground, under cover storage locations. Do not load any area beyond the design limits.

.2 Adequately protect and crate all components against damage, dirt, disfigurement and weather during delivery and storage. Damaged materials shall not be used and shall be replaced by approved material.

.3 Cover and protect the work of other Sections in the area of work from damage. Make good all damage to the satisfaction of the Consultant.

.4 Protect the installed work of this Section and on completion the work shall be examined and damage shall be remedied to the complete satisfaction of the Consultant.

2 Products

2.1 PERFORMANCE REQUIREMENTS

.1 Delegated Design: Engage a qualified professional engineer, to design railings, including attachment to building construction.

.2 Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

.1 Handrails and Top Rails of Guards:

.1 Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.

.2 Concentrated load of 200 lbf (0.89 kN) applied in any direction.

.3 Uniform and concentrated loads need not be assumed to act concurrently.

.2 Infill of Guards:

.1 Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).

.3 Infill load and other loads need not be assumed to act concurrently.

2.2 MATERIALS

.1 Structural Steel Sections and Steel Plate: New stock (not weathered or rusted); to conform to CAN/CSA-G40.21, Grade 300W (44W) and Grade 350W (50W) for wide flange shapes.

.2 Hollow Structural Sections (HSS): New stock; to conform to CAN/CSA-G40.21, Grade 350W (50W), Class C, stress relieved.

.3 Sheet Steel (Structural Quality): Conforms to ASTM A1011/A1011M.

.4 Sheet Steel (Commercial Quality): Conforms to ASTM A653/A653M, stretcher levelled or temper rolled.

.5 All Stainless Steel for interior use to be type 304, brushed satin finish, analysis 18-8.

.6 All Stainless Steel for exterior use to be type 316, brushed satin finish.

.7 Corten Steel: Conforms to ASTM A242.

.8 Galvanized Sheet Steel (Commercial Quality): Galvanized coating G90 (Z275) in accordance with ASTM A653/A653M, minimized spangle, stretch levelled or temper rolled. Specially treat by phosphate conversion process conforming to CGSB 31-GP-105Ma ready to receive prime paint finish.

.9 Steel Pipe: Hot-dip galvanized, zinc coated, welded and seamless type steel pipe conforming to ASTM A53/A53M.

.10 Aluminum Plate and Sheet: ASTM B209M, Alloy 6061-T6.

.11 Aluminum Extrusions: ASTM B221M, Alloy 6063-T6.

.12 Non-Shrink Grout: Premixed, high strength, maximum bearing, impact resistant, non-shrink non-metallic aggregate grout having minimum 76 Mpa 28 day compressive

strength and conforms to ASTM C939 and ASTM C1107/C1107M, 'Embeco Premixed Grout' by Master Builders Technologies Ltd., or 'Tartan Grout Iron' by Webster & Sons Ltd., or 'Sika Grout 212 HP' by Sika Canada Inc., or approved equivalent.

.13 Galvanizing: All uncoated steel specified to be galvanized shall be galvanized after fabrication by the hot dip process according to CAN/CSA-G164, with minimum coating of 2 oz./sq.ft. Galvanize after all welding is complete. Welding of galvanized material will not be permitted. Specially treat by phosphate conversion process conforming to CGSB 31-GP-105Ma ready to receive prime paint finish.

.14 Primer Paint: CISC/CPMA 2-75.

.15 Bolts, Nuts, Washers: Conforms to ASTM A325.

.16 Welding Materials: Conforms to CSA W59.

.17 Metal Filler: Polyester based type.

.18 Painting:

.1 Shop Applied Structural Steel Primer: Steel Spec Universal Primer (B50RV6227 Red), by Sherwin Williams Company of Canada Ltd., or approved equivalent. Apply a minimum of 2 mils dft./coat. Grey coloured primer is acceptable.

.2 Zinc Rich Paint For Touch-up of Galvanized Metals: Ready mixed, zinc-rich primer conforming to CAN/CGSB-1.181, Sealtight Galvafroid Zinc-Rich Coating by W.R. Meadows of Canada Limited or Zinc Clad No. 5 Organic Zinc Rich Primer by Sherwin Williams Company of Canada Ltd., or approved equivalent.

.3 Touch-up Primer (On Site): Procryl Universal Acrylic Primer by Sherwin Williams Company of Canada Ltd, or approved equivalent. Touch-up primer shall be no less than 3 mil dft.

.4 Refer to Section 09 90 00, and coordinate with the above.

.19 Isolation Coating: Acid and alkali resistant bituminous paint.

.20 Building Paper: Conforms to CAN/CGSB-51.32.

.21 Butyl Tape: Extruded, high grade, macro-polyisobutylene tape of size, width and shore hardness to suit conditions.

2.3 FABRICATION

.1 Fit and assemble work in shop where possible. Execute work according to details and reviewed shop drawings.

.2 Take measurements at the building for work which is to fit or be connected to steel or concrete before commencing fabrication.

.3 Where shop fabrication is not possible, make trial assembly in shop.

.4 Do all welding in accordance with requirements of CSA W59, CSA W55.3 and CSA W47.1 including all supplements. Weld stainless steel electric arc process. Grind welds smooth and flush with surface of parent metal, where exposed to view and where specifically indicated on drawings. Welds shall be continuous seam welds unless specified otherwise. Maintain sharp arises.

.5 Fit joints and intersecting members accurately in true planes, square, plumb, straight with tight joints and intersections.

.6 Provide adequate reinforcing, 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 rethreading or chasing threads.

.7 Fabricate, drill and tap members to accommodate attachments, anchorage and work of other Sections where located and directed by them.

.8 Exposed steel surfaces shall be smooth and free from imperfections such as warping, buckling, weld marks, burrs, rust and scale.

.9 Gauges and sizes of metal shall be adequate for various conditions.

.10 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.

2.4 SHOP PAINTING AND PROTECTION

.1 As per SSPC2 Hand Tool Clean and SSPC1 Solvent Clean, clean welds by wire brushing and wash down with clean water, to remove the chemical residues left by the electrodes, prior to painting.

.2 Prepare steel as per SSPC-3 Power Tool Cleaning for Interior or SSPC-6 Commercial Blast Cleaning for exterior members. Remove rust, mill scale, oil, dirt, and other foreign matter before commencing shop painting.

.3 Apply shop coat of primer to all surfaces except areas requiring field welding. Apply by brush, working paint well into surfaces, interstices and cavities.

.4 Primer is to be free of runs, sags, or other collections of primer due to dipping of members into primer.

.5 Steel work shall be painted under cover, and shall remain under cover, until the paint protection is dry.

.6 Prime field welded areas after erection and touch up shop coat where damaged and barred by erection and handling.

.7 Prime steel with two full coats of paint in strict accordance with paint manufacturer's directions.

.8 Give the parts which are inaccessible after assembly two coats of primer coat paint, of different colours, when members are noted to be painted.

2.5 HOT DIP GALVANIZING

.1 Hot dip galvanize, after fabrication, steel metal fabrication items. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with brush or spray-applied anti-corrosion coating containing 92-95% zinc, in accordance with manufacturer's printed directions.

.1 Members exposed to elements when in final location.

.2 Members embedded on exterior side of exterior walls.

.3 Members imbedded in concrete.

.4 Members specified in this Section or indicated on Drawings.

.2 Hot-dip galvanize members in accordance with CAN/CSA G164 and requirements of the following ASTM standards, with minimum coating weights or thicknesses as follows, unless otherwise indicated that high performance organic finish is required:

.1 Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips: ASTM A123/A123M; average weight of zinc coating of actual surface

.1 4.8 mm (3/16”) and less member thickness: 600 g/sq.m.

.2 6 mm (1/4”) and heavier members: 640 g/sq.m.

.2 Iron and Steel Hardware: ASTM A153/A153M; minimum weight of zinc coating, in gram per square meter of surface, in accordance with Table 1 for the various classes of materials used in the Work.

3 Execution

3.1 GENERAL

.1 Verify at site that the Work to receive the work of this Section is free of irregularities detrimental to the installation and performance of the work and that it is located correctly and at proper levels before delivery and installation.

.2 Erection: To meet specified requirements of CAN/CSA-S16.

.3 Bearing Plates and Anchors: Standard.

.4 Anchors: Anchors to structural concrete shall be approved inserts set into concrete or approved self-drilling expansion insets drilled and placed afterwards.

3.2 INSTALLATION

.1 Assemble and erect work plumb, true, square, straight, level and accurate to sizes detailed, to reviewed shop drawings, free from distortion and defects detrimental to appearance and performance.

.2 Isolate metals where necessary to prevent corrosion due to contact between dissimilar metals and between metals and masonry, concrete or plaster. Use bituminous paint or butyl tape.

.3 Supply adequate instructions, templates, and if necessary, supervise installation of the fastenings or accessories requiring to be built-in by other Sections of the Work.

3.3 SCHEDULES

.1 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.

.2 Itemized List: Supply and install metal work listed below unless specifically designated to be supplied only. Each item shall be as shown on drawings and as detailed on reviewed shop drawings.

.3 Miscellaneous Steel Framing, Channels, Angles, Plates and Brackets: As required and indicated on drawings.

.4 Guardrails and Handrails:

.1 Guardrail GR-01a, GR-01b & GR-01c at exterior Ramps/stairs:

.1 Galvanized steel guardrail, complete with flat bar top and bottom rail, intermediate stanchions and flat bar vertical pickets.

.2 38mm diameter SS handrail on10mm diameter pin and stand off welded to intermediate stanchions

.3 Grout metal posts, pickets, balusters, and the like, in metal sleeves cast into concrete, with non-shrink quick setting epoxy anchor cement, unless detailed otherwise. Fabricate sleeves of 75 mm (3") minimum depth.

.2 Guardrail G2

.1 Two-part assembly, consisting of galvanized steel stub with base plate and top plate, anchored into wood blocking at Roof R1 at max 1200mm intervals.

.2 Upper guardrail assembly consisting of galvanized stanchions, top and bottom flat bars and vertical pickets to be anchored to stub after roofing work is completed

.3 Handrails H1

.1 38mm diameter stainless steel pipe rail mounted to 10mm diameter stand off complete with wall mounting flange (stand off frequency max 900mm).

.5 Loose Lintels:

.1 Provide and install loose lintels if not by structural steel.

.2 Finish: Hot-dip galvanized after fabrication.

.6 Masonry Lateral Supports:

.1 Install deflection space and lateral support for non-load-bearing masonry walls and partitions in accordance with specified requirements of CAN/ULC-S304-M, where not provided on Structural Drawings.

.2 At walls with concealed tops:

.1 3" x 2" x 1/4" angles 8" long on both sides of walls. Anchor to structure above wall.

.3 At walls with tops exposed to view:

.1 3" x 2" x 1/4" angles, continuous on both sides of wall. Anchor to structure above wall.

.4 Finish: Prime paint.

.7 Other Miscellaneous Metal Components:

.1 As required and indicated on drawings.

.2 Finish: Prime paint for interior components, ready for finishing by Section 09 90 00 and hot-dip galvanized after fabrication for exterior components.

END OF SECTION

1. GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 The work described in this Section shall include furnishing all equipment, labour, materials and services to supply and install miscellaneous metal items, as shown on the drawings and specified herein.

1.1.2 The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.

1.1.3 Miscellaneous landscaping metal items including, but are not limited to;

1.1.3.1 Custom Galvanized Steel infant walking bar and associated work, as shown on the Drawings and as specified herein.

1.2 REFERENCES

1.2.1 ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

1.2.2 CSA G164: Galvanizing of Irregularly Shaped Articles.

1.2.3 NAAMM, The National Association of Architectural Metal Manufacturers.

1.3 SUBMITTALS

1.3.1 Submit (2) copies of all shop drawings indicated on the drawings as required by Owner's Representative. If specified, shop drawings shall be stamped by a certified Professional Engineer.

1.3.2 Submit shop drawings in accordance with Section 01 00 05.

1.4 DELIVERY, STORAGE AND HANDLING

1.4.1 Deliver the metal materials to the job site pre-packed for damage prevention in good condition and properly protected against damage to finished surfaces.

1.4.2 Store material in a location and in a manner to avoid damage. Stacking shall be done in a way that will prevent bending.

1.4.3 Store material in a clean, dry location away from uncured concrete and masonry. Cover with waterproof paper, tarpaulin or polypropylene sheeting in a manner that will permit circulation of air inside the covering.

1.4.4 Keep handling on site to a minimum. Exercise particular care to avoid damaging finishes of material.

2. PRODUCTS

2.1 ACCEPTABLE FABRICATORS

2.1.1 Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

2.1.2 Provide all metal components as required and as shown on the Drawings, as specified herein and as needed for a complete and proper installation.

2.1.3 Provide all finishing required for a consistent and safe finish that conforms to all relevant standards.

2.2 MATERIALS

2.2.1 **Galvanized Steel Handrail with Powder Coated Finish:**

2.2.1.1 Steel Components: Cold rolled domestic steel conforming to all relevant standards.

2.2.1.2 Galvanizing: Pre-Galvanized 0.9 mil. Zinc coating

2.3 FABRICATION

2.3.1 Perform galvanized Steel work in accordance with NAAMM, Code of Standard Practice for the Metal Industry, Workmanship, Class 1.

2.3.2 Workmanship: Fabricate work of this Section to meet the required class of workmanship indicated below in accordance with AMP 555, Section 8.

2.3.2.1 Class 1: for use on direct exposed to view fabricated items.

2.3.2.2 Class 2: for use on exposed to view (at a distance) fabricated items.

2.3.3 Form all changes in direction by miter/radius elbows.

2.3.4 Cut material square and remove burrs from all exposed edges with no chamfer.

2.3.5 Make exposed joints butt tight and flush.

2.3.6 Closed exposed ends by use of appropriate end cap.

2.4 FABRICATED ITEMS

2.4.1 **Galvanized Steel Handrail:**

2.4.1.1 Design Custom Galvanized Steel Decorative Fence to be mounted on precast wall as per Drawings.

2.4.1.2 Fabricate to sizes and shapes indicated on drawings.

2.5 WELDING

2.5.1 Weld for clean, neat welds continuously around entire length and/or circumference of joint for strength providing a complete seal against the elements.

3. EXECUTION

3.1 EXAMINATION

3.1.1 Examine the areas under which the work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected. Start of work shall imply acceptance of conditions.

3.2 INSTALLATION

3.2.1 Install all components in accordance with plans, details and specifications.

3.2.2 Coordinate metals installation with other trades, as required.

3.2.3 Where necessary provide shop drawings for review by the Owner's Representative prior to beginning work.

3.2.4 Erect work square and level and free from distortion or defects detrimental to appearance or performance.

3.2.5

3.3 CLEANING

3.3.1 Leave work area clean at end of each day.

3.3.2 Remove all welding splatter and grind where necessary for a neat smooth surface along all welds and joints.

3.3.3 After welding splatter removal and grinding is completed, wipe down to remove surface dust and oils.

3.4 REPAIR

3.4.1 Repair damage to adjacent materials caused by metal fabrications installation.

3.4.2 Immediately remove stained or otherwise defective work and replace with material that meets specification requirements.

3.4.3 Touch up and repair any damaged materials or finishes in accordance with manufacturers printed instructions or to the Owner's satisfaction.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to supply and install new wood framing, sheathing, and all other carpentry work and associated accessories indicated on the Drawings and as described herein.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CSA O80 Series	Wood Preservation
.4	CSA O141	Softwood Lumber
.5	CSA O121	Douglas Fir Plywood
.6	CSA O151	Canadian Softwood Plywood
.7	CSA O153	Poplar Plywood
.8	CSA O325	Construction Sheathing
.9	CAN/CSA O437 Series	Standard on OSB and Waferboard
.10	CSA B111	Wire Nails, Spikes and Staples (Withdrawn)

.11 National Lumber Grade Authority (NLGA) Standard Grading Rules for Canadian Lumber

1.3 Submittals

.1 For products treated with preservative by vacuum-pressure impregnation, submit following information certified by authorized signing officer of treatment plant:

.1 Information listed in AWPA M2 and revisions specified in CAN/CSA 080 Series, Supplementary Requirement to AWPA M2 applicable to specified treatment.

.2 Moisture content after drying following treatment with water-borne preservative.

.2 Submit product data for double hot-dipped galvanized nails confirming compliance with ASTM A153.

1.4 Installer Qualifications

.1 Maintain a qualified crew of carpenters for the work of this Section. Only qualified journeymen shall be engaged in framing work.

1.5 Delivery, Storage, and Handling

.1 Protect materials from moisture upon delivery.

.2 Store materials on raised supports. Cover materials with waterproof covering. Provide adequate air circulation and ventilation.

.3 Do not store seasoned materials in wet or damp areas.

.4 Store all materials in a dry environment. Do not cover materials having a moisture content of over 15%.

2.0 PRODUCTS

2.1 Lumber Materials

.1 Lumber: Except as otherwise specified, lumber shall be softwood, S-P-F, S4S, kiln-dried, moisture content 15% or less, not finger jointed, and in accordance with the following standards:

.1 CSA O141.

.2 Graded and stamped in accordance with the NLGA Standard Grading Rules for Canadian Lumber and by an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Furring, Blocking, Strapping, Nailing Strips, Grounds, Rough Bucks: S-DRY, Douglas fir species.

.1 Board Sizes: “Standard” grade to NLGA, Paragraph 114c.

.2 Dimension Sizes: “Standard” grade to NLGA, Paragraph 122c.

.3 Roofing Curbs, Nailers, Blocking, Cants: As specified in 2.1.2 above.

2.2 Panel Materials

.1 Douglas Fir Plywood: To CSA O121 with applicable grade stamp.

.1 Roof Deck Sheathing: untreated Tongue & Groove, 5/8” thick. Use Select Tight Face plywood under deck membrane.

.2 Wall Sheathing: Untreated, 1/2” thick, standard construction.

.2 Other Panel Products: Marked with a recognized, visible grade stamp.

2.3 Fasteners

.1 Roof Nailers: CSP material, “Sheathing” grade.

.2 Nail, Spikes, and Staples: To CSA B111 and as follows:

.1 Use common spiral nails and spiral spikes, except where specified otherwise, for interior work.

.2 Fasteners in Contact with Borate-Treated Lumber: Hot-dipped galvanized finished steel.

.3 Fasteners in Contact with ACQ-Treated Lumber: Stainless steel.

.3 Underlayment Fasteners:

.1 Nails: Galvanized, annular-ringed, length to provide minimum 85% penetration into subfloor but not enough to anchor underlayment to joists.

.4 Subfloor Fasteners:

.1 Staples: Chisel point, non-divergent, double-coated, length ensuring minimum 85% penetration into subfloor but not penetration through subfloor.

.5 Bolt, Nut, Washer, Screw and Pin Type Fasteners: Hot-dipped galvanized finished steel for all fasteners in contact with borate-treated lumber or stainless steel for all fasteners in contact with ACQ-treated lumber, unless specified otherwise.

.6 Joist Hangers: Hot-dipped galvanized finished steel for all hangers, plates, straps, etc. in contact with borate-treated lumber or stainless steel for all such connectors in contact with ACQ-treated lumber.

.7 Do not combine stainless steel fasteners with galvanized hardware or vice-versa.

2.4 Preservative Treatment

.1 Treat following items in accordance with applicable CSA O80 commodity standard using alkaline copper quaternary type C (ACQ-C) or copper azole type B (CA-B) preservative to obtain minimum net retention of 4.0 kg/cu. m of wood. Materials shall be kiln-dried after treatment.

.1 All dimension lumber and panel materials directly exposed to moisture (i.e. deck boards, trellis and similar such framing, exposed stairs).

.2 Treat following items in accordance with applicable CSA O80 commodity standard using “Advance Guard” borate-pressure treatment to obtain minimum net retention of 2.7 kg/cu. m of wood. Materials shall be kiln-dried after treatment. Lumber shall carry the Canadian Wood Preserver’s Bureau Quality Mark (“Advance Guard” quality mark).

.1 New lumber and panel materials inside, outside, and crossing wall moisture barrier.

.2 Items in contact with concrete or masonry.

.3 Furring, blocking, strapping, etc. for rainscreen cavity provisions.

.4 Roofing curbs, nailers, blocking, and cants.

.3 Inspection of products treated with preservative by vacuum-pressure impregnation will be carried out by an accredited inspection agency of the Canadian Wood Preservers Bureau (CWPB).

.4 All treated lumber and plywood shall bear an identifying stamp in accordance with the CWPB, CSA O80, or AWPA requirements.

.5 Following water-borne preservative treatment, dry material to maximum moisture content of 15%.

2.5 Accessories

.1 Subflooring Adhesive: To CAN/CGSB 71.26, cartridge loaded.

.2 Field Applied Wood Preservative:

.1 For ACQ or CA Preservative Wood: Organic solvent, copper naphthenate, prepared in accordance with CSA O80, coloured green.

.2 For Borate Preservative Wood: Water-based, borate-based, prepared in accordance with CSA O80, tint green.

.3 Polyethylene Film: To CAN/CGSB-51.34, 100 micrometres thick.

.4 Sealing Tape: Minimum 60 mm wide, polypropylene sheathing tape with acrylic adhesive, or duct tape of same width.

.5 Sill Gaskets: Closed-cell vinyl foam, with moisture-resistant properties.

3.0 EXECUTION

3.1 Field Treatment of Preservative-Treated and Existing Products

.1 Field-treat surfaces exposed by cutting, trimming, or boring of preservative-treated items with liberal application of preservative and in accordance with AWPA M4.

.2 Apply preservative in accordance with manufacturer’s instructions. Apply by dipping, brush, or spray to completely saturate and maintain wet film on surface for minimum 3-minute soak on lumber and 1-minute soak on plywood. Allow to dry 24 hours prior to covering.

.3 Preservative field-treat all existing lumber and plywood sheathing that is located on the interior of the moisture barrier (sheathing paper).

3.2 Erection of Framing Members

.1 Install members true to line, levels, and elevations, and square and plumb. Space uniformly.

.2 Construct continuous members from pieces of longest practicable length.

.3 Install spanning members with "crown-edge" up.

.4 Install blocking to facilitate installation of finishing materials, fixtures, specialty items, and trim.

.5 Select exposed framing for appearance. Install lumber and panel materials so that grade-marks and other defacing marks are concealed or remove by sanding where materials are left exposed.

.6 Frame, anchor, fasten, tie, and brace members to provide necessary strength and rigidity.

.7 Countersink bolts where necessary to provide clearance for other work.

.8 Install foam sill gaskets between wood and concrete.

3.3 Building-in of Polyethylene Sheet

.1 Build-in sheet polyethylene in framing where framing interrupts sheet polyethylene vapour retarder at the following locations:

.1 Between top and cap plates of walls. Leave minimum of 100 mm of sheet polyethylene on each side of interior walls and inside face of exterior walls.

.2 At intersections between interior and exterior walls, extend sheet polyethylene past next stud adjacent.

.3 Other locations where framing interrupts continuity of sheet polyethylene vapour retarder.

.2 Use sealing tape to seal joints.

3.4 Wood Furring and Blocking

.1 Provide wood furring and blocking at locations indicated on Drawings and as specified.

3.5 Nailing Strips, Grounds, and Rough Bucks

.1 Install rough bucks, nailer, and linings to rough openings as required to provide backing for frames and other work.

.2 Erect all wood framing members to be level and plumb. Construct to framing member’s full height without splices.

3.6 Roof and Wall Sheathing

.1 Install roof and wall sheathing in accordance with applicable building code requirements except as follows:

.1 Install roof and wall sheathing with panel end-joints located on solid bearing, staggered at least 800 mm.

.2 Fasten roof and wall sheathing panels spaced 150 mm o.c. along edges and 300 mm o.c. along intermediate supports. Do not use staples.

3.7 Roof Blocking, Nailers, Cants, Curbs

.1 Install wood items required for roofing and sheet metal work.

.2 Construct wood curbs for roof-mounted equipment, anchors, and roof penetrations, except drains. Curb heights measured from finished roof membrane:

.1 200 mm for plumbing vents.

.2 250 mm for other curbs.

.3 Mechanically fasten plywood facing to parapets and walls at roof-to-wall/parapet junctions.

.4 Screw top 38 x 89 mm plates of building control joint box to plywood sides. For roofing control joint box, use nails. Leave 25 mm gap between top plate ends every 2.4 m.

.5 Support edges of plywood backslope sheets. Bevel edge of sheets that meet structural deck.

.6 Attach curbs, control joint boxes, blocking, and framing directly to structure.

.7 Cut cant strips from 89 x 89 mm lumber cut at 45 degrees.

3.8 Panel-Type Subflooring

.1 Install subflooring with panel end-joints located on solid bearing, staggered at least 800 mm.

.2 Apply subflooring adhesive on wood framing to support panel-type subflooring. Place continuous single-bead on each framing member and double-bead on framing members supporting panel joints. Comply with adhesive manufacturer's installation instructions.

.3 Fasten subfloor panels using common-spiral or annular-grooved nails spaced 150 mm o.c. along edges and 300 mm o.c. along intermediate supports. Do not use of staples.

3.9 Panel-Type Underlayment

.1 Install only when environmental conditions in installation area conform to requirements for flooring installation. Comply with manufacturer's installation recommendations.

.2 Acclimatize wood underlayment in installation area for at least 24 hours before installation. Store on edge, spaced to permit air movement between faces. Test moisture content of underlayment and subfloor to confirm they are within acceptable range recommended by underlayment manufacturer.

.3 Install underlayment panels over subflooring with grade stamp down.

.4 Install with face grain at right angles to subfloor panels. Stagger underlayment panel joints. Offset underlayment and subfloor joints minimum 150 mm.

.5 Lightly abut panels to eliminate joint gaps. Sand panel joints level until joints cannot be felt by hand.

.6 Leave 3 to 6 mm gap between underlayment and abutting vertical surfaces, such as columns and perimeter walls.

.7 Fully fasten one panel at a time.

.8 Nail or staple panels every 50 mm along edges, minimum 6 mm and maximum 10 mm from edges, and every 100 mm over remainder of panels. Do not use screws. Do not fasten underlayment to joists.

.9 When stapling, panels at staple gun are to be in firm contact with subfloor and staples installed parallel to panel face grain.

END OF SECTION

1.0 GENERAL

1.1 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3 CSA O80 Series Wood Preservation

.4 CSA O141 Softwood Lumber

.5 CSA O121 Douglas Fir Plywood

.6 CSA O325 Construction Sheathing

.7 CSA B111 Wire Nails, Spikes and Staples (Withdrawn)

.8 National Lumber Grade Authority (NLGA) Standard Grading Rules for Canadian Lumber

1.2 Submittals

.1 Submit product data for double hot-dipped galvanized nails confirming compliance with ASTM A153.

1.3 Installer Qualifications

.1 Maintain a qualified crew of carpenters for the work of this Section. Only qualified journeymen shall be engaged in framing and each journeyperson shall have an Ontario Certificate of Proficiency.

1.4 Delivery, Storage, and Handling

.1 Protect materials from moisture upon delivery.

.2 Store materials on raised supports. Cover materials with waterproof covering. Provide adequate air circulation and ventilation.

.3 Do not store seasoned materials in wet or damp areas.

.4 Store all materials in a dry environment. Do not cover materials having a moisture content of over 15%.

2.0 PRODUCTS

2.1 Lumber Materials

.1 Lumber: Except as otherwise specified, lumber shall be softwood, S-P-F, S4S, kiln-dried, moisture content 15% or less, not finger jointed, and in accordance with the following standards:

.1 CSA O141.

.2 Graded and stamped in accordance with the NLGA Standard Grading Rules for Canadian Lumber and by an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Furring, Blocking, Strapping, Nailing Strips, Grounds, Rough Bucks: S-DRY, Douglas fir species.

.1 Board Sizes: “Standard” grade to NLGA, Paragraph 114c.

.2 Dimension Sizes: “Standard” grade to NLGA, Paragraph 122c.

.3 Roofing Curbs, Nailers, Blocking: As specified in 2.1.2 above.

.4 Wood Trim: Kiln-dried spruce, comb-faced fascia material.

2.2 Panel Materials

.1 Douglas Fir Plywood: To CSA O121 with applicable grade stamp.

.2 Other Panel Products: Marked with a recognized, visible grade stamp.

2.3 Fasteners

.1 Roof Nailers: CSP material, “Sheathing” grade.

.2 Nail, Spikes, and Staples: To CSA B111 and as follows:

.1 Use common spiral nails and spiral spikes, except where specified otherwise, for interior work.

.2 Fasteners in Contact with Borate-Treated Lumber: Hot-dipped galvanized finished steel.

.3 Fasteners in Contact with ACQ-Treated Lumber: Stainless steel.

.3 Underlayment Fasteners:

.1 Nails: Galvanized, annular-ringed, length to provide minimum 85% penetration into subfloor but not enough to anchor underlayment to joists.

.4 Subfloor Fasteners:

.1 Staples: Chisel point, non-divergent, double-coated, length ensuring minimum 85% penetration into subfloor but not penetration through subfloor.

.5 Bolt, Nut, Washer, Screw and Pin Type Fasteners: Hot-dipped galvanized finished steel for all fasteners in contact with borate-treated lumber or stainless steel for all fasteners in contact with ACQ-treated lumber, unless specified otherwise.

.6 Do not combine stainless steel fasteners with galvanized hardware or vice-versa.

2.4 Preservative Treatment

.1 Treat following items in accordance with applicable CSA O80 commodity standard using “Advance Guard” borate-pressure treatment to obtain minimum net retention of 2.7 kg/cu. m of wood. Materials shall be kiln-dried after treatment. Lumber shall carry the Canadian Wood Preserver’s Bureau Quality Mark (“Advance Guard” quality mark).

.1 New lumber and panel materials inside, outside, and crossing wall moisture barrier.

.2 Items in contact with concrete or masonry.

.3 Roofing curbs, nailers, blocking.

.2 Inspection of products treated with preservative by vacuum-pressure impregnation will be carried out by an accredited inspection agency of the Canadian Wood Preservers Bureau (CWPB).

.3 All treated lumber and plywood shall bear an identifying stamp in accordance with the CWPB, CSA O80, or AWPA requirements.

.4 Following water-borne preservative treatment, dry material to maximum moisture content of 15%.

2.5 Accessories

.1 Subflooring Adhesive: To CAN/CGSB 71.26, cartridge loaded.

.2 Field Applied Wood Preservative:

.1 For ACQ or CA Preservative Wood: Organic solvent, copper naphthenate, prepared in accordance with CSA O80, coloured green.

.2 For Borate Preservative Wood: Water-based, borate-based, prepared in accordance with CSA O80, tint green.

3.0 EXECUTION

3.1 Field Treatment of Preservative-Treated and Existing Products

.1 Field-treat surfaces exposed by cutting, trimming, or boring of preservative-treated items with liberal application of preservative and in accordance with AWPA M4.

.2 Apply preservative in accordance with manufacturer's instructions. Apply by dipping, brush, or spray to completely saturate and maintain wet film on surface for minimum 3-minute soak on lumber and 1-minute soak on plywood. Allow to dry 24 hours prior to covering.

3.2 Wood Furring and Blocking

.1 Provide wood furring and blocking at locations indicated on Drawings and as specified.

3.3 Nailing Strips, Grounds, and Rough Bucks

.1 Install rough bucks, nailer, and linings to rough openings as required to provide backing for frames and other work.

.2 Erect all wood framing members to be level and plumb. Construct to framing member's full height without splices.

3.4 Roof and Wall Sheathing

.1 Install roof and wall sheathing in accordance with applicable building code requirements except as follows:

.1 Install roof and wall sheathing with panel end-joints located on solid bearing, staggered at least 800 mm.

.2 Fasten roof and wall sheathing panels spaced 150 mm o.c. along edges and 300 mm o.c. along intermediate supports. Do not use staples.

3.5 Roof Blocking, Nailers, Curbs

.1 Install wood items required for roofing and sheet metal work.

.2 Construct wood curbs for roof-mounted equipment, anchors, and roof penetrations, except drains. Curb heights measured from finished roof membrane:

.1 200 mm for plumbing vents.

.2 250 mm for other curbs.

.3 Mechanically fasten plywood facing to parapets and walls at roof-to-wall/parapet junctions.

.4 Support edges of plywood backslope sheets. Bevel edge of sheets that meet structural deck.

.5 Attach curbs, control joint boxes, blocking, and framing directly to structure.

3.6 Wood Trim and Fascia

.1 Install wood trim and fascia boards using finishing nails set slightly below the surface.

.2 Mitre joints to disguise shrinkage.

END OF SECTION

1. GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 The work described in this Section shall include furnishing all equipment, labour, materials and services to supply and install landscape carpentry work, as shown on the drawings and specified herein.

1.1.2 The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.

1.2 REFERENCES

1.2.1 ASTM F1667, Driven Fasteners: Nails, Spikes and Staples.

1.3 SUBMITTALS

1.3.1 Submit shop drawings including a fastener schedule for the new custom sheds, benches, timber edging, chalkboard and acrylic panels, etc.

1.3.2 Submit shop drawings in accordance with Section 01 00 05.

1.4 QUALITY ASSURANCE

1.4.1 Single-source assurance: Obtain each type of wood product from one source and by a single producer.

1.4.2 Lumber identification: by grade stamp certified by Canadian Lumber Standards Accreditation Board.

1.5 DELIVERY, STORAGE AND HANDLING

1.5.1 Materials shall not be delivered before they are required for proper conduct of the work.

1.5.2 Deliver wood products bundled or crated to provide adequate protection during transit and job storage, with required grade marks clearly identifiable. Inspect wood products for damage upon delivery. Remove and replace damaged materials.

1.5.3 Keep materials under cover and dry, both in transit and on the site. Protect from weather and contact with damp or wet surfaces. Stack wood, lumber, plywood, and other panels. Provide for air circulation within and around stacks, and under temporary coverings. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

1.5.4 Protect work from damage during storage, handling, installation and until the work is turned over to the Owner. Make good damage and loss without additional expense to the Owner.

2. PRODUCTS

2.1 MATERIALS

2.1.1 Cedar and Pressure Treated Lumber:

2.1.1.1 All lumber shall be CLS lumber In accordance with CSA-01411 - 1970 and conform to the latest NLGA Standard Grading Rules.

2.1.1.2 All lumber and timber shall be selected for uniform appearance and shall be free of splits, cracks, open knots and other structural defects.

2.1.1.3 All lumber shall be air or kiln dried to 12% moisture.

2.1.1.4 All lumber for wood furniture including shall be #1 construction grade Western Red Cedar Wood, kiln dried and dressed on four sides.

2.1.1.5 Provide any other materials or accessories required as may be described on the drawings.

2.1.2 Recycled Plastic Timber:

2.1.2.1 All recycled plastic timber shall be from the sources noted on the drawings.

2.1.3 Hardware:

2.1.3.1 All screws, spikes, nuts, bolts, washers, post shoes, rods and other required fastenings shall be galvanized for pressure treated framing, coated deck screws for cedar top boards and suitable for use with Cedar Wood and/or Pressure Treated Lumber and/or Recycled Plastic Timber unless detailed otherwise.

2.1.3.2 Nails and spikes shall be "ARDOX", with spiral shank and hot dipped galvanized.

2.1.3.3 All galvanizing shall conform to CGSB G164 with 58 ml zinc per lm2.

3. EXECUTION

3.1 INSTALLATION

3.1.1 Execute work using skilled workers according to best practice, as specified herein and indicated on drawings.

3.1.2 Discard units of material with defects that impair quality of landscape carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

3.1.3 Set landscape carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.

3.1.4 Securely attach landscape carpentry work to substrate by anchoring and fastening as indicated.

3.1.5 Use sharp tools to make all cuts sharp and clean and ensure tight, flush joints.

3.1.6 Countersink all nuts, bolts, connectors, shoe and plate assemblies. Install wood plugs where detailed.

3.2 FINISHING

3.2.1 Sand all exposed woodwork to a smooth finish, free of splinters. Smoothly round all exposed edges and corners to a 6mm radius min.

3.3 ADJUSTING AND CLEANING

3.3.1 Damaged surfaces shall be repaired to the Owner's satisfaction prior to final acceptance of the work.

3.3.2 The Contractor shall provide the labour, supplies and equipment as necessary for final cleaning of surface and installed items;

3.3.3 Continuously clear the site of all extraneous materials, rubbish, or debris and leave the site in a clean, safe, well-draining, neat condition.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply all labour, materials, equipment, services and perform all operations required to complete all finish carpentry, millwork and fitment installation including but not limited to the following:

.1 Interior millwork

.2 High pressure decorative laminate

.3 Solid Surface countertops.

.4 Millwork finishing hardware and accessories.

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM):

.1 ASTM A307-04e1, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

.2 ASTM D6007-02, Standard Test Method for Determining Formaldehyde Concentration in Air from Wood Products Using a Small Scale Chamber

.3 ASTM D6330-98(2003), Standard Practice for Determination of Volatile Organic Compounds (Excluding Formaldehyde) Emissions from Wood-Based Panels Using Small Environmental Chambers Under Defined Test Conditions

.4 ASTM E1333-96(2002), Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber

.2 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S102-18, Standard Method of Test for Surface Burning Characteristics of building Materials and Assemblies

.3 Canadian Standards Association (CSA):

.1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples

.2 CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles

.3 CAN/CSA O80 Series-97 (R2002), Wood Preservation

.4 CSA O86-01, Engineering Design in Wood

.5 CSA O112 Series-M1977(R2001), Adhesives for Wood

.6 CSA O121-M1978 (R2003), Douglas Fir Plywood

.7 CAN/CSA-O141-M91(R1999), Softwood Lumber.

.8 CSA O151-M1978(R2003), Canadian Softwood Plywood.

.9 CSA O325.0-92(R2003), Construction Sheathing

.10 CSA O437 Series 93 (R2003) OSB and Waferboard

.11 CSA O452 Series 94 (R2001), Design Rated OSB

.4 National Lumber Grading Association (NLGA):

.1 NLGA Canadian Lumber Grading Rules

1.3 QUALITY ASSURANCE

.1 Contractor executing work of this section shall have a minimum of five (5) years continuous experience in successful manufacture/fabrication and installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Follow applicable requirements of The Architectural Woodwork Manufacturer's Association of Canada (AWMAC) Standard for Millwork latest edition, including supplements and modifications.

.3 Unless otherwise indicated on drawings, all millwork shall be Custom Grade, in accordance with AWMAC standards.

.4 Supplements and modifications to the above standards as indicated on the drawings or as specified herein shall govern work of this section.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Samples for Verification: Submit two (2) samples prior to fabrication of millwork as follows; accepted samples will form the standard of acceptance for the remainder of the work:

.1 High pressure decorative laminate for finishing of millwork.

.2 Solid surface countertops.

.3 Wood trim with applied opaque Finish: 12” long lumber for each finish system and colour.

.4 Exposed Fasteners, Hardware and Accessories: One unit for each type and finish.

.3 Shop Drawings:

.1 Submit detailed shop drawings of all shop fabricated finish carpentry components.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate sizes and locations of framing, blocking, furring, and reinforcements provided by work that is specified in other Sections is complete before starting work of this Section.

.2 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings, attended by the Contractor, the Subcontractor's representative and foreman for this project, the Consultant, materials supplier(s), and other relevant personal before commencement of work for this Section. Topics for discussion include but are not limited to the following:

.1 Installation requirements;

.2 Special surface effects and finishing;

.3 Coordination of work with adjacent finishes;

.4 Protection of finishes;

.5 Acceptability of substrates and quality of materials being used for the project.

1.6 DELIVERY, STORAGE, HANDLING & PROTECTION

.1 Do not permit delivery of work of this section to site until area is sufficiently dry so that woodwork will not be damage by excessive changes in moisture content.

.2 Coordinate deliveries to comply with construction schedules and arrange ahead for under cover storage location.

.3 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect material with suitable non-staining waterproof coverings.

.4 Store material in original, undamaged containers or wrappings.

.5 Unsatisfactory materials shall be promptly removed from the site.

.6 Adequately protect the structure and work of other sections during delivery, storage, handling and execution of the work of this section.

.7 Provide tools, plant and other equipment required for the proper execution of the work of this section.

1.7 SITE CONDITIONS

.1 Site Measurements: Verify dimensions by site measurements before fabrication and indicate measurements on Shop Drawings where casework is indicated to fit walls and other construction; coordinate fabrication schedule with construction progress to avoid delaying the Work; locate concealed framing, blocking, and reinforcements that support woodwork by site measurements before being enclosed and indicate measurements on Shop Drawings.

.2 Established Dimensions: Establish dimensions and proceed with fabricating casework without confirmed site measurements where site measurements cannot be made without delaying the Work; coordinate with the construction to ensure that actual dimensions correspond to established dimensions; allow for trimming and fitting.

.3 Ambient Conditions: Maintain area or room in which casework is being installed at a uniform temperature and humidity for 24 hours prior to, during and after installation in accordance with AWS for relative humidity and moisture content; provide additional lighting to maintain a minimum of 430 lx on surfaces and areas where casework is being installed.

1.8 WARRANTY

.1 Warrant plastic laminate work of this Section against defects in materials and workmanship in accordance with General Conditions but for an extended period of two (2) years.

.2 Solid Surface Countertop Manufacturer Warranty: Provide manufacturer's standard 10 year warranty against defects in materials and workmanship; including material and labour to repair or replace defective materials.

.3 Agree to repair or replace faulty materials or work which appears during warranty period, without cost to the Owner.

.4 Defects shall include but not be limited to, opening of joints, cracking, shrinkage, warpage, delamination of plastic laminate.

2 Products

2.1 MATERIALS

.1 Framing Lumber:

.1 Lumber for structural components shall be of species and grade specified, well seasoned, and processed and stamped at same mill with appropriate grade

markings. Conform to requirements of standard grading rule for Canadian lumber of Nation Lumber Grades Authority (NLGA) latest issue, approved by Canadian Lumber Standards Administrative Board, as follows:

.1 Rough Carpentry for built-in work: No. 2 select grade Ontario white pine.

.2 Blocking, Ground, Furring and Strapping, Bucks and Nailing Strips: C.L.A. No. 1 grade pine, kiln dried stock.

.3 Non-Exposed Softwood: Fabricator's option, meeting requirements of CAN/CSA O141-05(R2009), kiln dried for interior use to a moisture content of 4% to 8%, and 7% to 10% for exterior use; Surface 4 sides (S4S).

.2 Panel Materials:

.1 Plywood: Douglas Fir veneer core plywood, 19mm (3/4") thick or thickness as indicated on drawings, Select Sheathing-Tight Face, good two sides, sanded "B" faces and conforms to CSA 0121.

.2 Particleboard: ANSI A208.1, 700 kg/m³ density.

.3 Medium density fibreboard (MDF): ANSI A208.2, density minimum 750 kg/m³, moisture resistant.

.1 Basis of Design Materials: Premier Plus MR MDF by Flakeboard, or approved equivalent.

.4 Fire-Rated (FR) Medium density fibreboard (MDF): ANSI A208.2, meeting CAN/ULC S102, FSC certified; Modulus of Rupture (MOR): 4000 psi, with face screw hold of 250lbs.

.1 Basis of Design Materials: TRUPAN Fire-Rated (FR) MDF by Arauco, or approved equivalent.

.3 Glue: CSA 0112; Water-resistant urea-formaldehyde-free resin glue.

.4 Plastic Laminate Covered Components (PLAM):

.1 Plastic laminate face sheets: High pressure, paper based, melamine surfaced, laminated plastic sheets, conforming to CAN/CSA-A172, with thickness tolerances in accordance with Table 1 of CAN/CSA-A172 and plastic laminate grades as follows:

.1 General Purpose Grade (GP): Minimum 1.27mm (0.050") thick.

.2 Post-forming Grade (PF): Minimum 1.06mm (0.042") thick.

.2 Plastic laminate face sheet colour, gloss and texture: Carry pricing for four colours, as selected by the Consultant, from the manufacturers standard product line.

.3 Plastic laminate backing and liner sheets: High pressure, paper based, melamine surfaced, laminated plastic backing sheets, conforming to CAN/CSA-A172, backing grade (BK), minimum 0.5mm (0.020") thick.

.4 Cores: Unless otherwise indicated, 19mm (3/4") thick core.

.5 Laminating Adhesive: CSA-0112, water resistant type.

.6 Draw Bolt Fasteners: 'K&V 516' by Knape & Vogt Canada, or approved equivalent.

.7 Basis of Design: Wilsonart, Pionite, Nevamar or Formica.

.5 Wood Veneer (WV): plain sliced white birch with clearcoat finish.

.6 Solid Surface Countertop Material (SO): Cast, nonporous, filled polymer, with through body colour meeting requirements of NEMA LD 3, and having the following nominal properties:

.1 Thickness: 12mm and as detailed.

.2 Surface Burning Characteristics: in accordance with CAN/ULC S102 and as follows:

.1 Flame Spread: Maximum 25

.2 Smoke Developed: Maximum 450

.3 Pattern and Colour: to be selected by Consultant from manufacturers standard colour line, allow for 2 colours.

.4 Basis-of-Design Material: Quartz by Ceasarstone, CambriaQuartz by Cambria, Quartz by Corian or approved equivalent.

.7 Rough Hardware:

.1 Provide required rough hardware to frame and fix all finished carpentry and include for expansion shields, nails, spikes, screws, bolts, anchors, clips, plates, washers, rods, wires, wall brackets, chrome finishing trim, and other ironmongery which may be required. All wood screws shall be drill thread screws except at chipboard where self-tapping screws shall be used. All rough hardware shall be galvanized unless otherwise noted.

.8 Millwork Finishing Hardware:

.1 As scheduled on drawings/details.

2.2 FABRICATION AND WORKMANSHIP

.1 Work shall be executed by skilled carpenters under the supervision of a competent carpentry foreman. All items shall be shop assembled, insofar as is practical. Unless indicated otherwise comply with AWMAC Custom Grade requirements.

.2 Make thorough examination of drawings and details, check anchorage, interfacing with work of other sections and other factors influencing the installation of the work, and be fully cognizant of requirements.

.3 Finished woodwork shall be free from bruises, blemishes, mineral marks, knots, shakes and other defects and shall be selected for uniformity of colour, grain and texture.

.4 Be responsible for methods of construction and for ensuring that materials are rigidly and securely attached and will not be loosened by the work of other sections.

.5 Fabricate the work in a manner which will permit expansion and contraction of the materials without visible open joints.

.6 Mitre exposed corners; no end grain shall be visible in completed installation.

.7 Provide solid wood edging at exposed plywood edges.

.8 Provide wood trim mouldings to profiles as indicated on drawings.

.9 Jointing of shop assembled work shall be by means of mortise and tenons, dowels, stub tenons, dovetails, dadoes, lock joints as applicable for the jointing condition.

.10 Accurately cut, mitre, fit and frame work together to produce tight hairline joints, rigidly secured together in a permanent manner using glue, blind screw fixing or nails. Use concealed glue blocks for additional strength where possible.

.11 Finished woodwork shall be in one piece wherever possible and all trim shall be in long lengths. Where jointing is necessary in the length, the joints between pieces shall be scarfed, glued and properly fastened. The material being jointed shall match reasonably well for grain and colour where natural finish is specified. Joints between lengths where paint finish is to be applied may be finger jointed in lieu of scarfing. Trim shall be accurately cut and mitred at all corners, glued and properly fastened.

.12 Machine dressed work shall be properly machine using sharp cutters, the finished work shall be free from drag, feathers, slivers or roughness of any kind. Remove machine marks by sanding.

.13 Finished woodwork shall be carefully hand sanded after installation to remove roughness and planer marks. Sanding shall be done with the grain of the wood and finished with fine grit paper to leave a smooth scratch-free surface suitable to receive the paint or natural finishes to be applied over as specified in Section 09 90 00.

.14 Nail heads in the finished surfaces shall be set with straight shank nail sets. Screw and bolt heads in finished surfaces shall be let into the work and capped with edge grain wood caps dressed and finished flush.

.15 Provide cutouts for fixtures, fittings, inserts, outlet boxes, services, other mechanical and electrical items and appliances. Round corners, and chamfer edges. Where items for cutouts butt to underside or back of finished surface, finish exposed edge to match face. Where item covers cutout, and at all concealed cut edges of core material, apply uniform coating of seal to cut edges.

.16 The finished work shall be of a high quality, with all corners having exact angles to ensure no swerve or twisting. All bends, crimps or angle parts shall be produced by professional equipment and tools for this purpose and if long runs or repeats are required, such shall be produced in the shop, or have proper equipment on site.

.17 Counters, Cabinets, Window Sills and Fitments:

.1 Provide and install counters, cabinets, and fitments as indicated on drawings.

.2 Shop fabricate and finish countertops and cabinet work in as large a size as practical. Verify field dimensions and conditions prior to fabrication.

.3 Make each unit rigid and self-supporting, suitable for individual removal. Assemble components with dovetail connections, mortise and tenon or blind dado joints, and adequately glued and secured with screws.

.4 Construct cabinets of solid lumber framing, with 19mm (3/4") MDF gables. Provide 19mm (3/4") MDF bottoms. Provide minimum 6mm (1/4") thick MDF full width backs having joints concealed behind framing. Backs which support shelves, equipment, or other loads, shall be 19mm (3/4") thick MDF. Route backs into end gables.

.5 Fabricate cabinet base in wood, separately in height indicated or, if not indicated, to match flooring base.

.6 Fabricate cabinet doors of flush panels from 19mm (3/4") thick MDF framed with hardwood edging.

.7 Make drawer fronts of 19mm (3/4") finished MDF, and wide enough to cover slide space. Provide 13mm (1/2") drawer backs, 16mm (5/8") sides, 6mm (1/4") dividers, and 6mm (1/4") bottoms, all of finished MDF. Fasten sides to fronts with dovetail joints, and grooved and glued joints for backs. Groove and glue bottoms into fronts and sides.

.8 Drawers shall be supported and guided with side extension drawer slides.

.9 Where a locking drawer is located below another drawer, provide 6mm (1/4") thick MDF diaphragm in framing immediately above locking drawer.

.10 Fabricate shelving of 19mm (3/4") finished MDF. Route cabinet gables to receive fixed shelving where indicated and to receive recessed metal shelf standards flush with adjacent surfaces for adjustable shelving.

.11 Fabricate countertops to details shown of 13mm solid surfacing mounted to 19mm exterior grade waterproof Douglas Fir plywood.

.1 Fit corners and edges of countertops with solid stock. Extend side and backsplashes to heights indicated. Provide side returns to match backsplashes at all abutting fixed vertical surfaces.

.18 Edging Treatment:

.1 Provide Self Edge Laminate: HPDL, colour matching cabinet work.

.2 Provide 3mm hardwood edging to match face veneer at WV casework.

.19 Plastic Laminate Covered Components:

.1 Meet requirements of CAN/CSA-A172, Appendix A.

.2 Bond plastic laminate to core with adhesive using pressure. Provide balanced construction with plastic laminate face sheet on exposed sides of core and backer/liner sheet. Finish drawers with liner sheet on both sides of core for balanced construction.

.3 Unless otherwise detailed, provide 19mm (3/4") thick core.

.4 Apply plastic laminate to core material in accordance with adhesive manufacturer's instructions. Provide same core and laminate profiles to provide continuous support and bond over entire surface.

.5 Use continuous lengths up to 2439mm (8'). Keep joints 610mm (2') from cutouts and in locations indicated on reviewed shop drawings.

.6 Locate joints, where required at 2439mm to 3048mm (8' to 10') O.C. At L-shaped corners mitre plastic laminate, to the outside corner. Accurately fit members together to provide tight and flush butt joints, in true planes. Provide 6mm (1/4") blind spline and approved type draw bolts; one draw bolt for widths up to 150mm (6") at maximum 457mm (18") centres for widths exceeding 150mm (6"). Colour-match adjoining units.

.7 Form shaped profiles and bends using postforming grade laminate to laminate manufacturer's instructions.

.8 Where curved or bent surfaces are required for counters, backsplashes and other areas, use postforming laminate.

.9 Self-edge straight-line-edging with general purpose laminate and radius corners with postforming laminate, of same colour and finish as facing sheet, to cover exposed edges of core material. Apply with same adhesive as facing sheet. Chamfer edges uniformly at approximately 20 deg using machine router. Do not mitre laminate edges.

.10 Fabricate horizontal wearing surfaces including counters, shelves, both sides of removable shelves, cabinet doors and drawer fronts, of general purpose laminate except where postforming is required.

.11 Use general purpose laminate for exposed vertical surfaces except where otherwise specified or indicated.

.12 Apply plastic laminate backing sheet to reverse side of core of plastic laminate finished work including under counter tops and concealed portions of plastic laminate faced work. Provide backing sheet of specified minimum thickness, increased as required to compensate stresses caused by facing sheet.

.13 Apply laminated plastic liner sheet to interior of cabinetry unless indicated otherwise.

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

2.3 MOISTURE CONTENT

.1 Moisture content of interior woodwork shall be between 8% and 12%.

2.4 FINISHES

.1 Finishes shall match approved finished samples of wood treatment submitted by this section for each species of wood required. Wood items provided under this section shall be finished as part of the work of this section.

.2 Apply stain to items where scheduled, indicated or as directed Consultant, providing uniform required stain colour(s).

3 Execution

3.1 EXAMINATION

.1 Inspect available spaces and check surfaces over which the work of this section is dependent for any irregularities detrimental to the application and performance of the work. Notify Consultant in writing of all conditions which are at variance with those on the Contract Documents and/or detrimental to the proper and timely installation of the work of this section. The decision regarding correct measures shall be obtained from the Consultant prior to proceeding with the affected work.

.2 Check humidity in building with moisture reading instruments if doubt exists that building is sufficiently dry and ready to receive millwork. Do not proceed until unsatisfactory conditions are corrected.

.3 Commencement of work indicates acceptance of surfaces and conditions.

3.2 INSTALLATION - GENERAL

.1 Provide and fit in place all furring, strapping, battens, grounds and blocking required to provide adequate properly placed fixing for all finish carpentry work and as required for the work of other sections.

.2 Refer to drawings and coordinate with drywall, the painting and floor covering sections to establish sequence of installation or execution of each others' work. Pay particular attention to areas where materials are supplied by others and installed under this Contract.

.3 All nails where their use is permitted, shall be long enough so that at least half their length penetrates into the second member. Splitting of wood members shall be minimized by staggering the nails in the direction of the grain and by keeping nails well in from edges.

.4 Unless otherwise permitted by Consultant, fasten finish carpentry components in concealed manner.

.5 Plastic laminate work shall be free of cracks and chipped or broken edges. Replace damaged components.

.6 Fitments shall be installed level, plumb and true and complete in all respects.

.7 Fit small scribe moulds of same material as fitment to hide voids at junction of fitment to fitment and fitment to walls, partitions, ceilings, furrings.

3.3 PRIMING

.1 Immediately in instances where primed work is cut (as for fitting), a coat of primer shall be applied to the resulting raw surfaces.

3.4 INSTALLATION - FINISHING HARDWARE

.1 Take delivery of all finishing hardware and install. Check each item as received.

.2 Set, fit and adjust hardware according to manufacturer's directions at heights directed by Consultant. Hardware shall operate freely. Protect installed hardware from damage and paint spotting.

.3 Install all hardware for hollow metal doors including hinges.

.4 Pre-drill kickplates and doors before attachment of plates. Apply with water-resistant adhesive and countersunk stainless steel screws.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to complete the following work:

.1 Prepare the exterior foundation wall vertical surfaces, detail all cracks and joints, patch perimeter and voids and install a new cold applied waterproofing system as shown on the Drawings and indicated in the Specifications.

.2 Surface preparation includes abrasive blasting, patching of voids and crevices with manufacturer approved polymer-modified mortar where required, detailing of cracks and joints, application of manufacturer-recommended primer, and all other manufacturer requirements.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CAN/CGSB-37.29	Rubber-Asphalt Sealing Compound
.4	CGSB 37-GP-9Ma	Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing
.5	CGSB 37-GP-15M	Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing
.6	ASTM D4263	Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
.7	ASTM C836/C836M	Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
.8	ASTM E96 (Method B)	Standard Test Methods for Water Vapor Transmission of Materials
.9	ICC-ES AC29	Acceptance Criteria for Cold, Liquid-Applied, Below-Grade, Exterior Dampproofing and Waterproofing Materials

1.3 Site Examination

.1 Prior to submitting a bid, arrange for a visit to site by waterproofing manufacturer's technical representative to analyze site conditions and confirm procedures to be followed.

.2 Bidders shall visit the site and examine the surfaces to receive membrane. Rough surfaces may require additional surface preparation after cleaning. Bid shall include all costs of surface preparation and patching of rough surfaces. No extras for surface preparation or additional material will be entertained after bid closing.

.3 Bidders may remove sections of the existing waterproofing materials to evaluate surface roughness. Bidders must agree to accept existing surface conditions at time of bid.

1.4 Submittals

.1 Submit manufacturer's product data sheets, shop drawings, and/or catalogue illustrations identifying details of waterproofing system which have not already been indicated in these documents including installation specifications, material thicknesses, details at joints, cracks, upstands, walls, drains, and termination points for Consultant review prior to starting work.

.2 Submit installation procedures for Consultant review prior to starting work including surface preparation requirements.

.3 Submit with Bid a description of the products to be used to patch rough surfaces suitable for membrane application.

.4 Provide a certificate from system manufacturer confirming the following:

.1 A minimum of 82,000 sq. ft. (7,500 sq. m) of the system has been installed on structures of similar climate and exposure and has performed satisfactorily. Provide to Consultant a list of similar completed waterproofing applications for verification of "satisfactory performance".

.2 The system will meet the warranty requirements as specified in this Section.

.3 Waterproofing systems applicator is presently a licensed applicator of the waterproofing system.

.4 Applicator has a minimum three years of directly applicable waterproofing installation experience, or has installed a minimum of 55,000 sq. ft. (5,000 sq. m) of specified waterproofing system.

.5 Provide a certificate signed by the applicator and system manufacturer certifying the following:

.1 Surfaces to receive waterproofing systems were inspected and found satisfactory to receive the waterproofing system in accordance with the manufacturer's requirements.

.2 Waterproofing system was applied in accordance with manufacturer's recommendations.

.3 Completed waterproofing system conforms to system described.

.4 Additional or supplemental cold applied waterproofing requirements by RJC can be completed without compromising the system or its warranty.

.6 Any existing conditions that may adversely affect the bonding or performance of the membrane shall be brought to the attention of the Consultant, in writing, for resolution prior to installation of membrane. Application of waterproofing implies acceptance of surfaces.

.7 Confirm in writing the compatibility of the proposed waterproofing system with the existing waterproofing prior to application.

.8 Provide three copies of maintenance instructions for finished surfaces prior to Substantial Performance.

1.5 Environmental Requirements

.1 Do not install waterproofing system when ambient air temperature or substrate temperature is less than that specified in manufacturer's specifications.

.1 If this temperature is not reached, installation of temporary heaters and enclosures is required.

.2 Maintain air temperatures and substrate temperature at installation area in accordance with manufacturer's specifications.

.3 Protect materials from moisture damage or contamination until adequately cured.

.4 Meet the requirements of the Ontario Occupational Health and Safety Act.

.5 During application of waterproofing system, area must be well ventilated such that odours from the waterproofing system do not disturb the public nor adjacent residents.

.1 Provide forced air circulation during installation period for enclosed applications.

1.6 Performance Requirements

.1 The waterproofing membrane system is comprised of a fluid-applied waterproofing membrane specially formulated and installed to provide a monolithic and fully bonded waterproof protective coating. The design properties and installation thicknesses of the membrane are inter-related for proper performance. The performance requirements and warranty requirements apply to the total system and are the responsibility of the waterproofing system applicator and manufacturer.

.2 The waterproofing system shall satisfy the following requirements for the duration of the warranty:

.1 The system shall be totally waterproof, flexible, and thermally compatible with the substrate under applicable service conditions.

.2 The system shall not allow moisture penetration at termination details, drains, upturns, splices, joints, cracks, etc.

.3 The system shall be free of visible pinholes or blisters.

.4 The system shall exhibit zero chloride permeability.

.5 The system shall withstand active cyclical crack movements to a minimum of 1.5 mm and remain waterproof. In locations where cracks have been reinforced with rubber sheets, they shall withstand movements to a maximum of 3 mm and remain waterproof. Membrane shall comply with crack bridging requirements of CAN/CGSB-37.50.

.6 The membrane, primer, or surface patching shall fully adhere to the concrete substrate (adhesion).

.7 All layers of the system cohesively bonded to each other (adhesion).

.8 The system shall not debond or crack.

.9 The waterproofing system shall not blister, swell, crack, delaminate, disintegrate, compress, or stretch unduly:

.1 When subjected to long-term weight.

.2 When subjected to temperature ranges from winter to summer.

.3 When exposed to ultraviolet or any other sun's rays.

1.7 Warranty

.1 Submit a joint warranty in conjunction with supplier to Consultant that warrants the repaired areas against water leakage. Supplier and Contractor shall jointly repair areas of moisture ingress that manifest within the warranty period of five (5) years commencing from the date of Substantial Performance.

2.0 PRODUCTS

2.1 Waterproofing Membrane

.1 Cold fluid applied elastomeric waterproofing membrane system designed for concealed building components subject to hydrostatic head that is polyurethane, coal-tar free, and complies with ASTM C836:

.1 TREMproof 250 GC roller, self-levelling or trowel applied, as manufactured by Tremco Commercial Sealants and Waterproofing. Vertical applications only.

.2 Colphene LM 300 spray, brush, or trowel applied, as manufactured by Soprema Canada.

.3 MasterSeal HLM 5000 self-leveling/ squeegee, spray, trowel, or roller applied, as manufactured by BASF.

.2 For application to green concrete surface or surface-dry-but-damp concrete surfaces, acceptable product:

.1 TREMproof 250 GC rapid-curing, high solids, VOC compliant, modified polyurethane waterproofing membrane. One-part moisture curing elastomer (Viscosities: Self-Leveling, Roller and Trowel) as manufactured by Tremco Commercial Sealants and Waterproofing.

2.2 Accessories

.1 Primer: As recommended by waterproofing membrane system manufacturer

.2 Joint Backing: Closed-cell, polyethylene rod as recommended by membrane manufacturer;

.3 Reinforcing Fabric: Woven fiberglass scrim cloth.

.4 Elastomeric Sheet Flashing: 1/16” thick by 12” wide uncured neoprene sheeting.

.5 Elastomeric Transition Flashing to Above-Grade: Polyurethane liquid-applied coating system with ultraviolet protective topcoat. Acceptable Product:

.1 Tremco 801

.2 Approved equivalent.

.6 Joint Treatment: Acceptable Product:

.1 Dymeric 240FC; Tremco Inc.

.2 TREMproof 201/60T; Tremco Inc.

.3 TREMproof 250GCT; Tremco Inc.

.4 Colphene LM 300; Soprema Canada.

.5 Approved equivalent.

.7 Protection Course: As recommended by waterproofing membrane manufacturer:

.1 Acceptable Product for Walls:

.1 Protection Mat; Tremco Inc.

.2 Sopraboard; Soprema Canada

.3 Approved equivalent.

.2 Acceptable Product adjacent to planting beds:

.1 40-mil HDPE Root barrier; Tremco Inc.

.2 Sopraboard; Soprema Canada

.3 Approved equivalent.

.8 Prefabricated Composite Drainage: Two-part prefabricated composite drainage material consisting of a formed polystyrene core covered on one side with filter fabric.

.1 For backfilled walls less than 20 feet in height, a composite drainage mat with non-woven polypropylene filter fabric, 9 gpm/ft flow capacity per unit width and 10,800 lb/ft² compressive strength. Acceptable Product:

.1 Tremdrain 1000; Tremco Inc.

.2 Sopradrain 10G; Soprema Canada.

.3 Approved equivalent.

.2 For water collection and high profile section for water flow around perimeter of the structure, a drainage composite with non-woven needle-punched polypropylene filter fabric, a transition section to couple with adjoining drainage mat, high profile flow capacity of 100 gpm and fitted with compatible factory-molded universal tees, universal outlets, and 12” corner guards. Acceptable Product:

.1 TREMDrain Total-Drain; Tremco Inc.

.2 Approved equivalent

2.3 Surface Patch Materials

.1 Products used to patch rough surfaces shall be 100% solids epoxy and contain no additives or fillers. Membrane material may be used to fill rough areas if approved by manufacturer. Alternate products may be suggested for approval but must be suitable for installation below cold-applied waterproofing.

.2 No extras will be entertained for surface preparation or additional membrane material after bid closing, unless the scope of work changes.

2.4 Equipment

.1 Equipment weights and size shall be submitted to Consultant for approval prior to starting work and arrival on site.

2.5 Aluminum Fastener Bars

.1 All fastener bars to be aluminum 6 mm x 25 mm (0.25” x 1”) in size and fastened to wall with 6 mm x 50 mm long (0.25” x 2”) countersunk anchors at 450 mm (18”) centres and covered with an additional layer of membrane.

3.0 EXECUTION

3.1 Surface Preparation

.1 All existing elements that may affect installation of the waterproofing system shall be removed and re-installed as required for application of waterproofing to wall surfaces unless otherwise noted on the Drawings.

.2 Ensure surfaces are smooth, dry, clean, and free of ice and debris.

.3 Preparation of vertical surfaces is to be in strict accordance with the more stringent requirements of the membrane manufacturer’s recommendations and these Contract Documents including the following: preparation and smoothing of rough surfaces, and detailing of slab cracks, joints, and voids as required. No extras for surface preparation will be entertained after bid closing.

.4 The minimum standard for preparation of vertical surfaces for membrane application shall be abrasive-blast, hand patching voids or depressions in concrete surfaces, and re-pointing masonry wall joints as required. No extras shall be entertained for this item after the award of Contract. This applies to all foundation walls, columns, etc.

.5 Remove all existing paint and/or existing waterproofing membranes.

.6 New concrete surfaces shall be allowed to air dry a minimum of 14 days after moist curing and not exhibit any condensation under plastic sheet test prior to the placement of the waterproof membrane.

.7 Clean all metal surfaces to be cleaned abrasive blasting; scuff-sand lead flashing and plastic surfaces.

.8 No membrane shall be applied until the surface preparation has been reviewed by Consultant and inspected and accepted in writing by a representative of the system manufacturer.

.9 Clean all surfaces to receive membrane system in accordance with manufacturer's instructions; vacuum clean or blow clean with oil-free compressed air all surfaces to receive sealants, detailing materials, or membranes immediately prior to installation.

.10 Ensure environmental and site conditions, as recommended by the membrane manufacturer, are suitable for installation of work of this Section.

.11 Commencement of work implies acceptance of the previously prepared concrete surfaces and assumption of full responsibility for the surfaces prepared to receive the primer and membrane.

.12 Application procedures that result in toxic fumes or flammable solvent collecting or endangering workers or building occupants are not permitted.

.13 Repair adjacent finishes damaged during installation to match existing.

3.2 Detailing of Cracks and Joints

.1 Route, clean, prepare, and detail surface cracks in accordance with manufacturer's instructions; install backer rod where required.

.2 Install 1/4" diameter backer rod into corner of all horizontal-to-vertical junctures subject to movement and cover with 1" detail cant of approved sealant; install 1" detail cants at projections, curbs and other horizontal-to-vertical junctures.

.3 Install detail coats, joint and crack treatments, elastomeric flashing, and reinforcing fabric in accordance with manufacturer's instructions.

.4 Allow detail applications to cure in accordance with manufacturer's instructions prior to general application of membrane.

3.3 Membrane Application

.1 Prime all surfaces in accordance with manufacturer's instructions.

.2 Prepare surfaces to assure proper coverage rates and verify membrane wet-film mil thickness with gauges as work progresses.

.3 Retain empty product containers during course of work to aid in determining whether completed membrane complies with required average dry-film thickness.

.4 Verify proper dry condition of substrate using method recommended by membrane system manufacturer; perform adhesion checks prior to general application of membrane system using field adhesion test method recommended by manufacturer.

.5 Mask off adjoining surfaces not to receive membrane system.

.6 Apply cold-applied waterproofing system in two lifts evenly to provide a continuous coating. Refer to manufacturer’s written instructions for wet film thickness.

.7 Apply membrane uniformly and allow to cure in accordance with manufacturer's instructions.

.8 Carry waterproof membrane up junction of horizontal and vertical surfaces as shown on Drawings. Mask top of upturn to ensure neat straight finish to coating. All vertical surface irregularities to be patched prior to coating application.

.9 Feather terminating edge when entire area cannot be completed in one day; clean area 6" wide along terminating edge of membrane with Xylene solvent on clean white rags prior to start-up on next working day; use primer per manufacturer's instructions as needed; overlap existing work by 6" with new work.

.10 Equipment used for installation of waterproof membrane material shall be approved for use by waterproof membrane manufacturer.

3.4 Protection Board

.1 Apply adhesive, tape, or secure without fastening through waterproofing membrane.

3.5 Inspection and Testing

.1 Testing to be conducted by a testing agency designated by Consultant. Owner will pay costs of inspection and testing described in this Section.

.2 Contractor shall inform Consultant and designated testing agency 72 hours in advance of work to be performed under this Section.

.3 Prior to application of membrane, test moisture content of concrete mass by taping down a 450 mm x 450 mm (18” x 18”) polyethylene sheet for a period of 16 hours minimum to detect evaporation from slab surface. Number of tests shall be designated by membrane manufacturer, or Consultant; minimum number to be one test per 5,000 sq. ft. Locations to be determined by Consultant.

.4 To confirm membrane thickness, Consultant to perform cut tests. Number of tests to be one test per 550 sq. ft. of membrane minimum.

.5 To evaluate bonding of membrane to substrate, and/ or interlayer bonding, pull-off adhesion tests may be performed by the Consultant or designated testing agency at the discretion of Consultant.

.6 Additional tests may be performed at the discretion of the Consultant.

.7 Repair waterproofing system at test locations at no extra cost.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, material, equipment, supervision, and services necessary to install new crystalline waterproofing at areas designated on the Structural Drawings. Work includes the preparation of all surfaces, detailing of all cracks and joints, patching of all voids, and patching/ grinding rough surfaces smooth.

1.2 Site Examination

.1 Bidders shall visit the Place of the Work and review wall surfaces to receive crystalline waterproofing. Rough/ uneven surfaces, including masonry surfaces, may require additional surface preparation, patching, etc. to provide an application surface in conformance with the more stringent requirements between the manufacturer's requirements and this Specification Section.

.2 Bid shall include all costs of preparation and patching of rough surfaces. No extras for surface preparation or additional material will be entertained after bid closing.

1.3 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	ASTM C109/C109M	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
.4	ASTM C321	Standard Test Method for Bond Strength of Chemical-Resistant Mortars (Withdrawn 2021)
.5	ASTM C348	Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars
.6	ASTM C452	Standard Test Method for Potential Expansion of Portland-Cement Mortars Exposed to Sulfate
.7	ASTM C596	Standard Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement

.8	ASTM C944/944M	Standard Test Method for Abrasion Resistance of Concrete or Mortar Surfaces by the Rotating-Cutter Method
.9	NSF/ANSI 61	Drinking Water System Components - Health Effects (Includes Amendment)
.10	AASHTO T 259	Standard Method of Test for Resistance of Concrete to Chloride Ion Penetration
.11	ICRI 310.2	Selecting and Specifying Concrete Surface. Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair

1.4 Submittals

.1 Provide Safety Data Sheets (SDS) for each product.

.2 Submit non-typical waterproofing system details for conditions not accommodated for in the Contract Documents.

.3 Submit manufacturer’s written certification that the proposed system, as specified and detailed, fully complies with specified performance requirements.

.4 Submit installation procedures for Consultant review prior to starting work, including slab preparation requirements.

.5 The crystalline waterproofing applicator shall submit certificates confirming the following:

.1 Crystalline waterproofing applicator is presently a licensed applicator of the crystalline waterproofing system.

.2 Applicator has a minimum experience of at least five projects of similar nature in past five years.

.3 Applicator has undergone training provided by product manufacturer.

.6 Submit certificate signed by the Contractor and waterproofing system manufacturer certifying the following:

.1 Surfaces to receive systems were acceptable and found satisfactory to receive waterproofing system, per manufacturer's requirements and these Specifications. Application of waterproofing implies acceptance of surfaces.

.2 Crystalline waterproofing was applied in accordance with manufacturer's recommendations and these Specifications.

.3 Completed waterproofing system conforms to system described herein.

.7 Any existing conditions that may adversely affect bonding or performance of the coating shall be brought to the attention of the Consultant, in writing, for resolution prior to installation of the coating.

.8 Provide electronic copies of maintenance instructions for finished surfaces prior to Substantial Performance of the Work.

1.5 Warranty

.1 Submit a joint warranty in conjunction with supplier to Consultant that warrants the repaired areas against water leakage. Supplier and Contractor shall jointly repair areas of moisture ingress that manifest within the warranty period of five (5) years commencing from the date of Substantial Performance.

1.6 Delivery, Storage, and Handling

.1 Deliver products to the Place of the Work and store off the ground under appropriate cover to protect against moisture in accordance with manufacturer's instructions. Where heated storage of materials is required, provide heating/ heated area at no additional cost to the Contract.

.2 Deliver products in manufacturer's unopened containers fully identified with brand, type, grade, class, and all other qualifying information.

.3 Store products in an approved ventilated dry area; protect from contact with soil, dampness, freezing, and direct sunlight.

.4 Handle products in a manner that will prevent breakage for containers and damage to products.

.5 Liquids should not be stored in areas with temperatures greater than 30°C or below 5°C.

1.7 Environmental Conditions

.1 Do not install coating when ambient air temperature or substrate temperature is less than 5°C or under environmental conditions outside manufacturer's absolute limits. Install temporary heaters to maintain installation temperatures when required.

.2 Maintain substrate base and ambient air temperatures above 5°C for a minimum of 48 hours prior to, during, and 72 hours after installation. Maintain temperatures for a longer period if required to ensure materials adequately cure.

.3 Do not apply products to frozen or frost-filled surfaces.

.4 Exercise caution when concrete surface temperatures are high. Delay waterproofing system installation, or cool installation areas, if required to meet manufacturer's requirements for application of materials.

.5 Protect installed materials from moisture damage or dust contamination until adequately cured.

.6 All working conditions shall meet the requirements of the Ontario Occupational Health and Safety Act.

2.0 PRODUCTS

2.1 Performance Requirements

.1 Physical Properties:

.1 Positive Side Waterproofing: No signs of leakage, softening, or discolouration up to 13,8 bar (200 psi)/(1410,5 m) of water head.

.2 Negative Side Waterproofing: No sign of leakage up to 13,8 bar (200 psi) / (140,5 m) of water head.

.3 Compressive Strength (ASTM C109, 28 days): 3,330 psi average.

.4 Abrasion Resistance (ASTM D4060, 28 days): 2.7 x 10 g per cycle/47 cycles per mil.

.5 Compressive Strength (EN 12190, 28 days): >35 N/mm^2.

.6 Adhesive Tensile Strength: >1.5 N/mm^2.

.7 Coefficient of Water Vapour Diffusion Resistance (μ): 60.

2.2 Material

.1 Approved Crystalline Waterproofing Systems to be used in conjunction with the curtain injection foundation waterproofing system are:

.1 Cementitious, crystallizing cement-based mix containing chemicals that penetrate with moisture into capillary tracts and activate to form crystals that close the capillaries to produce a cementitious waterproofing system that becomes a permanent, integral part of the structure and is non-toxic, inorganic, and free of added chlorides and added sodium based-compounds. Approved crystalline waterproofing systems are:

.1 KOSTER NB1 Grey, manufactured by KOSTER Bauchemie AG, Aurich, Germany.

.2 Bonding agent for use where recommended by manufacturer to increase elasticity, flexibility, reduce water absorption, and improve bonding to steel. Do not use in case of drinking water contact where certification is required.

.1 KOSTER SB Bonding Emulsion, manufactured by KOSTER Bauchemie AG, Aurich, Germany.

.3 Approved Primer:

.1 KOSTER Polysil TG 500, manufactured by KOSTER Bauchemie AG, Aurich, Germany.

.2 Water to be potable, clean, clear, non-alkaline, and free of salts and other harmful elements.

3.0 EXECUTION

3.1 Preparation

.1 Protect adjacent surfaces not designated to receive waterproofing.

.2 Remove existing paints and finishes, grease, oil, and contaminates from substrate. Use high-pressure water blasting, wet or dry abrasive blasting, wire brush, steam cleaning, or other methods recommended by waterproofing manufacturer to produce surfaces suitable for application of waterproofing.

.1 Clean surfaces to receive cementitious waterproofing, chip or abrasive blast to a Level 3 Concrete Surface Profile per ICRI 310.2 and remove defective materials and foreign matter such as paint, dirt, grease, curing agents, form release agents, and mineral salts.

.3 Follow manufacturer's instructions to clean and prepare surfaces and seal cracks and joints.

.1 Use KOSTER SB Bonding Emulsion with manufacturer approved concrete repair materials. (Such as KOSTER Water Stop or KOSTER Repair Mortar). Comply with requirements listed in manufacturer's technical data information. No exceptions.

.2 Moving joints and cracks are treated and detailed as expansion joints. Install an elastic sealant and corresponding primer in accordance with sealant manufacturer's instructions.

.4 Honeycombed areas, cavities, recesses, and chipped out areas where form ties have been cut or removed must be routed/bush hammered to sound base and repaired according to manufacturer's instructions and patched flush with Repair Mortar.

.5 Uneven brick or block work must be first rendered flush with Repair Mortar.

.6 Construction Joints: Construction joints should be thoroughly cleaned and dampened. Apply one slurry coat of KOSTER NB 1 Grey at rate of 1.5 kg/m^2. After it has reached an initial set, dampen if dry and apply a second coat of KOSTER NB 1 Grey at same rate. Pour concrete while second coat is still less than 6 hours old to assist in bonding and to form an uninterrupted membrane.

.7 Piping Preparation: Cut back around pipes at least 2.5 cm to give sufficient depth and clean thoroughly. Apply KOSTER KB Flex 200. Flush up cavity with KOSTER KB-Fix 5.

.8 Fillets and Coves between Horizontal and Vertical Areas: Where fillets or coves are specified, it is desirable that cementitious waterproofing be applied behind cove strip. Repair mortar should be used.

.9 Stop water leakage according to manufacturer's plugging specifications.

.10 Install items such as anchors, plates, supports etc. prior to installation of waterproofing.

3.2 Examination

.1 Examine substrates that waterproofing system is to be installed on, adjoining construction, and existing site conditions affecting installation. Rectify any unsatisfactory conditions prior to proceeding with work.

.2 Verify the following substrate conditions prior to application of waterproofing:

.1 Substrate condition is in accordance with manufacturer's requirements and these Specifications.

.2 Concrete surfaces have open pores and wood float finish on horizontal surfaces.

.3 Concrete surfaces are free of voids, spalled areas, loose aggregate and sharp protrusions, and with no coarse aggregate visible.

.4 Masonry surfaces have been patched smooth.

.5 Curing compounds or surface hardeners incompatible with waterproofing have not been used on concrete or masonry.

3.3 Installation – Non-Active Leaks

.1 Mix waterproofing material in proportions recommended by manufacturer.

.1 For positive side applications, prepare a mixing liquid of at least 1 part KOSTER SB Bonding Emulsion to 7 parts clean water in a separate container. Mix liquid with NB 1 Grey to a thick slurry consistency.

.2 For negative side applications, prepare a mixing liquid of at least 1 part KOSTER SB Bonding Emulsion with 3 parts water. Mix liquid with KOSTER NB 1 Grey to a thick slurry consistency.

.3 In hot weather where temperatures exceed + 30ºC or when dry winds prevail, prepare a mixing liquid of at least 1 part KOSTER SB Bonding Emulsion to 3 parts water for mixing liquid. Mix liquid with KOSTER NB 1 Grey to a thick slurry consistency.

.2 Apply waterproofing material in accordance with manufacturer's specifications and recommendations. General application:

.1 Moisture must be present in the surface as necessary to begin the crystallization process.

.2 Wet the dry surfaces thoroughly with clean water immediately prior to applying slurry, making sure that no running or ponding water is present at time of application.

.3 Apply slurry with a cement brush in two coats or spray apply in two coats. Work in such a way as to leave no areas void and no pinholes. Back brush first coat if spray applied.

.3 Brush Application:

.1 Apply KOSTER NB 1 Grey at a rate of min. 1.5 kg/m^2 per coat. Brush application on surfaces other than formed concrete (positive side) is a minimum of 3 kg/m^2 in two coats, allowing excess water to run off first.

.2 Work in alternating coats from vertical to horizontal if brush applied on rough surfaces.

.3 Allow first coat to dry to the touch with no transfer of material or apply second coat when first coat will not be mechanically damaged through installation of the second. Wet the first coat with water prior to application of second coat, allowing excess water to run off first.

.4 KOSTER NB 1 Grey is self-curing. Do not apply any additional curing methods. Do not cover for 12 hours.

.4 Spray Application:

.1 Dampen surfaces with clean water just prior to spraying or prime with KOSTER Polysil TG 500.

.2 Surface should be damp to the touch with no standing or running water.

.3 Use conventional spray machine suitable for spraying cementitious material, operating with air pressure between 70 and 80 psi, a 4-8 mm nozzle, and 25 mm delivery hose.

.4 Two coats at minimum rate of 2.0 kg/m^2 per coat are required. Material can be spray applied using a 4-8 mm nozzle, keeping nozzle at a distance of 30 cm from the surface. Back-brush the first coat. Apply second coat with a 4-8 mm nozzle, consumption 2.0 kg/m^2.

.5 Allow first coat to dry to the touch with no transfer of material or apply second coat when first coat will not be mechanically damaged through installation of the second. Wet the first coat with water prior to application of second coat, allowing excess water to run off first.

.6 KOSTNER NB 1 Grey is self-curing. Do not apply any additional curing methods. Do not cover for 12 hours.

.5 For broadcast and trowel application, consult manufacturer for installation requirements and application techniques.

3.4 Installation – Active Leaks

.1 Install in accordance with manufacturer's instructions:

.1 Do not allow more than 3 minutes to elapse between steps. Treat small areas of surface to completion before proceeding to next area.

.2 Stop active leaks by forcefully hand-rubbing KOSTER KD 2 Blitz Powder into the leak until leakage has stopped completely.

.3 Remove excess powder with dry brush.

.4 Apply non-active leak system as a top coating after active leak system has cured.

3.5 Installation – Joints and Cavities

.1 Mix waterproofing material in proportions recommended by manufacturer.

.2 Apply waterproofing material in accordance with manufacturer's specifications and recommendations.

.3 Cavity Fill:

.1 Prime cavities at cleaned and prepared cracks, tie holes, etc. with patching compound in mortar consistency flush to surface prior to waterproofing material installation.

.2 Apply patching compound in lifts per manufacturer's instructions for larger spalled or honeycombed areas.

.4 Horizontal and Vertical Construction Joints: Prime seal strips and reglets in pre-formed 25 mm x 25 mm cavities with waterproofing material and then fill construction joints flush to surface with patching compound in mortar consistency. Apply waterproofing coat overtop of joint once preparation work has fully cured.

.5 Vertical Surfaces:

.1 Apply base coat of waterproofing material in slurry consistency at uniform rate of 0.70 to 0.75 kg/m^2. Apply using appropriate compressed air spray equipment, stiff masonry brush, or stiff broom.

.2 After base cost has reached initial set and while still tacky, apply finish slurry coat of waterproofing mixture at 0.70 to 0.75 kg/m^2. Apply so that final brush or broom strokes leave a parallel, uniform texture.

3.6 Curing

.1 Follow manufacturer's instructions for curing and hardening of waterproofing material.

.2 Protect surfaces from rain, frost, and drying.

3.7 Protection

.1 Protect cementitious waterproofing from contact with acid (below pH 7) and sulfates in concentrations exceeding limits for Portland Cement Type I/II.

.2 Touch-up, repair, or replace damaged products before Substantial Completion.

.3 Do not apply cementitious waterproofing at temperatures below +5ºC.

.4 Do not use curing compounds or water to bring mixture back to brushable consistency.

.5 Treated area must be kept clear for at least 48 hours before backfilling or applying any concrete screed or other topping.

.6 Unless broadcast and trowel application is used, cementitious waterproofing is not designed to be a wearing surface. When waterproofing a horizontal surface that will be subjected to traffic, area must be covered by concrete, cement, tile, or other protective screed after 48 hours.

.7 Cured KOSTER NB 1 coating may be painted with manufacturer-approved product. Do not use lime-based paints.

.8 Protect treated area from temperatures below +5ºC during application and for 24 hours after application.

.9 Use potable water for mixing and cleaning.

.10 All salt-burdened substrates must be primed with KOSTER Polysil TG 500.

3.8 Cleaning

.1 Remove leftover and foreign material that resulted from the Work at the Place of the Work.

.2 Clean adjacent surfaces and materials.

END OF SECTION

1.0 GENERAL

1.1 Work Includes

.1 Provide all labour, materials, equipment, supervision, and services necessary to supply and install new board insulation and associated accessories at perimeter foundations walls, below the new interior slab-on-grade, exterior walls, and where indicated on the Drawings and as described herein.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	ASTM D2842	Standard Test Method for Water Absorption of Rigid Cellular Plastics
.4	CSA B149.1	Natural Gas and Propane Installation Code
.5	CAN/CGSB-51.33	Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction (Withdrawn)
.6	CAN/CGSB-51.34	Vapor Barrier, Polyethylene Sheet for Use in Building Construction (Withdrawn)
.7	CGSB 71-GP-24M	Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation (Withdrawn)
.8	CAN/ULC-S101	Standard Methods of Fire Endurance Tests of Building Construction and Materials
.9	CAN/ULC-S102	Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
.10	CAN/ULC-S102.2	Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies
.11	CAN/ULC-S114	Standard Method of Test for Determination of Non-Combustibility in Building Materials

.12	CAN/ULC-S770	Standard Test Method for Determination of Long-Term Thermal Resistance of Closed-Cell Thermal Insulating Foams
.13	CAN/ULC-S701.1	Standard for Thermal Insulation, Polystyrene Boards

1.3 Submittals

.1 Submit product data, samples, and manufacturer's installation instructions of materials, accessories, etc. under provisions of Section 01 33 00.

.2 Product Data

.1 Provide manufacturer's technical data for the specified insulation.

.2 Include product characteristics and performance criteria: RSI values (aged values for insulations to CAN/ULC-S770), fire performance characteristics, moisture vapour permeance, water absorption ratings, compressive strengths, sound transmission ratings, evaluation reports showing conformance to applicable codes for insulation.

1.4 Mock-Ups

.1 Mock-up installation for concrete faced insulation and wall cladding assembly at specified location to establish construction technique.

.2 Mock-up may remain as part of the work.

1.5 Quality Assurance

.1 Obtain each type of insulation material from a single manufacturer.

.2 Polystyrene insulation shall be tested, certified, and labelled for conformance with CAN/ULC-S701, in accordance with CGSB, ULC, or other certification program accredited by Standards Council of Canada.

1.6 Regulatory Requirements

.1 Conform to applicable code for combustibility, flame spread and smoke developed performance requirements of insulation.

1.7 Delivery, Storage, and Handling

.1 Minimize time insulation products are stored or exposed to sunlight at project site by covering with opaque polyethylene film or light coloured tarpaulins until permanent covering is installed.

.2 Store products away from construction activity and sources of ignition.

.3 Protect products from damage during handling, installation, and at point of installation.

1.8 Ambient Conditions

.1 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

2.0 PRODUCTS

2.1 Extruded Polystyrene Board

.1 Foundation Wall Basis of Design: Concrete Faced Insulation Wall Panels by Tech-Crete.

.1 Thermal Resistance: RSI value of 0.87/25 mm.

.2 Board Size: As indicated on the Drawings.

.3 Compressive Strength: As specified per products above.

.4 Density: As specified per products above. Min. 48 kg/m^3.

.5 Water Absorption: To ASTM D2842 and C272, max. 0.3% by volume.

.6 Edges: Tongue and groove.

.7 Flame Spread/Smoke Developed Values: Less than 500 to CAN/ULC-S102 and CAN/ULC-S102.2.

.2 Below Slab on Grade Basis of Design: Styrofoam Highload 40 Insulation by DuPont de Nemours Inc.

.1 Thermal Resistance: RSI value of 0.87/25 mm.

.2 Board Size: As indicated on the Drawings.

.3 Compressive Strength: As specified per products above.

.4 Density: As specified per products above. Min. 48 kg/m^3.

.5 Water Absorption: To ASTM D2842 and C272, max. 0.3% by volume.

.6 Edges: Tongue and groove.

.7 Flame Spread/Smoke Developed Values: Less than 500 to CAN/ULC-S102 and CAN/ULC-S102.2.

.3 Above Grade Exterior Walls Basis of Design: CavityMate Ultra by DuPont de Nemours Inc.

.1 Thermal Resistance: RSI value of 0.97/25 mm.

.2 Board Size: As indicated on the Drawings.

.3 Compressive Strength: As specified per products above.

.4 Density: As specified per products above. Min. 48 kg/m^3.

.5 Water Absorption: To ASTM D2842 and C272, max. 0.3% by volume.

.6 Edges: Tongue and groove.

.7 Flame Spread/Smoke Developed Values: Less than 500 to CAN/ULC-S102 and CAN/ULC-S102.2.

2.2 Accessories

.1 Foamed-in-Place Insulation: Purpose-made for closing gaps in thermal insulation layer of extruded polystyrene thermal insulation systems. As recommended by insulation manufacturer. Basis of Design:

.1 Enerfoam by DuPont de Nemours, Inc.

.2 Prefinished Metal Flashing: As specified in Section 07 62 00.

.3 Silicone Sealant:

.1 As specified in Section 07 92 00.

.4 Insulation Fasteners: Designed to anchor insulation by frictional resistance within structurally adequate substrates.

.1 Galvanized steel mounting clips, minimum 2 screws per clip,

.2 Performance requirements for installed insulation fasteners:

.1 Pullout Resistance: Minimum 200 N, perpendicular to applicable substrates and within temperature range of -30°C to +40°C

.2 Corrosion Resistance: Carbon steel components shall show no more than 15% of the surface rusted, and coatings shall not blister, peel, or crack when tested to Corrosion Test Procedure of Factory Mutual Research Approval Standard, Class 1 Roof Covers (4470).

.5 Screws: Galvanized steel, self-tapping, concrete screws, length to suit insulation plus 25 mm.

3.0 EXECUTION

3.1 Examination

.1 Verify that building substrate surfaces, adjacent materials, and installation conditions are ready to accept the work of this Section. Ensure insulation materials and surfaces are dry.

.2 Verify that substrate is flat, sound, clean, and free of objectionable air surface voids, fins, irregularities, and materials or substances.

.3 Notify Consultant upon completion of preparation of the substrate to allow review before insulating material is installed or work is obscured. Prove minimum 72 hours notice.

.4 Beginning of installation means acceptance of existing surfaces and substrate.

3.2 Preparation

.1 Clean substrates of substances harmful to insulation. Remove projections from substrate that could puncture new materials.

3.3 Installation

.1 Install materials in accordance with manufacturer's recommendations.

.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 tight around electrical boxes, plumbing and heating pipes and ducts, and other protrusions.

.5 Keep insulation minimum distance required from heat-emitting devices such as recessed light fixtures and from sidewalls of CAN/ULC-S604 Type A chimneys and CSA B149.1 Type B and L vents.

.6 Use boards of largest possible dimensions to reduce number of joints. Boards with chipped and broken edges are unacceptable.

.7 Offset both vertical and horizontal joints in multiple layer applications.

.8 At foundation walls, ensure that the integrity of the waterproofing system is maintained. Do not damage nor penetrate the waterproofing system when installing the new insulation.

.9 Do not enclose insulation until it has been reviewed by Consultant.

3.4 Perimeter Foundations

.1 Install boards on exterior face of foundation wall and footing where indicated on the Drawings.

.2 Place boards in a method to maximize contact with bedding. Stagger side and end joints. Butt edges and ends tight to adjacent boards.

.3 Extend boards across construction joints, unbonded to foundation 75 mm on one side of joint.

.4 Cut and fit insulation tight to protrusions or interruptions to insulation plane.

.5 Install boards vertically from base of foundation to top of foundation, as indicated on the Drawings.

.6 Butt board joints tight; stagger from insulation joints.

3.5 Under Concrete Slabs

.1 Place insulation under slabs on grade after base for slab is complete. Lay boards on compacted fill.

.2 Extend boards under entire area of slabs, as indicated on the Drawings.

.3 Cut and fit insulation tight to protrusions or interruptions to insulation plane.

.4 Prevent insulation from being displaced or damaged while placing vapour barrier and slab.

.5 Ensure insulation is securely placed and retained as required to prevent movement during concrete placement.

.6 Provide adequate base for reinforcement supports (if applicable) to avoid damage to insulation and membrane, as well as to prevent shifting reinforcement during concrete placement.

3.6 Cavity Walls

.1 Install insulation boards on outer surfaces of air/vapour barrier membrane.

.2 Install fasteners following fastener manufacturer's recommendations for type of substrate, drill bits, edge distance, installation methods, and ambient and substrate temperature conditions.

.3 Apply adhesive in three continuous beads each board length. Apply adhesive fully around protrusions.

.4 Install boards horizontally between wall reinforcement.

.5 Extend boards across expansion joints, unbonded to substrate 75 mm on one side of joint.

.6 Place boards in a method to maximize contact with bedding. Stagger end joints. Butt edges and ends tight to adjacent boards. Place impale fastener locking washers. Cut off fastener spindles 3 mm beyond washers and install caps.

.7 Cut and fit insulation tight to protrusions or interruptions to insulation plane. Use foamed-in-place insulation where required to close gaps.

.8 Secure boards with screws to substrate at rate recommended by the manufacturer. Ensure that support and anchorage of boards are adequate to prevent movement and breaking of seals and air/vapour barrier system.

3.7 Protection

.1 Protect insulation and vapour barriers under provisions of Section 01 56 00.

.2 Do not permit work to be damaged prior to covering insulation. Protect from harmful weather exposures and physical abuse. Place plywood sheeting across exposed edges and corners. Secure temporarily to prevent displacement.

.3 Provide temporary coverings or enclosures when insulation will be subject to damage and cannot be protected by permanent construction immediately after installation.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and install the following as indicated in this Section:

.1 Mineral Fibre Batt Insulation

1.2 REFERENCE STANDARDS

.1 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S702-09-AM1, Standard for Thermal Insulation Mineral Fibre for Buildings

.2 CAN/ULC S114-05, Standard Method of Test for Determination of Non-Combustibility in Building Materials

.3 CAN/ULC S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-51.10-92, Mineral Fibre Board Thermal Insulation

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Affidavits:

.1 In lieu of samples and inspection procedures when required by CGSB Standards, submit affidavits, if requested, that materials supplied under these requirements meet CGSB Standards.

.3 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on site for reference by workers.

.4 Product Data Sheets.

1.4 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Handle and store material in accordance with the manufacturer's recommendations.

.2 Materials shall be delivered to the job in their original packages and containers bearing the manufacturer's labels intact and clearly visible.

.3 Store materials in dry, watertight areas and protect to prevent damage by other trades.

.4 Do not expose rigid insulation board to sunlight after installation. Protect it with black polyethylene or tarpaulin cover as recommended by manufacturer if permanent covering is not completed within twenty-four (24) hours.

2 Products

2.1 MATERIALS

.1 Acoustical Fire Batt Insulation (INS-01)

.1 Non-combustible, lightweight, mineral wool batt insulation to CAN/ULC S702, Type 1, that provides fire resistance to ASTM E136 and a sound control to ASTM E90 and ASTM E423.

.2 Size: 412 x 1219 mm.

.3 Thickness: As scheduled/detailed.

.4 Acceptable Material: ROCKWOOL AFB or equivalent.

.2 Mineral Wool Rainscreen Cavity Insulation (INS-06):

.1 Unfaced, semi-rigid mineral slag batt insulation in accordance with CAN/ULC S702-09, Type 1; having a nominal RSI of 0.67/25 mm; rated non-combustible in accordance with CAN/ULC S114-05 and having a flame spread rating of 5 or less in accordance with CAN/ULC S102; density 32 kg/m3; square edges, thickness as required to meet design insulation values indicated on drawings or as required to fill insulated spaces where not indicated.

.2 Basis of Design Materials:

.1 ROCKWOOL Inc., COMFORTBATT

.2 Or approved equivalent.

.3 Foamed-In-Place Insulation:

.1 Two component polyurethane froth/spray kit, UL Class I (flame spread of 25 or less), Great Stuff by Dow Building Solutions Inc., or approved equivalent.

.2 Refer also to Specification 07 21 19.

3 Execution

3.1 PREPARATION

.1 All materials and methods used in application shall be in strict accordance with the printed instructions of the manufacturer.

.2 Remove stains, defective work or materials when directed by the Consultant and replace with approved work and materials at no cost to Owner.

.3 Clean all surfaces of dust, dirt and projecting surfaces prior to the application of insulation.

.4 Do not install insulation when ambient air and surface temperatures are below 4 deg C (40 deg F) or more than 38 deg C (100 deg F). The temperature shall be maintained in the building during and after installation as necessary by the above requirement and as directed for curing of the adhesive. Obtain approval prior to proceeding with application of adhesive and insulation.

3.2 INSTALLATION

.1 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.2 Cut insulation to fit around electrical boxes, pipes, ducts, openings, corners and all protruding obstructions occurring on the surface to be insulated and seal with adhesive.

.3 Keep insulation minimum of 75mm (3") away from heat emitting devices.

.4 Trim and cut insulation neatly to fit spaces. Butt joints tightly, offsetting vertical joints. In multiple layer application, offset both vertical and horizontal joints.

.5 Install batt insulation in locations and thicknesses shown. Seal joints to prevent transfer of moisture.

.6 Apply foamed-in-place insulation at exterior walls, around penetrations through walls and where indicated. Apply foamed-in-place insulation with suitable equipment in accordance with the manufacturer's written instructions. Fill all joints completely, leaving no voids or gaps and trim excess material.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This Section includes requirements for supply and spray application of medium density closed cell polyurethane foam to provide insulation, air barrier and vapour barrier, including all surface preparation, primers and transition membranes necessary for a complete installation. Refer also to the following:

.1 Specification 07 25 00 Weather Resistant Barriers

.2 Specification 07 26 27 Fluid Applied Air Barrier System

1.2 REFERENCE STANDARDS

.1 CAN/ULC-S705.1-15 Standard for Thermal Insulation Spray Applied Rigid Polyurethane Foam, Medium Density, **Material Specification**.

.2 CAN/ULC-S705.2 Standard for Thermal Insulation Spray Applied Rigid Polyurethane Foam, Medium Density, - **Application**.

.3 CALIBER Quality Assurance Program.

.4 CAN/ULC-S770-09 Standard Test Method For Determination Of Long-Term Thermal Resistance of Closed-Cell Thermal Insulating Foams.

.5 Greenguard Gold Certification – Interior Air Quality.

.6 ASTM International (ASTM):

.1 ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

.2 ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

.3 ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.

.4 ASTM D1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.

.5 ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.

.6 ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.

.7 ASTM D2856 - Standard Test Method for Open-Cell Content of Rigid Cellular Plastics by the Air Pycnometer.

.8 ASTM D6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics.

.9 ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

.10 ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

.11 ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

.12 ASTM E413 - Classification for Rating Sound Insulation.

.13 ASTM E423 - Standard Test Method for Normal Spectral Emittance at Elevated Temperatures of Nonconducting Specimens.

.14 ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials

.15 ASTM E2178 - Standard Test Method for Air Permeance of Building Materials.

.16 ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Before starting the work, submit result of independent laboratory test reports, data sheets, physical proprieties, meeting or exceeding requirements of the standard in reference to this specification.

.3 Submit a laboratory report of the adhesion compatibility with: flashing membranes, coatings and substrates.

.4 License under CALIBER and certification of applicators under CALIBER to be submitted to the consultant prior to the beginning of the work.

.5 Submit by the manufacturer a conformity certification to NBC of the polyurethane foam system.

.6 Submit test results by an independent and SCC certified laboratory on air barrier material performance, conducted in order to certify that the air barrier material rating meets National Building Code requirements and this specification.

.7 Submit test results by independent laboratory on LTTR values according to CAN/ULC-S770 for all SPF system used on the project. Other test methods will not be accepted.

.8 Submit the assembly test result in accordance with art: 3.2.3.8 of NBC. (UL EW24 and EW25 Assembies)

1.4 QUALITY ASSURANCE

.1 Contractor performing work under this section must be certified by CALIBER or have a experience of a minimum of 5 years.

.2 Upon request of consultant, submit a copy of the contractor quality control report as requested in CAN/ULC-S705.2.

.3 Conduct site tests of sprayed work as required by the CALIBER Quality Assurance Program.

.4 Upon request, submit manufacturer/supplier field applied product quality control report.

.5 Pre-Installation Conference:

.1 Convene a pre-installation conference two (2) weeks prior to commencing work of this section. Require attendance of parties directly affecting work of this section, including, but not limited to, the Owner’s representative, Consultant, General Contractor, vapour permeable air barrier membrane contractor, vapour permeable air barrier membrane manufacturer's representative and substrate installer.

.2 Pre-Installation conference to be scheduled to coincide with regularly scheduled, on-site project progress meeting.

.3 Review preparation and installation procedures and co-ordinating and scheduling required with related work.

1.5 MOCK-UP

.1 Provide mock-up of insulation and air barrier.

.2 Construct typical exterior sample wall in conjunction with section, incorporating window frame head jamb and sill and building corner condition with foundation wall junction.

.3 Acceptance of mock-up sample may form part of the completed work.

.4 Do not commence work until sample installation has been accepted.

.5 Acceptance of sample preparation will be a reference for minimum acceptance of the work. Any need for deviation of the mock-up acceptance shall be reported in writing.

.6 Upon consultant request, provide in writing manufacturer acceptance of the mock-up quality.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Materials shall be delivered in manufacturers original sealed containers clearly labelled with manufacturer's name, product identification, safety information, net weight of contents, and expiring date.

.2 Material is to be stored in a safe manner and where the temperatures are in the limits specified by the material manufacturer.

.3 Empty containers shall be removed from site on a daily basis in accordance with CAN/ULC-S705.2.

1.7 WARRANTY

.1 Warrant work of this section against defects and deficiencies for a period of two years from date work completion.

.2 Provide manufacturer's warranty for the field-applied product.

PART 2 – PRODUCTS

2.1 ENVIRONNEMENTAL REQUIREMENTS

.1 The product shall not contain any CFC, HCFC, HFC or any ozone depletion substance.

.2 The Spray Polyurethane Foam Insulation shall have a minimum of 18% recycled content from post-consumer and post-industrial sources. The % shall be calculated by weight basis ratio of the recycled source in the final SPF system to be applied on the building.

.3 The SPF shall contain a minimum of 4% renewable content.

.4 The product shall have a HFO blowing agent with a global warming potential of maximum 1. (GWP)

.5 Product shall conform to GREENGUARD Gold certification.

.6 The product shall have its own Type III Environmental Product Declaration (EPD), produced and verified by a third party in accordance with ISO 14025 and EN 15804 or ISO 21930.

2.2 MATERIALS

.1 Spray Applied Polyurethane Foam Insulation system in accordance with CAN/ULC S705.1-15 Standard for Thermal Insulation Spray Applied Rigid Polyurethane Foam, Medium Density, Material Specification and those specific objectives performances.

.2 The product shall be evaluated by the CCMC.

.3 The product must be UL listed.

2.3 PHYSICAL PROPERTIES

.1 Closed Cell Medium Density Spray-in-Place Polyurethane Foam Insulation must meet or exceed the following criteria:

Density	ASTM D1622	2.21 lb/ft^3	35.49 Kg/m^3
Long Term Thermal Resistance (LTTR) Design value	CAN/ULC S770-03 CAN/ULCS705.1-01	100 mm / R-25 75 mm / R-19 50 mm / R-12	100 mm / 4.24 RSI 75 mm / 3.26 RSI 50 mm / 2.03 RSI

Long Term Thermal Resistance (LTTR) Design value	CAN/ULC S770 -09 CAN/ULC S705.1-15	100 mm / R-24 75 mm / R-17 50 mm / R-11	100 mm / 4.14 RSI 75 mm / 3.00 RSI 50 mm / 1.94 RSI
Dimensional stability	ASTM D-2126 (% of change in volume at 28 days) -20°C 70°C H.R. > 97 +/- 3% 80°C	-0.1 % +8.5 % -0.3 %	
Flame Spread Index	CAN/ULC S102-S127	235	
Compressive strength	ASTM D1621	24.8 lb/in^2	171 KPa
Tensile strength	ASTM D1623	58.16 lb/in^2	401 KPa
Open cells	ASTM D6226	5 %	
Water absorption	ASTM D2842	0.64 %	
Air Permeance	ASTM E 2178-13 (30.7mm, top skin removed)	0.0021L/s· m²@75 Pa	
Fungi Resistance	ASTM C1338	No Fungal Growth	
VOC	CAN/ULC S774	1 day	
VOC	GREENGUARD Certification	Gold	
Water vapour permeanc	ASTM E96 (50 mm)	0.23 perm	13 ng/Pa s.m²
Radon Diffusion Coefficient	ISO/TS 11665-13 (method C K124/02/95)	1,3 x 10^{-10} m^2/S	
Radon Resistance Coefficient 50mm	ISO/TS 11665-13 (method C K124/02/95)	17410 x 10^6 s/m	
Building Face Protectio	Article 3.2.3.8. NBC 2015	UL EW24 Assembly UL EW25 Assembly	

2.4 ACCESSORIES

.1 Primer: Install primers in accordance with the manufacturer recommendations and the CAN / ULC-S705.2 standard.

.2 For oily metal surface like Z-Bar, steel deck roof or curtain wall pan, aluminum tube, and PVC, before spraying polyurethane foam apply adhesive primer as recommended by manufacturer.

.2 Transition membranes as Specified in Division 7. Materials used to ensure the continuity of the Air Barrier System shall be checked for compatibility with other materials. The SPF and membrane manufacturers shall give written confirmation that the materials are compatible with their products. Auxiliary air barrier materials may include – sealants, housewraps, tape, fastening bars, fasteners and sheet metal.

2.5 EQUIPMENT

.1 Equipment shall be as recommended in CAN/ULC-S705.2 and approved by the foam manufacturer for type of application.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verify that surfaces and conditions are suitable to accept work as outlined in this section.

.2 According to the prescriptions of the standard CAN/ULC-S705.2, verify the conditions of surfaces.

.1 Surfaces to be covered with spray foam shall be free of an excess of moisture, frost, oil, rust, and any other foreign material able to have a negative effect on the adhesion of the product. In doubt, apply a primer.

.2 Allow time for the complete cure of the substrates: concrete, mortar, fillers, membranes, primers, coatings or other surfaces, before applying the spray foam.

.3 Verify the adhesion of membranes and coatings to different substrates are good, taking in account the climatic conditions for the application of membranes, coatings and spray foam.

.4 Install membrane detail around opening to be installed as per typical details and per membrane manufacturer requirements.

.5 All oily metal surface like Z-Bar, steel deck roof or curtain wall pan, aluminium tube, and PVC, shall be primed as referenced in CAN / ULC S705.2 and Section 2.4 of this specification.

.6 Identify the moisture content of all different building materials.

.7 Report in writing any defects in surface or conditions that may adversely affect the performance of products installed and follow manufacturer's recommendations.

.8 Commencement of work outlined in this section shall be deemed as acceptance of existing work and conditions.

3.2 TRANSITION MEMBRANE APPLICATION

.1 Install transition membranes control joints, wall penetrations, connections between dissimilar materials (i.e. concrete block to sheathing), beams, rough openings, roof parapets and any and all other connections that may experience differential movement. When installing transition membranes:

.1 Only apply membranes to primed surfaces.

.2 Roll self-adhering membranes with a steel or polypropylene hand roller to ensure full contact.

.3 Connect to all window, door and parapet blocking connections by mechanically fastening with a metal bar or strap.

.4 Lap sheet membrane a minimum of 75mm on each connection substrate and overlap a minimum of 50mm at joints.

3.3 SPRAY-IN-PLACE POLYURETHAN FOAM INSULATION APPLICATION

.1 Spray application of polyurethane foam shall be performed in accordance with CAN/ULC-S705.2.

.2 Apply spray foam on dry, solid and clean surfaces when the climatic conditions are in accordance with the CAN/ULC S705.2 standard and with Huntsman Building Solutions recommendations.

.3 Apply only when surfaces and environmental conditions are above -20°C (-4°F). Refer to technical data sheets.

.4 Apply in consecutive passes (min. 15 mm (5/8''), max. 50 mm (2'')).

.5 Apply to obtain the thickness as indicated on drawings. Use only the Long Term Thermal Resistance (LTTR) CAN/ULC S 770 test method to calculated design R value.

.6 Do not spray closer than 3" (75 mm) to chimneys, recess spotlight or other source of heat.

3.4 TOLERANCE

.1 Apply the product to achieve an average thickness of ± 6 mm (1/4”), from (9 readings on 1 m^2), of the thickness requirements in the drawings at a minimum of 1 m^2 readings for each 150 m^2 surface sprayed.

.2 Apply the insulation uniform in accordance to NBC article 9.25.2.3. 1).

3.5 APPLICATION CONDITIONS

.1 Execute the work of this section when the temperature of the air and substrate are within the limits of the data sheet supplied by the manufacturer.

.2 Apply the spray foam only when the relative humidity is below 80%.

.3 Prepare all surfaces in accordance with the manufacturer’s recommendations and CAN/ULC-S705.2 Standard.

3.6 PROTECTION

.1 Ventilate area receiving insulation to maintain safe working conditions.

.2 Ensure the safety of the workers in conformity with local regulations, standards and manufacturers recommendations.

.3 For spraying within buildings/internal spaces:

.1 Delimit the working space (with a polyethylene if required).

.2 All the ventilation ducts must be sealed before the spraying.

.3 Install a fan extracting air outside the building.

.4 The workspace, in retrofit construction (occupied buildings), must be under negative pressure at a minimum exfiltration rate of 0.3 air changes per hour.

.5 The workspace, in retrofit construction, must be under negative pressure for a minimum of 24 hrs.

.6 Confirm everyone in the workspace has respiratory protective equipment and personal protective equipment in conformity with provincial regulations and the CAN/ULC-S705.2 standard.

.7 Protect adjacent surfaces, windows, equipment, and site areas from damage of over spray.

3.6 FIELD QUALITY CONTROL

.1 The installer shall conduct daily tests required by CAN/ULC-S705.2.

.2 The installer shall complete the daily work record and record the results of all testing. The daily work record shall be kept on site for routine inspection. Copies of the daily work record shall be forwarded to the Consultant upon request.

.2 Third party inspection of the completed application of polyurethane foam insulation shall be paid for from the project cash allowance and shall include:

.1 Total thickness.

.2 Free of voids, pinholes, cracks, and crevices.

.3 Adhesion to substrate.

3.7 FIRE PROTECTION

.1 Any open flame or welding is not permitted to be in contact with the Spray Polyurethane Foam in place. Use protection as required in CAN / ULC S705.2.

.2 All plastic insulation must be protected from interior occupancy space by an approved thermal barrier to meet the requirements of local Building Codes.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for supply and installation of weather barriers and accessories, installed behind rainscreen cladding assemblies.

1.2 REFERENCE STANDARDS

.1 American Society for Testing of Materials (ASTM):

.1 ASTM D882-2010, Standard Test Method for Tensile Properties of Thin Plastic Sheeting.

.2 ASTM E84-2010b, Standard Test Method for Surface Burning Characteristics of Building Materials.

.3 ASTM E96/96M-2010, Standard Test Methods for Water Vapor Transmission of Materials.

.4 ASTM E2178-2003, Standard Test Method for Air Permeance of Building Materials.

.2 Air Barrier Association of America (ABAA):

.1 ABAA 2011, Installer's Certification Program.

.2 ABAA 2012, Water-resistive Barrier Installation Guideline.

.3 American Association of Textile Chemists and Colorists (AATCC)

.1 AATCC 42 2007, Water Resistance: Impact Penetration Test.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Co-ordination: Co-ordinate work of this Section with work of other trades for proper time and sequence to avoid construction delays.

.2 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings.

.1 Notify attendees two (2) weeks prior to meeting and ensure meeting attendees include as minimum:

.1 Owner;

.2 Consultant;

.3 Water-resistive barrier installer;

.4 Manufacturer's Technical Representative.

.2 Ensure meeting agenda includes review of methods and procedures related to water-resistive barrier installation including co-ordination with related work.

.3 Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within one (1) week of meeting.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Action Submittals:

.1 Product Data: Submit product data including manufacturer's literature for water-resistive barrier membrane and accessories, indicating compliance with specified requirements and material characteristics.

.1 Submit list on water-resistive barrier manufacturer's letterhead of materials, components and accessories to be incorporated into Work.

.2 MSDS report.

.3 Include product names, types and series numbers.

.4 Include contact information for manufacturer and their representative for this Project.

.2 Samples:

.1 Submit duplicate 305mm x 305mm (12" x 12") sample of membrane.

.2 Submit duplicate 305mm (12") long samples of seam tape and each type of flashing materials.

.3 Test Reports:

.1 Submit test reports showing compliance with specified performance characteristics and physical properties including air permeance, water vapour permeance and structural performance.

.2 Submit ICC-ESR documentation demonstrating compliance with ICC-AC 38 Acceptance Criteria for Water-Resistive Barriers.

.4 Field Reports: Submit manufacturer's field reports within three (3) days of each manufacturer representative's site visit and inspection.

.5 Installer Qualifications:

.1 Submit verification of manufacturer's approval of installer, or letter verifying installer's experience with work similar to work of this Section.

.3 Closeout Submittals

.1 Operation and Maintenance Data: Supply maintenance data for water-resistive barrier materials for incorporation into manual specified in Division 01.

.2 Record Documentation:

.1 List materials used in water-resistive barrier work.

.2 Warranty: Submit warranty documents specified.

1.5 QUALITY ASSURANCE

.1 Installer Quality Assurance: Manufacturer's approval of installer, or minimum two (2) years' experience with work similar to work of this Section.

.1 Ensure all accessories such as seam tape, flashing membranes, fasteners and sealants come from same source as water-resistive barrier membrane.

1.6 MOCK-UP

.1 Provide mock-ups in accordance with Division 01.

.2 Construct mock-ups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution before installing materials indicated in this Section.

.3 Build mock-ups using exposed and concealed materials indicated for the completed Work, and as follows:

.1 Locate mock-ups in the location and of the size indicated or, if not indicated, as directed by Consultant.

.2 Notify Consultant 7 days in advance of the dates and times when mock-ups will be constructed.

.3 Demonstrate the proposed range of aesthetic effects and workmanship.

.4 Include examples of window frame, door frame, interior corner, exterior corner and common protrusions or penetrations of membranes.

.5 Obtain Consultant's acceptance of mock-ups before proceeding with construction of work of this Section.

.6 Maintain mock-ups during construction in an undisturbed condition, as a standard for judging the completed Work.

.7 Accepted mock-ups may form a part of the completed Work.

1.7 ENVIRONMENTAL CONDITIONS

.1 Weather barrier shall to be applied to surfaces that are either wet, oily, frosted, dirty or contaminated in any way.

.2 Ambient Conditions: Apply air and vapour membrane to substrate surfaces that are within manufacturer’s installation temperature threshold range accounting for wind cooling and apparent temperature when actual temperature is approaching manufacturer’s minimum temperature threshold.

1.8 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Delivery and Acceptance Requirements:

.1 Deliver material in accordance with Division 01.

.2 Deliver materials and components in manufacture’s original packaging with identification labels intact and in sizes to suit project.

.2 Storage and Handling Requirements: Store materials off ground and protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

.1 Ensure materials are protected from sunlight and UV radiation.

.3 Packaging Waste Management:

.1 Separate and recycle waste packaging materials.

.2 Remove waste packaging materials from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper and plastic material in appropriate on-site storage containers for recycling in accordance with Waste Management Plan.

1.9 WARRANTY

.1 Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty document executed by authorized company official. Manufacturer’s warranty is in addition to and not intended to limit other rights Owner may have under Contract Conditions.

.1 Ten (10) years limited material warranty.

.2 Installer’s Warranty: Submit installers warranty stating that weather barrier and accessories are installed in accordance with manufacturer's recommendations and that membrane, transitions and through-wall flashing membranes, primers, mastics, adhesives and sealants are sourced from one manufacturer.

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design products are named in this Section; form the basis-of-design materials for the project; additional manufacturers offering similar products may be incorporated into the work of this Section provided they submit requests a minimum of five (5) days in advance of Bid Closing.

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

.1 Dörken Systems Inc.,

.2 Solitex.

.3 Vaproshield

2.2 MATERIALS

.1 WRB-01 - Vapor permeable water-resistive barrier with highly tear-resistant thermo-bonded non-woven polyester substrate, and waterproof acrylic highly UV resistant coating.

.1 Include factory applied self-adhesive strip at longitudinal edges of barrier membrane.

.2 Design Criteria:

.1 Water Vapor Permeance: To ASTM E96 (Procedure A), 204 perms minimum.

.2 Water Impact Penetration Resistance: To AATCC 42, no water passing.

.3 Air Permeance: To ASTM E2178, 0.9 L/(s x m^2) @ 75 Pa.

.4 Tear Resistance: To ASTM D 1922, 1916 g minimum.

.5 Dry Tensile Strength: To ASTM D882, MD 47.4 lb/in^2, CD 28.7 lb/in^2 minimum.

.6 Elongation at Break: To ASTM D882, MD 40 %, CD 45 % minimum.

.7 Fire Rating Characteristics to ASTM E84:

.1 Rating: NFPA Class A, IBC Class A minimum.

.2 Flame Spread: 10 maximum.

.3 Smoke Developed: 145 maximum.

.3 WRB-01 Weather Resistant Barrier for Walls: Vapor permeable water-resistive barrier with tear-resistant thermo-bonded, non-woven polyester substrate and waterproof acrylic polymeric coating stabilized against oxidation and UV degradation and factory applied adhesive edge strips.

.1 Service Life Expectancy: Twenty-five (25) years.

.2 Weight: 5.5 lb/100 ft^2, 270 g/m^2, 44 lb/roll nominal.

.3 Colour: Black.

.4 Basis of Design Materials: Dörken Systems Inc., DELTA®-FASSADE S (or approved equivalent).

.4 Accessories:

.1 Seam tape: In accordance with water-resistive barrier manufacturer’s written recommendations.

.1 Basis of Design Materials: Dörken Systems Inc., DELTA®-FASSADE TAPE (or approved equivalent).

.2 Flashings: Self-adhering, water-resistive flashing membrane in accordance with water-resistive barrier manufacturer’s written recommendations.

.1 Basis of Design Materials: Dörken Systems Inc., DELTA®-FASSADE FLASHING (or approved equivalent).

.3 Fasteners: Water and vapour resistant fasteners in accordance with water-resistive barrier manufacturer's written recommendations.

.1 41mm (1-5/8") corrosion-resistant screw with 50mm (2") minimum diameter plastic caps, unless otherwise recommended by the manufacturer.

.4 Sealants and Adhesives: Elastomeric sealant and adhesive in accordance with water-resistive barrier manufacturer's written recommendations, and Section 07 92 00.

.1 Ensure sealants are UV resistant and compatible with adjacent materials.

.2 Basis of Design Materials: Dörken Systems Inc., DELTA®-THAN (or approved equivalent).

.5 Primers: In accordance with flashing manufacturer's written recommendations.

.6 Flexible Membrane Through-wall Flashing: Self-adhering, butyl-rubber based flashing membrane.

.1 Basis of Design Materials: Dörken Systems Inc., DELTA®-TW FLASHING (or approved equivalent).

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for water-resistive barrier installation in accordance with manufacturer's written recommendations.

.1 Visually inspect substrate in presence of Consultant.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 PREPARATION

.1 Prepare surfaces in accordance with manufacturer's written requirements for type of substrate; free from voids, spalled areas, loose aggregates or sharp points; clean surfaces to remove contaminants that could affect bond such as grease or wax, dust, dirt and debris.

.2 Ensure step flashings and kick-out flashings are installed before beginning installation of water-resistive barrier membrane.

.3 Ensure protrusions that may penetrate water-resistive barrier membrane are removed before beginning installation.

3.3 INSTALLATION

.1 Install water-resistive barrier before installation of windows and doors in accordance with manufacturer's written recommendations.

.2 Do installation in accordance with ABAA written recommendations for installation of water-resistive barriers.

.3 Unroll water-resistive barrier with printed side out, wrapping entire building, including rough openings for windows, doors and other protrusions or penetrations.

.1 Install water-resistive barrier plumb and level to exterior face of sheathing, or directly to framing members in accordance with manufacturer written recommendations.

.2 Ensure water-resistive barrier is installed with textured side facing substrate.

.4 Start installation of water-resistive barrier at building corner, leaving 150mm to 305mm (6” to 12”) of membrane extended beyond corner.

.5 Install horizontally starting at bottom of wall.

.1 Overlap water-resistive barrier membrane as follows:

.1 Exterior Corners: 305mm (12”) minimum.

.2 Vertical and horizontal seems: 150mm (6”) minimum.

.3 Other seams, joints or at protrusions and penetrations: 150mm (6”) minimum.

.6 Attachment of Water-resistive Barrier Membrane to Substrate:

.1 Attach water-resistive barrier to steel studs through exterior sheathing with mechanical fasteners, and elastomeric adhesive in accordance with manufacturer’s written recommendations.

.1 Secure using fasteners and custom caps spaced 157mm (18”) maximum vertically on center along stud line and 610mm (24”) maximum on center, horizontally.

.2 Ensure fasteners penetrate securely through metal studs 19mm (¾”) minimum.

.3 Install fasteners 150mm (6”) from sill and frame of window and door openings.

.4 Ensure fasteners are installed 229mm (9”) minimum from window or door head.

3.4 SITE QUALITY CONTROL

.1 Field Inspection: Coordinate field inspection in accordance with Division 01.

.2 Manufacturer’s Services:

.1 Coordinate manufacturer’s services.

.1 Manufacturer review work involved in handling, installation, protection, and cleaning of water-resistive barrier and components, and submit written reports in acceptable format to verify compliance of Work with Contract conditions.

.2 Manufacturer’s Field Services: Provide manufacturer’s field services consisting of product use recommendations and periodic site visits for product installation review in accordance with manufacturer’s instructions.

.1 Report any inconsistencies from manufacturer’s recommendations immediately to Consultant.

.3 Schedule site visits to review work at stages listed:

.1 As required by consultant.

.2 Obtain reports within three (3) days of review and submit immediately to Consultant.

3.5 CLEANING AND PROTECTION

.1 Progress Cleaning: Perform cleanup as work progresses in accordance with Division 01.

.1 Leave work area clean end of each day.

.2 Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment.

.3 Waste Management:

.1 Coordinate recycling of waste materials.

.2 Collect recyclable waste and dispose of or recycle field generated construction waste created during construction or final cleaning related to work of this Section.

.3 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

.4 Protect installed products and components from damage during construction.

.5 Repair damage to adjacent materials caused by water-resistive barrier installation.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to supply and install new sheet vapour retarder sheeting where indicated on the Drawings and as described herein.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3 CAN/CGSB-51.34 Vapor Barrier, Polyethylene Sheet for Use in Building Construction (Withdrawn)

.4 CAN/CGSB-19.21 Sealing and Bedding Compound, Acoustical (Withdrawn)

1.3 Mock-Up

.1 Construct 10 m^2 size mock-up of polyethylene sheet vapour retarder installation including a minimum of one lap joint.

.2 Accepted mock-ups may be part of finished installations.

.3 Allow 24 hours for Consultant review of mock-ups before proceeding with further vapour retarder installations.

1.4 Waste Management and Disposal

.1 Collect, package, and store polyethylene cut offs and waste material for recycling.

2.0 PRODUCTS

2.1 Polyethylene Sheet Vapour Retarder

.1 To CAN/CGSB-51.34-M86, 0.15 mm thick, polyethylene film.

2.2 Accessories

.1 Joint Sealing Tape: Air resistant pressure-sensitive adhesive tape, 50 mm wide for lap joints and perimeter seals, 25 mm wide elsewhere.

.1 205-02 Tuck Contractor's Sheathing Tape by Cantech

.2 Approved alternative.

.2 Sealant: To CGSB 19.21, compatible with vapour retarder materials, recommended by vapour retarder manufacturer.

3.0 EXECUTION

3.1 Installation

.1 Ensure services are installed and reviewed prior to installation of vapour retarder.

.2 Install sheet vapour retarder on warm side of exterior floor assembly prior to installation of remaining assembly to form continuous unbroken vapour retarder.

.3 Use sheets of largest practical size to minimize joints. Arrange all joints to occur on solid bearing.

.4 Inspect sheets for continuity. Repair punctures and tears with sealing tape before installations are concealed.

.5 Cut and tailor sheet vapour retarder to form openings and ensure material is lapped and sealed to frames.

.6 Seal perimeter of polyethylene film vapour retarder as follows:

.1 Apply continuous bead of sealant to substrate at perimeter of sheets.

.2 Lap sheet over sealant and press into sealant bead.

.3 Install staples through lapped sheets at sealant bead into substrate.

.4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

.5 Sheet to be upturned at vertical surfaces and sealed as described above.

.7 Seal lap joints of sheet vapour retarder as follows:

.1 Attach first sheet to substrate.

.2 Apply continuous bead of sealant over solid backing at joint.

.3 Lap adjoining sheet minimum 150 mm and press into sealant bead.

.4 Install staples through lapped sheets at sealant bead into substrate.

.5 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply labour, materials, plant, tools and equipment to complete the Work as shown on the Drawings and as specified herein, including, but not limited to the following:

.1 Materials and installation methods of vapour permeable air barrier membrane system.

.2 Materials and installation methods to bridge and seal the following air leakage pathways and gaps:

.1 Connections of the walls to the roof air barrier. Connections of the walls to the foundations, seismic and expansion points, openings and penetrations of window frames, store front, and other envelope systems, door frames, piping, conduit, duct and similar penetrations, masonry ties, screws, bolts and similar penetrations. All other leakage pathways in the building envelope.

1.2 PERFORMANCE REQUIREMENTS

.1 Provide a vapour permeable air barrier constructed to perform as a continuous air and vapour barrier, and as liquid water drainage plane flashed to discharge any incidental condensation or water penetration.

.2 The building envelope shall be designed and constructed to control air leakage into, or out of the conditioned space, for a targeted post-retrofit air leakage rate of 1.0 L/s/m2 at 50 Pa.

.3 The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:

.1 Foundations and walls.

.2 Walls and windows or doors.

.3 Different wall systems.

.4 Wall and roof.

.5 Wall and roof over unconditioned space.

.6 Walls, floor and roof across construction, control and expansion joints.

.7 Walls, floors and roof to utility, pipe and duct penetrations.

.8 All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.

.4 Sequence work to permit installation of materials in conjunction with related materials and seals.

1.3 QUALITY ASSURANCE

.1 Work in this Section is to be carried out by a skilled applicator approved by manufacturer and in strict accordance with manufacturer's printed instructions. Upon request, provide written confirmation or certification from the vapour permeable air barrier manufacturer that the installer has been trained and is recognized by the manufacturer as suitable for the execution of the work.

.2 Perform Work in accordance with the manufacturer's written instructions of the air barrier membrane and this specification.

.3 Maintain one (1) copy of the manufacturer's written instructions on site.

.4 Compounds used in this section shall be sourced from one (1) manufacturer, including sheet membrane, air barrier sealants, primers, mastics and adhesives.

.5 Pre-Installation Conference:

.1 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings, attended by the Contractor, the Subcontractor's representative and foreman for this project, the Consultant, materials supplier(s), and other relevant personal before commencement of work for this Section.

.2 Review preparation and installation procedures and co-ordinating and scheduling required with related work.

.3 Record discussions of conference and decisions and agreements (or disagreements) reached and furnish copy of record to each party attending. Review foreseeable methods and procedures related to the vapour permeable air barrier membrane, including the following:

.1 Tour, inspect and discuss condition of substrate, penetrations and preparatory work performed by other trades.

.2 Review surface preparation, minimum curing period and installation procedures.

.3 Review special details and flashings.

.4 Review required submittals, both completed and yet to be completed.

.5 Review and finalize construction schedule related to work and verify availability of materials, installer’s personnel, equipment and facilities needed to make progress and avoid delays.

.6 Review required inspections, testing, protection and repair procedures.

.7 Review weather and forecasted weather conditions, and procedures for coping with unfavourable conditions.

.6 Arrange for a Manufacturer's Representative to:

.1 Visit the site and discuss any special requirements, procedures and unique conditions, prior to commencement of work.

.2 Inspect substrate surfaces and recommend solutions to accommodate requirements for surface preparation of the existing coating and any adverse conditions.

.3 Periodically visit and inspect the installation and report unsatisfactory conditions to the Contractor.

.4 Attend final inspection and to submit written certification that the products, systems and assemblies have been installed in accordance with the manufacturer's requirements.

.7 Inspection and Testing:

.1 Cooperate and coordinate with the Owner's inspection and testing agency. Do not cover any installed vapour permeable air barrier membrane until any required inspections, testing approvals have been completed.

.2 Contractor and membrane manufacturer’s representative shall conduct at least three ASTM D4541 Adhesion test at random mock-up locations, demonstrating membrane achieves minimum pull strength of 16 PSI.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Documentation:

.1 Prior to commencing the Work, submit documentation from an approved independent testing laboratory certifying that the air leakage and vapour permeance rates of the air barrier membranes, including primary membrane and transition sheets, exceed the requirements of the OBC.

.2 Prior to commencing the Work submit copies of manufacturer's current ISO certification. Membrane, primers, sealants, adhesives and associated auxiliary materials shall be included.

.3 Prior to commencing the Work submit references clearly indicating that the membrane manufacturer/installer has successfully completed projects on an annual basis of similar scope and nature for a minimum of fifteen (15) years. Submit references for a minimum of ten (10) projects.

.4 Prior to commencing the Work submit manufacturer's complete set of standard details for the air barrier membrane system showing a continuous plane of air tightness throughout the building envelope.

.5 Prior to commencing work provide a material checklist, complete with application rates and minimum thickness of primary membranes.

.3 Shop Drawings:

.1 Show the locations and extent of the vapour permeable air barrier system including details of typical conditions, intersections with other envelope systems and materials, membrane counter-flashings and details showing how gaps in construction will be bridged and how miscellaneous penetrations such as conduits, pipes, etc. are sealed.

.4 Samples:

.1 Submit to Consultant for approval, samples of materials and components to be used in vapour permeable air barrier system, prior to fabrication of work together with name of manufacturer and technical literature. Submit 305mm x 305mm (12" x 12") samples of vapour permeable air barrier membrane.

.5 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on site for reference by workers.

1.5 ENVIRONMENTAL CONDITIONS

.1 Vapour permeable air barrier membrane is not to be applied to surfaces that are either wet, oily, frosted, dirty or contaminated in any way.

.2 Maintain surface of substrates and ambient temperatures constantly between 38 deg C and 5 deg C during application and curing of primers and adhesives for flexible vapour permeable air barrier membrane flashings, except as permitted otherwise by Consultant in writing.

1.6 MOCK-UPS

.1 Construct mock-ups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution before installing materials indicated in this Section.

.2 Build mock-ups using exposed and concealed materials indicated for the completed Work.

1.7 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries with construction schedule and arrange for proper storage areas.

.2 Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.

.3 Store materials in a clean, dry and protected area, off the floor or ground, in their original containers, sealed and undamaged. Manufacturer's labels are to be easily visible and undamaged. Store rolled materials on end.

.4 Store liquid membrane materials, adhesives and primers at minimum 5 degree C, and store away from open flames, sparks and excessive heat as liquid membrane materials and primers are flammable because of solvent content.

.5 Care and precaution are to be exercised by the applicator so as not to damage the work of other trades. Applicator is responsible to take all necessary precautions to protect work of other trades during application.

.6 In addition to the above, store modified bituminous sheet type flexible vapour permeable air barrier membrane flashings as follows;

.1 Store rolls of membrane tape in accordance with manufacturers written instructions.

.2 Store materials away from direct heat or open flame.

.3 Store rolls away from direct sunlight until ready for use.

.4 For installation in cold weather, store rolls of membrane in heated storage trailer for minimum of 24-hours with the temperature kept at 21 degree C and remove for application with as little exposure as possible to low ambient temperatures.

.7 The vapour permeable air barrier membrane is not designed for permanent exposure, but can be left exposed for up to a maximum of thirty (30) days. As soon as possible after the membrane has cured, protect vapour permeable air barrier membrane from damage by work of other Sections.

1.8 WARRANTY

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions, but for a period of two (2) years and agree to repair and replace faulty materials or work which becomes evident during the warranty period, without cost to the Owner. Provide the Owner with a written warranty to this effect.

2 Products

2.1 MATERIALS

.1 Fluid-applied, Vapour Permeable Air Barrier (AB-01): UV-resistant, one-component, elastomeric membrane.

.1 Basis of Design Product: AirBloc 17MR by Henry Company, Perm-A-Barrier VPL by GCP, or approved equivalent.

.2 Sheet-Applied Vapour Permeable Air Barrier (AB-02): Self-adhering air barrier membrane bonded with permeable adhesive layer and split-back poly-release film.

.1 Basis of Design Product: Blueskin VP160 by Henry, Sopraseal Stick 1100 T by Soprema, or approved equivalent.

.3 Sheet-applied Air Barrier Membrane Flashing Primer:

.1 Water based, polymer emulsion type, compatible with AB-01/AB-02.

.1 Basis of Design Product: Blueskin Aquaprime by Henry Company, or approved equivalent.

.4 Flexible Air Barrier Membrane Flashings (Transition Flashings):

.1 40 mils (1mm) thick x width to suit, strips of self-adhering, SBS rubberized asphalt laminated to a cross-laminated, high density polyethylene film with a silconized release liner.

.1 Basis of Design Product: Blueskin TWF by Henry Company, or approved equivalent.

.5 Reinforcing Fabric (Joint Treatment Mesh):

.1 150mm (6") wide, open weave 20/10 mesh, glass fibre yarn saturated with synthetic resins, reinforcing fabric fabric weighing minimum of 2.5 oz/sq.yd., and conforming to CGSB 37-GP-63M

.1 Basis of Design Product: Yellow Jacket 990-06 by Henry Company, or approved equivalent.

.6 Air Barrier Sealant:

.1 High solids, high flexibility, polymer modified, rubberized asphalt type sealant, compatible to vapour permeable air barrier membrane and conforming to CAN/CGSB-37.29-M.

.1 Basis of Design Product: Polybitume Sealing Compound by Henry Company, or approved equivalent.

.7 Substrate Cleaners:

.1 Petroleum spirits thinner or low flash petroleum spirits (mineral spirits) conforming to CAN/CGSB-1.4-2000, or xylene thinner (xylol) conforming to CAN/CGSB-1.49-M.

.8 Packing Insulation:

.1 Loose, glass fibre or mineral fibre insulation, 1.0 lbs./cu.ft. density, and conforming to CAN/CGSB-51.11.

3 Execution

3.1 EXAMINATION

.1 The installer shall examine conditions of substrates, areas and other conditions under which the vapour permeable air barrier system will be applied for compliance with requirements.

.2 Verify that surfaces and conditions are ready to accept the Work of this section. Surfaces shall be sound, dry, even and free of oil, grease, dirt, excess mortar or other contaminants. Concrete surfaces shall be cured and dry, smooth without large voids, spalled areas or sharp protrusions. Masonry joints shall be flush and completely filled with mortar, and all excess mortar sitting on masonry ties shall have been removed. Verify substrate is visibly dry and free of moisture.

.3 Notify the Consultant in writing of any discrepancies. Commencement of work or any parts thereof shall mean acceptance of the prepared substrate.

.4 Do not proceed with application of vapour permeable air barrier membrane when rain is expected within 16-hours.

3.2 GENERAL

.1 Ensure continuity of the air seal throughout the scope of this section.

.2 Components and membrane materials must be obtained as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.

.3 Install all materials in accordance with the manufacturer's written directions, unless otherwise specified herein.

3.3 SURFACE PREPARATION

.1 Clean, prepare and treat substrates according to manufacturer's written instructions. Surfaces to be coated must be smooth, clean, dry, firm to the touch and free from oil, grease, dirt, excess mortar and other contaminants.

.1 Brushing and/or scraping of substrates may be required to adequately prepare surface.

.2 Remove all poorly bonded, existing surface coating prior to installing work of this Section.

.3 Thoroughly wash metal surfaces with mineral spirits or xylol and wipe dry with clean rags.

.2 Vapour permeable air barrier membrane is not to be applied over lightweight, cast-in-place concrete containing high moisture or certain curing compounds. Cast-in-place concrete should be cured for a minimum of two (2) weeks prior to application of vapour permeable air barrier membrane.

.3 Concrete surfaces shall be free of large voids and spalled areas. Fill all spalled concrete areas, form-tie holes/voids and open mortar joints in concrete block with mortar to produce a smooth, even surface. Allow to cure properly before proceeding.

3.4 JOINT AND PROTRUSION TREATMENTS

.1 Prepare only enough vapour permeable air barrier membrane compound as required for joint and protrusion treatments and can be used within compound's usable pot life. Mix vapour permeable air barrier membrane with a double blade agitator attached to a 13mm (1/2") drill in strict accordance with the manufacturer's written instructions.

.2 Exterior sheathing board inside/outside corners: Embed minimum 305mm (12") wide, continuous strip of reinforcing fabric in vapour permeable air barrier membrane, centred over corner.

.3 Fill joints up to 6mm (1/4") wide in exterior grade sheathing board and joints in between panels of exterior grade plywood with trowel application of vapour permeable membrane or mastic as recommended by manufacturer ensuring that joints are completely filled.

.4 Where joints in exterior grade sheathing board are over 6mm (1/4") wide, ensure joints are completely filled with a vapour permeable membrane or mastic and apply continuous flexible air barrier membrane flashing or mesh as specified herein, lapped a minimum of 75mm (3") and fully adhered to both sides of substrate.

.5 Where joints/cracks up to 6mm (1/4") wide occur in concrete or masonry, fill joints/cracks with a thick trowel application of vapour permeable air barrier membrane or mastic, ensuring that joints are completely filled.

.6 Where joints/cracks in concrete or masonry are over 6mm (1/4") wide, apply a vapour permeable membrane or mastic as recommended by manufacturer ensuring that joints are completely filled.

.7 Ensure continuity of air barrier membrane by working air barrier membrane over all exterior sheathing board fasteners and around all masonry ties and anchors and other items.

3.5 APPLICATION - AIR BARRIER MEMBRANE FLASHINGS

.1 Apply primer to all substrate areas where flexible air barrier membrane flashings are to be applied. Apply primer using lambs wool roller at rate 100 sq.ft. to 300 sq.ft./gallon (2.044 to 6.131 sq.m./gallon) depending on porosity of substrates. Allow primer to "tack up" for approximately 30-minutes prior to application of flexible air barrier membrane flashings.

.2 Do not use solvent-based primer where it may be in contact with polystyrene insulation.

.3 Install flexible air barrier membrane flashings in strict accordance with the manufacturer's written instructions unless otherwise specified herein.

.4 Ensure a uniform, continuous air barrier effect. Where air barrier membranes are to be provided under other Sections, co-ordinate the work such that air barrier membrane continuity is achieved.

.5 Provide air tight seals at penetrations in flexible air barrier membrane flashings.

.6 Apply flexible air barrier membrane flashings to extend air barrier membrane at peripheries of the installation as required to facilitate joining and sealing of the air barrier provided in adjacent construction, lapping joints minimum of 75mm (3"), extending membrane onto adjacent concrete/metal substrates not less than 150mm (6"), centred over joints.

.7 Apply continuous flexible air barrier membrane flashings at expansion and deflection joints within framing members, lapping joints minimum of 75mm (3"), extending membrane onto adjacent concrete/metal substrates which have no applied air barrier not less than 150mm (6"), centred over joints.

.8 Flexible Weather Barriers:

.1 Provide continuous 457mm (18") side flexible weather barrier membrane in exterior masonry cavity walls at expansion joints.

.2 Install flexible weather barrier membrane to substrate with adhesive, in strict accordance with manufacturer's instructions.

.3 Loop down flexible weather barrier into expansion/control joints approximately two (2) times the width. Lap joints minimum 150mm (6") and seal. Ensure that flexible weather barrier lap joints which are looped into expansion /control joints are sealed with adhesive. Seal tops and bottoms of membrane barrier at change in construction to present continuous, uninterrupted flexible weather barrier.

.4 Pack joint with loose batt insulation with face of insulation down two (2) times the width of expansion from face interior wythe.

3.6 APPLICATION - VAPOUR PERMEABLE AIR BARRIER MEMBRANE - LIQUID APPLIED

.1 Areas to receive vapour permeable air barrier membrane are as follows:

.1 On all new / existing substrates, behind all rainscreen cladding.

.2 Prepare only enough vapour permeable air barrier membrane compound as can be used within compound's usable pot life. Mix vapour permeable air barrier membrane with a double blade agitator attached to a 13mm (1/2") drill in strict accordance with the manufacturer's written instructions.

.3 Apply vapour permeable air barrier membrane to substrates in a continuous coating at a rate of 27 - 45 litres/9.29 sq.m. (6 to 10 gal./100 sq.ft.) by roller, spray or trowel methods, producing a minimum wet film thickness of 100 wet mils.

.4 Ensure that application of vapour permeable air barrier membrane overlaps all flexible air barrier membrane flashings, dampproof course/thru-wall flashings a minimum of 75mm (3").

.5 Where masonry anchors pass through the air barrier membrane, ensure continuity of air barrier by applying vapour permeable air barrier membrane all around/over masonry anchors.

3.7 APPLICATION - VAPOUR PERMEABLE AIR BARRIER MEMBRANE - SHEET APPLIED

.1 Apply self-adhering water resistive air barrier membrane complete and continuous to substrate in an overlapping shingle fashion and in accordance with manufacturer's recommendations and written instructions. Stagger all vertical joints.

.1 Align and position self-adhering membrane to substrate, remove top panel of protective release film and press firmly into place.

.2 Ensure alignment, hold membrane in place to avoid wrinkles and sequentially remove remaining panels of protective film and press firmly into place.

.3 Ensure minimum 75mm (3") overlap at all end and 50mm (2") side laps of subsequent membrane applications.

.4 Apply pressure to all membrane surfaces, laps and flashings using an appropriate roller to provide best possible surface adhesion.

3.8 INSPECTION

.1 Prior to membrane being covered, notify the Consultant 48 hours prior to allow for review.

3.9 PROTECTION AND CLEAN-UP

.1 Protect membrane to avoid damage from other trades, and construction materials during subsequent operations.

.2 Cap and protect exposed walls against wet weather conditions during and after application of membrane for a minimum of 24 hours.

.3 If the vapour permeable air barrier cannot be covered within thirty (30) days after installation, apply temporary UV protection such as dark plastic sheet or tarpaulins. Contact material manufacturer for further recommendations.

.4 Clean spillage and soiling on adjacent construction that will be exposed in the finished work using cleaning agents and procedures recommended by the manufacturer of the affected construction.

.5 Remove any masking materials after installation.

.6 Applicator is responsible for the removal of surplus and waste material incurred during application.

.7 Equipment and tools can be cleaned using mineral spirits or xylol.

END OF SECTION

1.0 GENERAL

1.1 Section Includes

.1 Fibreglass shingle roofing, complete with sheet metal flashings and accessories.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3 Canadian Roofing Contractors Association (CRCA) Roofing Practices Manual

.4	CSA A123.5	Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules
.5	CSA A123.2	Asphalt-Coated Roofing Sheets
.6	CSA A123.51	Asphalt Shingle Application on Roof Slopes 1:6 and Steeper
.7	CSA B111	Wire Nails, Spikes and Staples (Withdrawn)
.8	CSA A93	Airflow Ventilators for the Unoccupied Spaces of Buildings

1.3 Submittals

.1 Product Data

.1 Submit product data sheets for laminated fibreglass shingles including product characteristics, performance criteria, installation instructions, limitations, colour, and finish.

.2 Samples

.1 Before commencing work, submit duplicate samples of full-size shingles.

1.4 Quality Assurance

.1 Use only skilled trades people experienced in type and class of work.

.2 Notify Consultant if Drawings or Specifications differ materially from manufacturer's printed instructions.

1.5 Mock-Up

.1 Construct mock-up of typical wall-to-roof assembly details, incorporating roof assembly components with valley flashings installed, building corner condition, and illustrating materials interface and seals.

.2 Locate where directed by the Consultant.

.3 Allow for Consultant review of mock-up before proceeding with work.

.4 Mock-up may remain as part of the Work.

1.6 Delivery, Storage, and Handling

.1 Deliver and store all materials in their original packaging bearing manufacturer's name, grade, weight, and standards pertaining thereto.

.2 Neatly store and protect materials at all times in dry, well-ventilated, elevated areas, protected against damage from the elements. Remove from storage only materials to be used that day.

.3 Immediately remove damaged materials from site.

2.0 PRODUCTS

2.1 Shingles

.1 Shingles For Slopes 1:6 and Steeper: To CSA A123.51, and as follows:

.1 Heavyweight laminated fibreglass asphalt shingle reinforced with non-woven glass fibre mat. UL 2218 Impact Resistance – Class 4 with acceptable material as follows:

.1 Pabco Premier 30 Laminated Fibreglass multilayered shingles by Pabco Roofing Ltd. with 30-year warranty.

.2 Cambridge IR by IKO Industries Ltd with 30-year warranty.

.3 Supreme AR Shingles by Owens Corning with 30-year warranty.

.4 Or approved alternative.

.2 Colour: As selected by Owner from manufacturer's standard colour range.

2.2 Membrane Underlayment

.1 Self-adhering SBS rubberized asphalt compound integrally laminated to polyethylene or polypropylene film and rated for high temperature applications, including primer specified by the manufacturer. Acceptable products:

.1 Lastobond Shield HT by Soprema Inc.

.2 Blueskin PE 200 HT by Henry

.3 Grace Ultra by GCP Applied Technologies

.4 Or approved alternative.

2.3 Eave Protection

.1 Eave Protection membrane: Self Adhesive, rubberized asphalt sheet material.

.1 Lastobond 195, by Soprema Inc.

.2 ArmourGuard Ice & Water protector by IKO

.3 Gripgard by EMCO Building Products Ltd.

.4 Eaveguard by Bakor.

.5 Or approved alternative.

2.4 Fasteners

.1 Nails: 11 or 12 gauge corrosion-resistant roofing nails of hot-dipped galvanized steel or aluminum, CSA B111. Flat head; diamond point. Nail head diameter of not less than 3/8”, with sufficient length to penetrate 3/4” into plywood sheathing.

2.5 Metal Flashings

.1 As specified in Section 07 62 00.

2.6 Roof Vents

.1 Purpose-made, conforming to CSA A93, providing a minimum net free venting area of 50 sq. in. per vent. Colours as selected by Consultant from manufacturer's standard range. Plastic vents shall have a minimum 3" flange on upslope side and a minimum 2" flange on remaining three sides.

.1 Duraflo 6050T Shake & Shingle, Slant Back, Square Top Roof Vent by Canplas Industries Ltd.

.2 600 or 550 Roof Vent by 2004, Lomanco Inc.

.3 Or approved alternative.

3.0 EXECUTION

3.1 Examination

.1 Examine all surfaces to receive roofing.

.2 Curb all penetrations except plumbing vents. For all penetrations over 8" wide, provide upslope splitters or curbs set diagonally to the slope.

.3 Notify Consultant if structural members or substrate is unacceptable to receive work of this Section.

.4 Commencement of work of this Section implies acceptance of surfaces.

3.2 Protection

.1 Protect adjacent parts of building from damage. Cover walls and other surfaces in the vicinity of hoisting apparatus with heavy canvas or other suitable protective material. Repair any damage caused by the work of this Section to match original materials and appearance.

.2 Conduct operations to minimize deck exposure to weather. Protect as required to prevent water infiltration and damage to building interior.

3.3 Preparation

.1 Remove existing roofing, flashings, underlayment, and plywood.

.2 Install new sheathing as specified in Section 06 10 00 – Rough Carpentry.

.3 Leave surfaces free from dirt and loose material.

.4 Notify Consultant at least 48 hours before commencement of any roofing work.

3.4 Underlayment

.1 Install underlayment over entire roof area.

.2 Lay horizontal to roof slope with a minimum headlap of 4” to shed water and side lap 4”.

.3 Nail or staple in place sufficiently to hold in place until shingles are installed.

3.5 Flashings

.1 Install drip edge along eaves and rake edges, and as detailed, with minimum 3” flange extending onto roof decking.

.2 Extend water barrier up vertical face 6” or as otherwise detailed.

.3 Install metal step flashing interleafed between shingles, extending minimum of 5” up vertical surfaces above finished roof surface and 4” between roof courses. Provide minimum head lap of 3” for each step flashing. Extend minimum of 3” beyond the down slope corners, folded, not cut. Terminate shingles flush with vertical face.

.4 Install metal apron flashing, extending minimum of 5” up vertical surfaces, 4” over the roof material, and 4” beyond the corners.

3.6 Shingle Application

.1 Install shingles over clean and dry substrate.

.2 Use four nails per shingle. Space nails 1” from edge and 1-1/2” above butt line of following course. Space shingles 1/4” apart.

.3 Drive nails flush and tight but do not overdrive nails to cut into shingles.

.4 Double shingles at eaves, projecting butts 1-1/2” from first sheathing board or bottom strapping. Project shingles 1” minimum at gable ends.

.5 Apply strip of additional underlayment minimum 8” wide over hips and ridges. Apply shingles at same weather exposure as field of roof.

.6 Provide open- metal valleys. Keep nails away from valley centre.

3.7 Cleaning and Protection

.1 Inspect day's work, repair any deficiencies, and clean up debris prior to leaving site for the day.

.2 Protect installed work and materials.

3.8 Maintenance Materials

.1 Provide additional shingles, sufficient to cover 10 sq. m of roof. Shingles to be provided in their original packaging.

END OF SECTION

1.0 GENERAL

1.1 GENERAL REQURIEMENTS

.1 This section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 DESCRIPTION OF WORK

.1 This sub trade is responsible for the supply and installation of the following items, including all related labour and materials necessary to successfully complete the installation of same whether or not in the Contract Documents:

.1 Fiber reinforced composite cladding panels

.2 Fastening system

.3 Closures and related trim

.4 Caulking and sealants

.5 Other related Work as indicated on Drawings, Details and Specifications

1.3 SUBMITTALS

1. Submit Engineered Stamped Shop Drawings of panel installation, material, panel layout, and accessories in accordance with Section 01 33 00. No Work shall be fabricated before Shop Drawings have been reviewed/ returned. **Submitting the Architect's Drawings for this purpose is not acceptable.**

.2 Indicate on Shop Drawings all information required to fabricate and install the components of this system. This shall include dimensions, connection and jointing details, gauges, finishes, etc. Ensure that plan and section details of interior and exterior corners, horizontal and vertical joints, fascias and soffits, cut-outs, miscellaneous trim, fastening methods etc are shown at a minimum scale of 1:5.

.3 Shop Drawings indicating connection and support of cladding panels shall be sealed by a qualified professional engineer licensed to design structures and registered in Ontario.

.4 Submit 100mm x 150mm sample of proposed color for review.

.5 Submit samples of accessories if requested by the architect.

.6 Submit manufacturer's data sheets covering the care and recommended maintenance procedures of siding for incorporation into maintenance manuals.

.7 Submit copies of manufacturer's warranties.

1.4 QUALITY ASSURANCE

1. Installers shall have a minimum of ten (10) years of proven experience in the installation of similar products specified on projects of a similar size and scope.

2. Install a mockup on the building in a location as directed by the architect. Mockup shall incorporate panels, and all required finishing accessories and adjacent materials including flashing, windows, doors and trim. Mock up may form part of the work.

1.5 DELIVERY, STORAGE AND HANDLING

1. Deliver, store and handle materials in accordance with the site and environmental conditions prescribed by the manufacturer.

2. Remove damaged materials from the site.

1.6 COORDINATION WITH OTHER TRADES

1. All penetrations through the siding for the work of other trades shall be fitted with a watertight sleeve.

1.7 WARRANTY

1. Provide manufacturer's ten (10) year warranty from date of production to maintain the mechanical qualities, water tightness and frost resistance with exception of a gradual change caused by normal wear (aging), provided the panels are correctly installed on a ventilated construction according to the installation prescriptions of the producer.

2. The following will be deemed as defective Work; leakage, failure to stay in place, undue cracking, chipping or adjacent deformations, panel deformation, buckling, spalling, deterioration of surface. Failure of 15% of surface area of panels shall be deemed a total failure of the installation requiring complete re-application of panels.

2.0 PRODUCTS

2.1 PANEL SYSTEM

1. Material: Cement, calcium-silicate strengthened with cellulose fibers and resins without asbestos, fiberglass or formaldehyde.

2. Size:

.1 As per Drawings.

3. Thickness:

.1 Minimum 8mm thick, suitable for face fastening according to panel sizes indicated on Drawings

4. Panels shall be non-combustible when tested to ASTM E-136-81/CAN4-S114M80 and shall meet a maximum flame spread rating of 5 and a maximum smoke development rating of 25 when tested in accordance with CAN4-S102M

5. Surface: smooth

6. Colour: as selected by consultant from manufacturer standard colour range. Allow for 2 colours.

7. Face fastened

8. Acceptable Manufacturers/Distributors:

.1 Natura Fibre Cement Panel as manufactured by Equitone. Distributed by Engineered Assemblies.

.2 Carat Fibre Cement Panel as manufactured by Swisspearl. Distributed by Muralis Architectural.

2.2 FASTENERS

.1 As recommended by panel manufacturer, to suit backup assembly as detailed.

.2 All fasteners to have sufficient corrosion resistance or be coated with corrosion resistant products.

2.3 THERMALLY BROKEN CLADDING SUPPORT FRAMING

.1 Thermally broken, horizontal and vertical exterior wall panel sub-framing support/attachment system to meet ASHRAE 90.1 wall assembly U value and continuous insulation requirements with the following attributes:

.1	Compressive Strength:	ASTM D638	40,000 psi.
.2	Compressive Modulus:	ASTM D695	673,400 psi.
.3	Shear Strength:	ASTM D732	16,000 psi.
.4	Thermal Conductivity:	ASTM C518	1.05 BTU in/ hr sf degree F.

.5 Coefficient of Thermal Expansion: ASTM E831 2.2 x 10e-6 in/in/degree F.

.6 Thermal Resistance (R value): ASTM C518 0.95 hr sf degree F/ BTU.

.7 Surface Burning Characteristics: ASTM E84.

.1 Flame Spread: 25 (class A).

.2 Smoke Developed: 50 (class A)

.8 Spacing: Refer to manufacturer's recommendations and comply with project specific calculations

.9 Connectors and Fasteners: Minimum ultimate pull-out capacity: 450 pounds.

.10 Acceptable product/manufacturer: Armatherm Z Girt.

.2 Framing Size/profile:

.1 Horizontal framing (inner layer): z-girt profile, minimum 50mm deep or as detailed/scheduled.

.2 Vertical framing (outer layer): z-girt profile, 22mm deep.

.3 Cladding contractor to provide engineered support framing, including fastener specification to suit required cladding panel support.

2.4 CONTINUOUS WEATHER BARRIER SHEATHING MEMBRANE

.1 Refer to Specification 07 25 00.

2.5 SEALANTS

.1 Refer to Specification 07 92 00 Building Envelope Sealants.

2.6 FLASHING

.1 Reference: ASTM A653/A653M, "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process".

.2 Submittals: Product Data: Submit manufacturer's specifications, application instructions, details and maintenance instructions.

.3 Materials: Prepainted sheet steel: ASTM A653/A653M; Classification LFQ, Grade A, Z275 zinc coating designation, 0.60 mm minimum base steel thickness, commercial quality, prefinished with 8,000+ Series coating system by U.S. Steel Canada, Pre-Coat 8000+ by Dofasco Inc. or Colourite WeatherX by Vicwest Steel. Colour: Colour as selected by Consultant.

.4 Execution:

.1 Form work neatly to size, shape and dimensions shown or required for the work. Make angles and lines in true alignment. Erect work straight, sharp, plumb and level in true plan, free of bulges and waves. Verify dimensions at the building. After soldering, remove flux or acid with neutralizing chemical, wash surface with water and then let dry, ready installation as applicable. Where welding is employed or indicated, employ mechanics skilled in welding metal being worked; grind exposed welds smooth to match adjacent surfaces and remove slag and splatter before priming. Use concealed fastenings except where approved before installation.

.2 Make allowances for expansion and contraction for material being used. Shop form, lap and solder or weld corners and angles into one piece 450 mm (1'-6") minimum each way from corner or angle. Hem drip legs of copings and flashings at 45 degrees and secure drips with nailed or screwed concealed continuous edge strips of same gauge and material. Use concealed fastenings wherever possible. Make "S-lock" type seams or "Standing" type seams. Make joints with opening away from prevailing winds. Install with joints and seams which will be permanently weatherproof.

3.0 EXECUTION

3.1 INSPECTION

1. Inspect the Work and notify the architect of any conditions that would affect the installation or performance of the Work.

3.2 PREPARATION

1. Verify site dimensions prior to commencement of the Work,

2. Clean and prepare to existing substrate to provide a surface free of frost, loose nails, dirt, debris or other contaminants that would adversely affect the installation of the breathable underlayment.

3. Seal all penetrations using a combination of tapes, self adhered membranes and other compatible sealants and products. Ensure all laps and details allow water to flow to the exterior

4. Starting at base of wall, unroll sheathing membrane horizontally across wall. Extend 6” over starting corner. Fasten at top and bottom of roll within 2” of edge 12 “on centre and at a maximum of 2’ 0” on centre in field. Do not place vertical laps above windows.

3.3 INSTALLATION

1. Only installers approved by cladding manufacturer shall install panels.

2. Install panels, and accessories in accordance with manufacturer’s printed instructions and reviewed Shop Drawings.

3. Fasten panels with fasteners and equipment as recommended by the manufacturer.

4. Install panels with joints over middle of wall framing, maintain a 8mm gap between panels.

5. Keep minimum distance to corners and edges as recommended by the manufacturer.

6. Install panels true to line and level with clean cut edges and joints.

8. Any penetrations of the panel system must be properly sealed with a sealant in accordance with Section 07 92 00.

9. Finished installation shall be properly secured, free of rattles, distortions, waviness, protrusions, damaged or chipped components.

3.4 CLEAN UP

1. Remove any concrete dust from cutting/drilling panels with clean water and a compressor hose or brush.

2. Upon completion of Work remove all equipment, tools, surplus materials and garbage.

3. Panel installation site shall be left in a clean condition free from construction debris.

END OF SECTION

1.0 GENERAL

1.1 Section Includes

.1 Provide the necessary supervision, labour, equipment and materials to supply and install a new roof system and remove and replace any old roofing system, sheet metal flashings, and wood blocking down to the structural deck as shown in the project documents.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3 Canadian Roofing Contractors Association (CRCA) Roofing Practices Manual

.4	CGSB 37-GP-56M	Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing (Withdrawn)
.5	ASTM D6162/D6162M	Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements
.6	ASTM D6163/D6163M	Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements
.7	ASTM D6164/D6164M	Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements
.8	CAN/CGSB-51.33	Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction (Withdrawn)
.9	CSA B111	Wire Nails, Spikes and Staples (Withdrawn)
.10	CAN/ULC-S770	Standard Test Method for Determination of Long-Term Thermal Resistance of Closed-Cell Thermal Insulating Foams

.11	CAN/ULC-S704.1	Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced
.12	ASTM D5957	Standard Guide for Flood Testing Horizontal Waterproofing Installations
.13	ASTM D41/D41M	Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
.14	ASTM E108	Standard Test Methods for Fire Tests of Roof Coverings

1.3 Submittals

.1 Submit Shop Drawings of sloped roof insulation indicating roof perimeters, , penetrations, curbs, slopes, ridges, valleys, low points in existing roof deck that may form areas of ponding, crickets, sumps, and roof drain locations. Identify conflicts between insulation heights and existing installed features.

.2 Submit product data on material characteristics, performance criteria, limitations, and for each product to be used.

.3 Submit certificate that installer is certified by membrane manufacturer for the methods specified.

.4 Submit written inspection report, if requested by Consultant, from the membrane manufacturer stating that materials used on site meet the specified criteria and are compatible with each other. Submit report to the Consultant within 48 hours of visit.

1.4 Quality Assurance

.1 Foreperson shall have minimum 10 years of experience in roofing industry.

.2 Use only Redseal trades people for roofing installation.

.3 Do work in accordance with applicable standard in CRCA Roofing Specifications Manual, except where specified otherwise.

1.5 Mock-Up

.1 Construct a minimum 3 sq. m mock-up of roof system in location acceptable to Consultant showing typical lap joint, transition to sloped roof, and penetration, prior to installation of roofing system.

.2 Arrange for Consultant's review during construction of the mock-up a minimum of 48 hours in advance.

.3 Mock-up may remain as part of the Work if accepted by Consultant.

.4 Do not commence roof installation until Consultant has reviewed mock-up.

.5 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the Work of this Section.

1.6 Notification and Testing

.1 Notify Consultant at least 48 hours before commencement of any roofing work.

.2 Notify the Consultant each morning that work is occurring.

.3 Consultant reserves the right to have cut tests made to establish quality of work. Such tests shall be made in the presence of the Contractor. Cost of tests and subsequent repairs shall be borne by the Contractor.

.4 The review and testing service does not relieve the Contractor of their responsibility for quality control of production and for errors made by them.

1.7 Environmental and Safety Conditions

.1 Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Labour Canada.

.2 Roofing application shall not be carried out when materials are damp or when ambient temperatures are less than manufacturer's specifications.

.3 Be responsible for the safe disposal of all debris from the job site and in compliance with the Environmental Protection Act.

.4 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of products including special conditions governing use.

1.8 Delivery, Storage, and Handling

.1 Deliver and store all materials in their original packaging bearing the manufacturer's name, grade, weight, and applicable standards.

.2 Ensure shelf life of all materials has not elapsed.

.3 Store material in accordance with manufacturer's directions.

.4 Remove from site any material damaged or exposed to wet weather.

.5 Do not overload structure or adjacent structures, including suspended slabs.

.6 Store rolls on ends with selvage edge up, one pallet high only.

.7 Ensure all rolled base sheet membranes are maintained at a temperature between 10°C and 40°C prior to use.

.8 Store solvent based liquids, adhesives, and primers away from excessive heat and open flames and at temperatures between 15°C and 26°C.

.9 Gypsum Sheathing

.1 Cover with opaque polyethylene film or light coloured tarpaulins.

.10 Metal Flashings and Trim

.1 Transport, handle, and store assembled units and/or their component parts in a manner to preclude damage of any nature.

.2 Stack preformed material in manner to prevent twisting, bending, and rubbing.

.3 Remove all units or components that are stained, watermarked, cracked, bent, chipped, scratched, or otherwise unsuitable for installation and replace with new.

.4 Protect finish and edges in accordance with manufacturer's directions.

.5 Prevent contact of dissimilar metals during storage and protect from acids, flux, and other corrosive materials and elements.

1.9 Warranty

.1 Contractor Warranty

.1 Provide extended warranty stating that all labour and material will be provided at no cost to Owner to remedy all material and workmanship defects in modified bituminous membrane roofing and related membrane flashings which appear within 15 years from the date of Substantial Performance of the Work. Warranty not to be

pro-rated. Defects include but are not limited to: ponding in excess of manufacturer limits unless otherwise noted (whichever is more stringent), blisters, ridges, open seams, fish mouths, excessive degranulation, any defect resulting in water penetration into the roof assembly or the interior. Contractor to provide for all field review required from manufacturer to supply above warranty.

.1 Warranty to be issued on letterhead by field membrane manufacturer listing Owner, Installer, and General Contractor. Warranty to be signed and sealed by an authorized signing officer.

.2 Make all necessary repairs and replacements within 48 hours of receipt of written notification.

.3 Nothing contained in this article shall be construed as in any way restricting or limiting the liability in common law and statutory liability of the Contractor.

.2 Manufacturer's System Warranty:

.1 Obtain 15 Manufacturer System Labour, Material, and Workmanship Warranty. Inspections to be provided by system manufacturer's representatives.

2.0 PRODUCTS

2.1 Sheathing Board

.1 Gypsum Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, minimum 16 mm thick, Type X core, and factory primed.

.1 Basis of design: Dens Deck Prime by Georgia Pacific Canada Ltd.

2.2 Primers

.1 Asphalt Primer: To CGSB 37-GP-9Ma, VOC content as recommended by manufacturer.

2.3 Vapour Retarder

.1 Single-ply self-adhered bituminous membrane consisting of:

.1 Minimum 0.8 mm SBS modified bitumen with silicone release film.

.2 Basis of Design: Sopravap'R by Soprema

2.4 Base Insulation

.1 Isocyanurate insulation to CAN/ULC-S704, thickness as indicated on Drawings, Type 2 Class 1, polymer bonded glass fibre, 20-psi compression to ASTM C1289 manufactured using HCFC-free blowing agents and integrally laminated to heavy, non-asphaltic, fiber reinforced, non-organic glass fibre facers. Maximum panel dimension shall be 1,219 mm (48"). Install in two layers minimum, with joints staggered 250 mm (10") between layers. Basis of design:

.1 Sopra-Iso by Soprema

.2 AC Foam III by Atlas Roofing Corp.

.3 IKOTherm III by IKO Industries Ltd.

2.5 Insulation Overlay Board

.1 Protection Board: Asphaltic core between asphalt saturated fibreglass facers to CAN/ULC-S706, Type 1, square edges, 4.8 mm (3/16") thick. Basis of Design:

.1 Sopraboard by Soprema

.2 IKO Protectoboard

.3 IKO IKOTherm CoverShield

.4 Approved substitution

2.6 Modified Bitumen Membrane

.1 Two ply system made from prefabricated modified bitumen membranes containing minimum 11% of elastomer Styrene Butadiene Styrene (SBS) and reinforced with non-flammable, fireproof and stress-resistant insert of glass fibre and polyester composite.

.1 Cap Sheet and Cap Sheet Flashing/Stripping:

.1 Properties:

.1 Application: Cold-Adhesive.

.2 Type I, Class A in accordance with ASTM E108, Grade G in accordance with ASTM D6163 material.

.3 Reinforcing: Reinforced with composite polyester/glass fibre mat.

.4 Thickness: Minimum individual membrane thickness of 3.0 mm to CGSB 37-GP-56M.

.5 Bottom Surface: Sanded.

.6 Top Surface: Granulated.

.7 Colour: Selected by Owner.

.2 Basis of Design:

.1 Paradiene 30 by Siplast Inc.

.2 Coldply Traffic Cap 460 by Soprema Inc.

.3 Modiflex MP-250-Cap by IKO Industries Inc.

.4 Approved alternative

.2 Base Sheet and Base Sheet Stripping:

.1 Properties:

.1 Application: Cold-Adhesive.

.2 Type II, Class C, Grade 2 Material.

.3 Reinforcing: Composite polyester/glass fibre mat

.4 Thickness: Minimum individual membrane thickness of 2.5 mm to CGSB 37-GP-56M.

.5 Bottom Surface: Sanded.

.6 Top Surface: Sanded.

.2 Basis of design:

.1 Paradiene 20 by Siplast Inc.

.2 Coldply Base 410 by Soprema Inc.

.3 Modiflex Cold Gold Base by IKO Industries Ltd.

.4 Approved alternative.

2.7 Scupper

.1 4” copper box clamp scupper complete with membrane clamping collar and 4” flange.

2.8 Accessories

.1 Insulation Fasteners: Conform to membrane manufacturer’s written recommendations for wind uplift and corrosion resistance; length as required by insulation thickness plus 25 mm max.

.2 Adhesive: Two-component polyurethane foamable adhesive. Basis of design:

.1 Duotack 365 by Soprema. Compliant with local wind-uplift test requirements.

.3 Vent Stack Flashings: Spun aluminum sleeve to fit over vent stack with sufficient space to insulate. A spun aluminum cap to fit outside sleeve and inside vent stack. Cap shall not restrict vent stack’s inside diameter.

.4 Metal Securing Strips: 25 mm wide, 0.67 mm galvanized steel or 1.5 mm aluminum, double hemmed, fastened at 200 mm (8”) o.c., installed at all vertical or overhead terminations.

.5 Gypsum Sheathing Joint Tape: No. 15 felt in 150 mm width.

.6 Gas Pipe Support: Steel base plate welded to a steel pipe, solid steel core, threaded to provide 51 mm maximum vertical adjustment, stainless steel strap anchor (3 mm x 25 mm), two rollers, and 1.6 mm aluminum sleeve with sufficient space to insulate.

.7 Roof Vents: Continuous welded with 100 mm (4”) flanges. Welded areas shall be cold galvanized and all interior and exterior surfaces painted.

3.0 EXECUTION

3.1 Pre-Installation Meeting

.1 Convene one (1) week before commencing work of this Section.

3.2 Protection

.1 Dispose of rainwater away from face of building until drains or hoppers are installed and connected.

.2 Protect new and existing roofing from traffic and damage.

.3 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed work and materials out of storage.

.4 Seal and protect exposed edges.

3.3 Precautions

.1 Do not carry out roofing application when materials are damp, or when ambient temperatures are less than –15°C. Postpone roofing work when inclement weather appears imminent. Minimum temperature for solvent-based adhesive is –5°C.

.2 Apply each part of roofing system only when surfaces are clean and dry.

.3 Locate equipment and materials in areas designated by Consultant or Owner.

.4 Conduct operations to leave deck exposed for minimum period of time. Protect, as required, to prevent water infiltration or environmental damage to building interior.

.5 All aspects of roofing operation shall follow in close sequence. No part of the operation shall be far ahead of succeeding part such that the latter cannot be finished that working day.

.6 Erect and maintain safety fences around tall equipment and material.

.7 Contractor is responsible for disconnection, relocation, and reinstallation of all existing mechanical and electrical services and equipment.

.8 Ensure that Owner is aware of any such work that may impact the interior environment of the building, prior to disconnection or shut down.

.9 Disconnection and reconnection of all electrical services to meet latest regulations of Canadian Electrical Code and applicable Municipal and Provincial Codes and Regulations. In each and every instance of application, Code, Regulation, Statute, By-Law, or Specification, the most stringent requirements shall apply.

.10 Provide Owner with a schedule indicating time and dates for any work creating a disruption to interior environment and obtain Owner's written approval.

.11 All adjacent parts of the building shall be protected from damage caused by roofing operations. Cover walls and other surfaces in the vicinity of hoisting apparatus with heavy canvas or other suitable protective material. Any damage caused under this contract shall be repaired to match the original materials and appearance.

.12 Any sharp projections that may penetrate the membrane, in the opinion of the Consultant, shall be grounded smooth and flush.

3.4 Substrate Preparation

.1 Existing roof construction shall be structurally sound to provide support for new roof system. Notify Consultant of any deteriorated wood framing to determine method of treatment or replacement.

.2 Remove all existing membrane, flashings, cants, and wood blocking and sweep clean. Remove only amount of roofing and flashing that can be made watertight with new materials during the workday or before the onset of inclement weather.

.3 Substrate surface shall be firm and free from dust, loose material, excess moisture, and oil-based curing agents.

.4 Prepare substrate surface in accordance with membrane manufacturer's written instructions or this Specification, whichever is more stringent.

3.5 Sheathing Board Installation

.1 Install gypsum sheathing over wood framing.

.2 Install boards with long sides at right angles to long edge of wood framing.

.3 Adhere sheathing board in beads of foam adhesive to wood framing per manufacturer's written instructions to meet local wind loading requirements. Beads to be minimum 1/2" to 3/4" and spaced maximum 12" apart in the field and 6" apart in perimeter zones. Do not allow foam to skin over.

3.6 Primer Application

.1 Apply by brush or spray at rate designated by manufacturer.

3.7 Vapour Retarder Installation

.1 For Self-Adhering Vapour Retarder:

.1 Prime gypsum board as recommended by vapour retarder manufacturer.

.2 Install membrane with minimum 75 mm (3") side laps and 150 mm (6") end laps. Support end laps with a strip of sheet metal between deck and membrane in accordance with manufacturer's requirements.

.3 Apply pressure to membrane surface to ensure adequate adhesion. Avoid fish mouths, buckles, or any other application defect. Stagger end laps by a minimum of 12" (300 mm).

.4 Roll membrane per manufacturer's requirements.

.5 Overhang vapour retarder at all edges and extend up verticals 400 mm (16") minimum. Wrap over ends of insulation boards at roof perimeter and penetrations.

.6 Ensure that vapour retarder at roof edges and vertical building surfaces maintains, together with wall vapour retarder, integrity of vapour retarder system for the building.

3.8 Survey

.1 Survey roof during installation to locate low points not associated with drains and notify Consultant of findings.

3.9 Insulation Installation

.1 For fully adhered cold-adhesive attachment:

.1 Install insulation to meet thickness and R-Value indicated on Drawings.

.2 Stagger all joints in boards and fully adhere using adhesive.

.3 Install one layer of tapered insulation in areas indicated on Drawings and adhere with adhesive. Ensure modules are placed in parallel rows, in a pre-designed order, and as indicated on shop drawings.

.4 Adhere insulation boards in beads of foam adhesive per manufacturer's written instructions to meet local wind loading requirements. Beads to be minimum 1/2" to 3/4" and spaced maximum 12" apart in field and 6" apart in perimeter zones. Do not allow foam to skin over.

.5 Ensure that insulation fillers are completely adhered in place as specified.

.6 Install insulation isolation joints at 500 to 2,000 sq. ft. intervals. Document locations of isolation joints on as-built drawings.

.7 Cap all insulation as detailed with an insulation overlay board.

3.10 Insulation Overlay Board Installation

.1 Install overlay over insulation as detailed on Drawings.

.2 Install overlay board with long sides at right angles to underlying insulation.

.3 Stagger all joints in boards. Adhere to CSA 123.21.

3.11 Base Sheet Installation

.1 For cold adhesive applied base sheet:

.1 Ensure base sheet membrane is installed parallel to long side of underlying insulation overlay board.

.2 Commencing at lowest point of roof and perpendicular to roof slope, embed base sheet into cold adhesive as per manufacturer's written recommendations. Apply base sheet with 75 mm (3") side laps and 150 mm (6") end laps. Extend base sheet up vertical, to a point as detailed on Drawings, in a full coat of primer

.3 Ensure base sheet is unrolled to enable membrane to relax prior to installation, for amount of time required by weather conditions.

.4 Seal all joints.

.5 Adhere all laps with adhesive as recommended by manufacturer.

3.12 Cap Sheet Installation

.1 For cold adhesive-applied cap sheets:

.1 Plan membrane application so that laps are not superimposed over laps of base sheet. Mark a chalk line where first course is to start. Unroll 2.0 m to 3.0 m of membrane and line it up to chalk line or selvage edge. Reroll and commence application. If roll goes out of line by more than 12 mm (1/2"), cut and realign.

.2 Adhere one-ply of membrane, granule side up. Constantly check adhesion to ensure proper bonding is achieved.

.3 Side laps shall cover selvage edge and be a minimum of 75 mm (3"). End laps shall be 150 mm (6").

3.13 Membrane Flashings and Sheet Stripping Installation

.1 Install flashing membrane in accordance with specific system requirements using longest pieces practical. Terminate flashing as shown on Drawings in accordance with manufacturer's instructions.

.2 Plan for flashing membrane installation so laps are not superimposed over laps of underlying membrane.

.3 Extend flashing/stripping vertically a minimum of 200 mm (8") beyond the horizontal field surface.

.4 Overlap base sheet flashing over horizontal field base sheet membrane a minimum of 100 mm (4").

.5 Overlap cap sheet flashing over horizontal field cap sheet membrane a minimum of 150 mm (6").

.6 Overlap flashing membrane side laps a minimum of 75 mm (3”).

.7 Install reinforcing gussets at all inside and outside corners in accordance with manufacturer’s recommendations.

.8 Base sheet flashing/stripping shall be fully adhered over roof membrane and vertical surface in accordance with manufacturer’s instructions and application rates. Cap sheet flashing shall be fully adhered over base sheet membrane with specified overlap in accordance with manufacturer’s instructions and application rates.

.9 Nail flashings to exterior face of parapet, mechanical curb, and wall at location and spacing shown on Drawings.

.10 Secure all membrane flashings to verticals with continuous securement strips installed along top edge of membrane flashings and fastened at 200 mm (8”) o.c. Lap all strips to the selvage a minimum of 75 mm (3”) and seal laps securely.

.11 Embed granules for preparation of the salvage edges where membrane will overlap the mineral surface.

.12 At all head laps, where “T” joints occur, cut corner of membrane to be overlapped, on a 45 degree angle. Apply manufacturer-approved mastic to cover granule portion at overlap areas and to fill step where membrane “T” overlaps.

3.14 Vent Flashings Installation

.1 Install vent stack covers at all existing vent pipes. Extend existing vent pipes as required to a minimum height of 400 mm (16”) above completed membrane surface. Provide sufficient allowance for pipe expansion or contraction.

.2 Prime vent stack flange, centre over existing vent stack, and set into heated base sheet membrane. Flash with one ply of base sheet membrane for reinforcement, to extend a minimum of 200 mm (8”) beyond flange. Complete installation with application of cap sheet membrane.

.3 Install batt insulation between vent stack and aluminum stack flashing.

.4 Caulk as detailed on Drawings.

.5 Secure vent caps with self-tapping screws.

3.15 Metal Flashings

.1 Refer to Section 07 62 00.

3.16 General

.1 Patch cap sheet membrane utilizing patches with a minimum size of 400 mm (16”) by 900 mm (3 ft.)

.2 Minimum length of cap sheet on flat run of roof shall not be less than 900 mm (3 ft.)

.3 Discard any cap sheet rolls with or deformed ends.

.4 Following completion of new roofing, soften and apply a liberal application of manufacturer-approved bulk type mineral granules to cap sheet membrane edges where asphalt has extruded or flowed beyond clean lines and to all surface damage.

.5 Remove splices in delivered rolls. Cut back the roll 400 mm (16”) on both sides of the splices.

3.17 Completion of Day’s Work

.1 Install water cut-offs at end of each day’s work. Construct water cut-off as a permanent insulation cell wall. Note location of each insulation cell on (as-built) record drawings. Where a day’s work is more than 200 sq. m, construct additional cell walls in order to keep insulation cells to 200 sq. m maximum.

.2 Construct cell dividers using base sheet or vapour barrier.

.3 Do not incorporate temporary roofing membranes into main roof system. Remove all membranes utilized for this purpose and discard.

.4 Inspect all laps of membrane application to ensure they are properly bonded. Repair any deficiencies before leaving the site for the day.

.5 Leave no openings for water ingress into the roof assembly.

.6 Leave no base sheet exposed overnight unless all seams are sealed before leaving site.

.7 Progressively remove from the site all debris created by the execution of Work and dispose of at a certified disposal location. Contractor may be asked to produce proof of disposal location.

3.18 Field Quality Control

.1 Review and testing of membrane roofing and associated work will be done by an agency appointed and paid for by Owner. Notify Consultant at least 48 hours before commencement of any roofing work.

.2 Consultant may have cut tests made to establish quality of work. Such tests will be made in presence of Contractor. Cost of tests and subsequent repairs shall be borne by the Contractor.

.3 Notify Consultant in event that Specifications conflict with manufacturer's recommendations.

.4 Review and testing service does not relieve Contractor of responsibility for quality control.

END OF SECTION

1.0 GENERAL

1.1 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3 Canadian Roofing Contractors Association (CRCA) Roofing Practices Manual

.4 SMACNA Architectural Sheet Metal Manual

.5	ASTM A653/A653M	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
.6	ASTM A792/A792M	Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot Dip Process
.7	ASTM B152/B152M	Standard Specification for Copper Sheet, Strip, Plate, and Rolled Bar
.8	ASTM B370	Standard Specification for Copper Sheet and Strip for Building Construction
.9	CSA B111	Wire Nails, Spikes and Staples (Withdrawn)
.10	CSSBI S8	Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products

1.2 Submittals

.1 Samples:

.1 Submit samples of each condition including cross-cavity flashing, sill, head, cap, saddle, facia, etc.

.2 Submit samples of each type of material and colour to be used.

.2 Product Data: Provide manufacturer's technical data for each type of material to be used.

1.3 Mock-Up

.1 Assemble a mock-up of each condition, including cross-cavity flashing, sill, head, cap, saddle, facia, etc.) on site for Consultant review.

.2 Mock-up shall include all components of the system, including typical joints and connection hardware, and typical tie-ins to adjoining systems, all finished as specified.

.3 Modify mock-ups as Consultant may direct to meet specified requirements.

.4 Mock-up may remain as part of the Work.

.5 Allow 24 hours for Consultant review of mock-up before proceeding with work.

1.4 Delivery, Storage, and Handling

.1 Do not expose stored products to wetting or damage. Store neatly and properly stacked.

.2 Transport, handle, and store products so as to prevent damage. Stack preformed products in manner to prevent twisting, bending, and rubbing.

.3 Remove all units or components that are stained, watermarked, cracked, bent, chipped, scratched, or otherwise unsuitable for installation and replace with new.

.4 Protect finish and edges in accordance with manufacturer’s directions.

.5 Store material in accordance with manufacturer’s directions.

.6 Prevent contact of dissimilar metals during storage and protect from acids, flux, and other corrosive materials and elements.

2.0 PRODUCTS

2.1 Sheet Metal Materials

.1 Carbon Steel:

.1 G90 galvanized steel sheet to ASTM A653/A653M, commercial quality coating. Thickness: 24 gauge (0.6070 mm).

.2 Finish:

.1 Prefinished steel with factory applied silicone modified polyester on primer, both paint and primer back cured. Include paint system coating to reverse side of coil stock to prevent corrosion of backside surfaces and uniform colour.

.2 Performance Level: “CSSBI S8. Coating thickness not less than 25 µm ± 3 µm (1.0 mils ± 0.1 mils).

.3 Colour: The Owner will select up to four colours from manufacturer’s standard colour range.

.2 Copper:

.1 Sheet Copper: To ASTM B370, cold rolled temper, weighing not less than 16 oz./sq. ft. (10.7 kg/sq. m).

.2 Copper: To ASTM B152. Commercially pure alloy 110.

.3 Finish: Colour as supplied by mill and elected by the owner. Free of all water staining and weathering oxides.

.3 Aluminum:

.1 Standard Alloys: To AA Aluminum Standards and Data and to ASTM B209.

.2 Use a minimum 0.032” (0.81 mm) aluminum sheet thickness.

.3 Organic Coatings (Paint Finishes):

.1 Pigmented organic coatings shall be coil or spray applied in factory and meet performance requirements of AAMA 1402.

.2 Pretreatment of metal surfaces as required by paint manufacturer to provide proper surfaces for applying specified coating, in accordance with AAMA 1402 for coil coated sheet.

2.2 Accessories

.1 Underlay for Metal Flashing: Self-adhering membrane or equivalent with compatible primers and sealants. Acceptable Products:

.1 Lastobond Shield HT by Soprema.

.2 Jiffyseal 140/60 by ProtectoWrap Company.

.3 Blueskin PE 200 HT by Henry

.4 Or approved alternative.

.2 Sealants: Compatible with the roofing membranes and as recommended by the roofing membrane manufacturer.

.3 Cleats and Starter Strips: Of same materials and temper as sheet metal, minimum 50 mm (2”) wide x thickness same as sheet metal being secured.

.4 Fasteners: Of same material as sheet metal, corrosion resistant, to CSA B111, flat head roofing nails of length and thickness suitable for metal flashing and trim application.

.5 Washers: Of same material as sheet metal, 1.0 mm thick with rubber packings.

.6 Touch-Up Paint: As recommended by prefinished material manufacturer.

2.3 Fabrication

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA and SMACNA details and specifications.

.2 Form to maximum 2400 mm (8 ft.) lengths using one piece for each flashing section. Make allowance for expansion at joints.

.3 Use standing seams for all joints and splices for cap flashings. Use flat-lock seams where cap flashings are accessible to occupants.

.4 Hem exposed edges on underside 12 mm; mitre and seal corners with sealant.

.5 Form sections square, true, and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.6 Form metal flashing on a bending brake with shaping trimmed. Perform hand seaming on a bench, as far as practicable, with proper sheet metal working tools. Make angles of bends and folds for interlocking metal with full regard to expansion and contraction to avoid buckling and damage to metal.

.7 Form flashings, copings, and fascia to profiles indicated on Drawings and as required to complement and finish membrane roofing and wall systems.

2.4 Saddle and Cap Flashings

.1 Shop fabricate complete saddle flashing in one piece with soldered seams. Grind seams smooth, prime, and shop paint to match sheet stock.

2.5 Eavestroughs and Downpipes

.1 Form eavestroughs and downpipes from aluminum.

.2 Use standard sizes and profiles to match existing drainage system.

.3 Provide goosenecks, outlets, strainer baskets, and necessary fastenings.

.4 Splash Pads: Precast concrete or as indicated on the drawings.

2.6 Scuppers

.1 Form scuppers from copper in sizes and profiles indicated on Drawings.

.2 Provide necessary fastenings.

3.0 EXECUTION

3.1 Examination

.1 Examine surfaces to receive flashings. Notify the Consultant of surfaces that are considered unacceptable to receive work of this Section.

3.2 Preparation

.1 Protect work of other Sections from damage by work of this Section.

3.3 Installation - General

.1 Install sheet metal work in accordance with CRCA standards.

.2 Use concealed fastenings throughout, except where approved by the Consultant prior to the start of work.

.3 Provide underlay under sheet metal; secure in place and lap joints 100 mm (4”).

.4 Counter-flash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flashing joints using standing seams forming tight fit over hook strips.

.5 Use flat-lock joints for all metal flashing except roof. S-pocket and standing seams are acceptable. Lock end joints and caulk with sealant.

3.4 Counter Flashings

.1 Install metal counter flashings as soon as possible after membrane flashings are in place and reviewed by Consultant.

.2 Counter flashing shall have crimped bottom edge, stiffening break, and extend at least 400 mm (16”) up verticals or as detailed on Drawings and extend down to horizontal plane of roof surface.

.3 Where detailed on Drawings, turn top edge of flashing into walls, secure with lead wedge or friction fit pins into reglet, and caulk at joint to wall.

.4 Secure sections in S-pocket joints and allow sufficient tolerance for expansion and contraction between each piece.

.5 Secure metal counter flashing a minimum of 300 mm (12”) above roof membrane. Use fasteners of sufficient length to penetrate at least 25 mm (1”) into substrate.

3.5 Cap Flashings

.1 Supply and install continuous metal starter strips, secure at 600 mm o.c. (24” o.c.), maximum of 50 mm above drip edge, with fastener of sufficient length to penetrate a minimum of 25 mm (1”) into substrate.

.2 Supply and install metal cleats at 600 mm o.c. (24” o.c.) and as detailed. Use fastener of sufficient length to penetrate a minimum of 25 mm (1”) into substrate.

.3 Form cap flashings to profiles shown on Drawings and ensure positive drainage to interior roof surface areas.

3.6 Eavestroughs and Downpipes

.1 Install eavestroughs in maximum 15 m (50 ft.) lengths, and secure to building at 750 mm o.c. (30”) with eavestrough fastener bracket with screw. Slope eavestroughs to downpipes. Provide at least one downspout per 15 m (50 ft.) of eavestrough length. Solder and seal joints watertight.

.2 Install downpipes and provide goosenecks back to wall. Secure downpipes to wall with straps at 1800 mm (6 ft.) o.c.; minimum two straps per downpipe. Seal all nail penetrations at straps.

.3 Connect downpipes to drainage system and seal joint with plastic cement. If drainage system is not accessible, install splash pans.

3.7 Scuppers

.1 Install scuppers in accordance with applicable CRCA standards.

3.8 Touch-Up and Cleaning

.1 Remove grime and dirt from flashing materials by dry wiping as material is erected.

.2 Remove all excess solder. Remove excess sealant with sealant manufacturer recommended solvent that will not harm finish.

.3 Wipe off all handprints, smudges, and other superficial stains.

.4 Remove and replace all dented and damaged materials.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary for the complete installation of sprayed fireproofing as indicated on the Drawings and as described herein.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CAN/ULC-S101	Standard Methods of Fire Endurance Tests of Building Construction and Materials
.4	ASTM E72	Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
.5	ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials
.6	ASTM E119	Standard Test Method for Fire Tests of Building Construction and Materials

.7 ULC - List of Equipment and Materials - Volume III - Fire Resistance Ratings

1.3 Qualifications

.1 Applicator of work under this section shall be licensed by material manufacturer and be qualified and skilled in this type of application. Use materials and equipment recommended by manufacturer and execute all work in accordance with more rigorous requirements of Contract Specifications and manufacturer’s recommendations.

1.4 Performance Requirements

.1 Fireproofing system shall provide the fire resistance rating specified on the Drawings to restrained structural steel sub-framing assemblies in accordance with ULC listed ratings.

.2 Fireproofing system shall have been tested by Underwriters' Laboratories of Canada, or other certified testing agency, in accordance with ASTM E119 and CAN/ULC-S101.

.3 Applied fireproofing shall remain free from cracks, checking, dusting, flaking, spalling, separation, and/or blistering, and withstand abrasion relative to the occupancy and exposure of the installation.

1.5 Submittals

.1 Submit for Consultant review, within one week of project start-up, product data including ULC Design Nos., assemblies, and thicknesses of various required applications.

.2 Certified copies of reports verifying sprayed fireproofing applied to substrates on site will meet or exceed requirements specified under the intended application and details.

1.6 Product Handling

.1 All materials shall be delivered, stored, and handled to prevent inclusion of foreign materials and damage of materials by water or breakage. Material shall be delivered and stored in original packages until ready for use. Packages or materials showing evidence of water or other damage shall be rejected. Materials shall be delivered to the job site in sealed bags, which are labelled to identify the application for which the product is intended.

1.7 Protection

.1 Provide natural ventilation to properly dry the fireproofing during and subsequent to its application. In enclosed areas lacking openings for natural ventilation, interior air shall be circulated and exhausted to the outside.

.2 Use polyethylene protection sheets to prevent spray from contaminating air beyond application area.

.3 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.

.4 Provide heating, hoarding, and ventilation as required to permit application of firespray materials in strict accordance with more rigorous requirements of Contract Specifications and manufacturer's recommendations.

1.8 Quality Control

.1 Control thickness with an appropriate gauge as the work proceeds and provide access and assistance to the Consultant to verify thickness.

.2 Do not apply fireproofing when ambient or substrate temperature is 10°C or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours prior to, during, and for 24 hours after product application.

.3 Ventilate building spaces during and after application of fireproofing according to manufacturer's written instructions until fireproofing dries thoroughly.

1.9 Warranty

.1 Provide a certificate stating that sprayed fireproofing has been completed as specified and in full accordance with requirements of Contract Specifications and manufacturer’s requirements to provide the necessary fire resistance ratings.

.2 Provide a warranty stating that applied fireproofing will remain free from cracks, checking, dusting, flaking, spalling, separation and/or blistering for a warranty period of three (3) years and that upon failure to provide such performance, Contractor will reinstall or repair sprayed-on fireproofing to the satisfaction of the Owner at no additional cost.

2.0 PRODUCTS

2.1 Materials

.1 Sprayed Fireproofing shall be ULC labelled and listed.

.2 Sealer: Type recommended by fireproofing manufacturer.

.3 Water shall be clean, fresh, and free from organic mineral impurities that would be harmful to sprayed materials.

.4 All materials shall be asbestos free.

2.2 Manufacturers

.1 Cementitious Fireproofing

.1 “Cafco 300” as manufactured by Isolatek International

.2 "Pyrocrete 241" as manufactured by Carboline.

.3 "A/D Type 5" as manufactured by A/D Fire Protection Systems

.2 Fibrous Fireproofing

.1 "A/D Type FP" as manufactured by Double A/D Distributors.

.2 "Hibar" as manufactured by Celufibre Industries Ltd.

3.0 EXECUTION

3.1 Preparation

.1 All surfaces to which sprayed fireproofing will be applied shall be free of oil, grease, dirt, loose paint, mill scale, or any other material that would impair bond.

.2 Verify that painted substrate are compatible and have suitable bonding characteristics to receive sprayed fireproofing.

.3 Remove incompatible materials.

.4 All clips, hangers, supports, sleeves, and other attachments to fireproofing bases, as covered under other sections of the specifications, are to be placed by others prior to application of fireproofing material, where these attachments can be anticipated in advance.

.5 Cover other work subject to damage from fallout or overspray of fireproofing materials during application.

.6 Application of fireproofing to underside of roof deck shall not commence until roof is completely installed and tight. When roof traffic is anticipated, as in the case of periodic maintenance, protection shall be installed as a walkway to distribute loads.

3.2 Application

.1 Application of sprayed fireproofing shall be in accordance with printed instructions of material manufacturer and fire test report information, to thickness required to achieve specified fire rating in accordance with ULC requirements.

.2 Upon request, a qualified manufacturer's representative shall be present for initial application to guide and assist application's personnel.

.3 Provide natural ventilation to properly dry fireproofing during and subsequent to its application. In enclosed areas that lack openings for natural ventilation, interior air shall be circulated and exhausted to the outside.

.4 Mask supply and return ducts with polyethylene sheeting prior to spraying.

.5 Mask sprinkler heads, and all other equipment and fixtures in immediate area that could be damage or impaired by overspray. Note: Sprinklers heads that are not completely protected cannot be cleaned and must be replaced at Contractor’s expense.

.6 Apply bonding adhesive or primer to substrate as recommended by manufacturer.

.7 Apply sprayed fireproofing to correspond with tested assemblies, or acceptable calculation procedures to provide specified fire resistance rating to structural steel.

.8 Apply sprayed fireproofing over substrate, building up to required thickness to cover substrate with monolithic blanket or uniform density and texture.

.9 Cure fireproofing according to manufacturer's written recommendations.

.10 Apply sealer or curing compound to surface of sprayed fireproofing as required by manufacturer.

3.3 Inspection and Testing

.1 Inspection and testing of sprayed fireproofing will be carried out by Testing Laboratory designated by Owner.

.2 Owner will pay costs for testing.

3.4 Patching

.1 Patch damage to fireproofing caused by testing or by other trades before fireproofing is concealed and before final inspection.

3.5 Clean Up

.1 After completion of fireproofing work, remove equipment and clean all wall, floor, and soffit areas of deposits of sprayed materials.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and install materials in accordance with published 'Through-Penetration Firestop Systems' in UL's Fire Resistance Directory or the publication of another approved independent laboratory.

1.2 REFERENCE STANDARDS

.1 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S115-05, Standard Method of Fire Tests and Firestop Systems

.2 American Society for Testing and Materials (ASTM):

.1 ASTM E814-11a, Standard Test Method for Fire Tests of Penetration Firestop Systems

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Shop Drawings:

.1 Provide details indicating all reinforcing, anchorages, fastening and proposed method of installation for the various conditions within the project.

.3 Samples:

.1 Submit samples of each type of firestop and smokeseal material and accessory.

1.4 QUALITY ASSURANCE

.1 Applicator shall be licensed by the manufacturer of fireproofing materials.

.2 Conform to flame and temperature ratings established by CAN/ULC-S115-05 and ASTM E814-11a.

.3 Submit manufacturer's certification that materials meet or exceed specified requirements.

.4 Maintain flame and temperature ratings equal to surrounding materials.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Deliver materials in original, unopened packages bearing name of manufacturer and product identification.

.2 Store materials off ground, under cover, and away from damp surfaces.

1.6 SITE CONDITIONS

.1 Do not apply materials when temperature of substrate material is below 4 deg C and surrounding air temperature is below 4 deg C, for 24 hours prior to application.

2 Products

2.1 MATERIALS

.1 Bears UL, ULC or Warnock Hersey label and confirmation of compliance with ASTM E814-11a or CAN/ULC-S115.

.2 Provide fire stopping and smoke sealing systems in accordance with CAN/ULC-S115-M and shall also conform to special requirements in part 3.5 of the Building Code.

.3 Fire-resistant rating of fire stopping material assemblies must meet or exceed the fire-resistance rating of the floor or wall section being penetrated.

.4 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control shall be elastomeric seal type. Do not use a cementitious, or rigid seal at such locations.

.5 Primers shall be to manufacturer's recommendation for specific material, substrate, and end use.

.6 Damming and backup materials, supports and anchoring devices shall be to manufacturer's recommendations, and in strict accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.7 Sealants for vertical joints, shall be non-sagging type.

3 Execution

3.1 PROTECTION

.1 Mask adjacent work of other Sections as necessary to avoid spillage onto adjoining surfaces. Remove stains on adjacent surfaces as required.

3.2 PREPARATION

.1 Examine sizes and conditions to establish correct thickness and installation of backup materials. Ensure surfaces are dry and frost free.

.2 Clean bonding surfaces of deleterious substances including dust, paint, rust, oil, grease and other foreign matter which may otherwise impair effective bonding.

.3 Do not apply firestops and smokeseals to surfaces previously painted or treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Prepare surfaces in accordance with manufacturer's instructions.

.5 Priming and Sealing: Prime surfaces in accordance with manufacturer's instructions.

3.3 APPLICATION

.1 Mix materials in accordance with manufacturers' written instructions.

.2 Apply in strict accordance with ULC certification and manufacturer's recommendations to provide a temperature and flame rated seal equal as a minimum to the rating of the wall or floor surrounding.

.3 Seal all holes or voids made by penetrations to ensure an air and water resistant seal.

.4 Seal all joints to ensure an air and water resistant seal, capable to withstand compression due to thermal, wind or seismic joint movement.

.5 Consult with Mechanical Engineer and project manager prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.

.6 Apply to mechanical and electrical service through-penetrations, to formed, sleeved, or cored openings in smoke and fire rated masonry, or gypsum wallboard stud walls and structural floors and ceilings.

.1 Coordinate with plumbing, HVAC and electrical contractors to ensure proper firestopping application, providing smokeseal around penetrations through fire rated assemblies. Ensure that end joints between lengths of firestopping material have been properly sealed.

.7 Apply to head of smoke and fire rated gypsum wallboard stud wall abutting underside of structure (concrete or steel deck).

.8 Apply to control joints in rated stud walls.

.9 Apply to penetrations for passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire rated vertical barriers (walls and partitions), horizontal beams (floor/ceiling assemblies) and vertical service shaft walls and partitions.

.10 Apply to safing slots gaps between edge of floor slabs and curtain walls.

.11 Apply to openings between structurally separate sections of walls and floors.

.12 Apply to gaps between tops of walls and ceiling or roof assemblies.

.13 Apply to expansion joints in fire rated walls and floors.

.14 Apply to openings and penetrations in fire rated partitions or walls containing fire doors.

.15 Apply to openings around structural members which penetrate fire rated floors or walls.

.16 Apply firestop and smokeseal materials in accordance with manufacturer's directions, with sufficient pressure to properly fill and seal openings.

.17 Tool or trowel exposed surfaces.

.18 Remove excess compounds promptly as work of this Section progresses and upon completion of work of this Section.

3.4 CURING

.1 Cure materials in accordance with manufacturer's instructions.

.2 Do not cover up materials until proper curing has taken place.

3.5 IDENTIFICATION

.1 Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, prepreinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

.1 The words: "Warning: Through-Penetration Firestop System - Do Not Disturb"

.2 Contractor's name, address and telephone number.

.3 Designation of applicable testing and inspection agency.

.4 Date of installation.

.5 Manufacturer's name for firestop materials.

3.6 CLEAN UP AND REPAIRS

.1 Clean adjacent surfaces immediately and leave work neat and clean.

.2 Remove excess materials using recommended procedures, as work progresses.

.3 Remove dams after initial set of firestops and smokeseals as required.

.4 Correct staining and discolouring of adjacent surfaces as directed by Consultant.

.5 Remove all debris and excess materials entirely from the site and leave the work in a neat and tidy condition.

.6 Perform one simulated smoke test for each penetration type once per day. Simulate smoke at a rate of four seconds/100 cubic feet (2.8 cubic metres) and maintain the fog density until inspection is complete.

.7 After inspection is complete, repair all defective firestopping and smokeseals and test again. Continue this procedure until all firestopping and smokeseals passes test.

END OF SECTION

1.0 GENERAL

1.1 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	ASTM C679	Standard Test Method for Tack-Free Time of Elastomeric Sealants
.4	ASTM C719	Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)
.5	ASTM C794	Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
.6	ASTM C920	Standard Specification for Elastomeric Joint Sealants
.7	ASTM C1193	Standard Guide for Use of Joint Sealants
.8	ASTM C1248	Standard Test Method for Staining of Porous Substrate by Joint Sealants
.9	ASTM C1472	Standard Guide for Calculating Movement and Other Effects When Establishing Sealant Joint Width
.10	ASTM C1521	Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints
.11	ASTM D412	Standard Test Method for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers—Tension
.12	ASTM D2202	Standard Test Method for Slump of Sealants

.13 Sealant, Waterproofing and Restoration Institute (SWRI) publication, Sealants: The Professionals' Guide 2013.

1.2 Submittals

.1 Samples:

.1 Submit samples of each type of material and colour to be used and to facilitate colour selection.

.2 Cure samples under equivalent conditions to job site, before submission.

.2 Submit letters from sealant manufacturer’s representative that all areas and surfaces were inspected and found satisfactory to receive materials, in accordance with sealant manufacturer's requirements.

1.3 Quality Assurance

.1 Sealant manufacturer’s representative shall review site conditions, joint design, and installer’s qualifications. Report unsatisfactory conditions to the Consultant.

.2 Representative shall check container labels, randomly inspect preparation of substrate materials, and perform random testing of installed work in at least three (3) locations.

.1 Cut test locations to be 150 mm long.

.2 Certify thickness, hardness, and surface finish conform to intended design.

.3 Report to the Consultant.

1.4 Qualifications

.1 Perform the work of this Section using skilled mechanics having at least five (5) years of experience, and trained and competent in use of sealant materials.

1.5 Mock-Up

.1 Construct mock-up to show location, size, shape and depth of joints complete with back-up material, primer, caulking, and sealant.

.2 Construct mock-up in location directed by the Consultant.

.3 Joint to be size, shape, and depth of joints applicable to work, complete with back-up material, primer, and sealant.

.4 Mock up may be part of finished work.

.5 Allow 24 hours for review of mock-up by Consultant before proceeding with sealant work.

.6 Test sealant in contact with samples of materials to be caulked to ensure that proper adhesion will be obtained and no staining of any materials will result. Prepare joint samples at the site of each type of sealant for each joint condition.

1.6 Performance Requirements

.1 Sealant system shall satisfy the following requirements for the duration of the warranty period:

.1 Totally waterproof, flexible, and thermally compatible with substrate under applicable service conditions.

.2 Provide a weathertight seal that does not allow moisture penetration.

.3 Withstand active cyclical movements of 100% extension and 50% compression of joint width and remain bonded and watertight.

.4 Shall not debond, crack, or craze.

.5 Shall not leak.

.2 Reference to products does not relieve manufacturer of responsibility to comply fully with all specified criteria.

1.7 Delivery, Storage, and Handling

.1 Deliver, handle, store, and protect materials as recommended by materials manufacturer.

.2 Deliver and store materials in original wrappings and containers with manufacturer’s seals and labels, intact. Protect from freezing, moisture, water, and contact with ground or floor.

.3 Store material in heated conditions during winter work.

1.8 Field Conditions

.1 Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Labour Canada.

.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 Minimum application temperature for sealant to be per sealant manufacturer's written application instruction.

.4 Special care must be taken to ensure that substrate surfaces are clean and dry. If applying sealants below 4°C, the applicator is to consult with the sealant manufacturer and follow any additional recommendations.

2.0 PRODUCTS

2.1 Materials

.1 Joint Cleaner: Xylol, methylethylketone, alcohol, or non-corrosive type recommended by sealant manufacturer and compatible with joint forming materials.

.2 Primers: Types recommended by sealant manufacturer.

.3 Joint Back-Up: Round closed cell foam, extruded polyolefin, Shore A hardness of 20, tensile strength 140 to 200 kPa, oversized 30-50%, compatible with sealant and primer, non-adhering to sealant, and non-gassing.

.4 Bond Breaker: Pressure-sensitive plastic tape that will not bond to sealants.

.5 Sealants:

.1 Category 1: One part silicone conforming to ASTM C920 Type S, Grade NS, Class 50, Use NT, M, A, O

.1 795 by Dow Corning.

.2 Spectrem 2 by Tremco Ltd.

.3 Approved alternative.

.2 Category 2: One part silicone conforming to ASTM C920 Type S, Grade NS, Class 100/50, Use NT, M, A, O

.1 790 by Dow Corning.

.2 Spectrem 1 by Tremco Ltd.

.3 Colour of Sealants: Selected by the Owner to match adjacent finishes. Contractor to provide colour samples to facilitate selection.

3.0 EXECUTION

3.1 Examination

.1 Examine surfaces before commencing work of this Section.

.2 Installation of sealant implies acceptance of surfaces. Notify Consultant in writing of any existing conditions that may affect bonding or performance of the sealant for resolution before installation of materials.

3.2 Preparation

.1 Ensure ambient and existing site conditions are suitable for installation of work of this Section, as recommended by manufacturer.

.2 Ensure all existing sealant and extruded tapes are removed and surfaces prepared and primed in accordance with manufacturer's recommendations.

.3 Prepare surfaces in strict accordance with manufacturer's recommendations, including preparation and smoothing of rough surfaces and detailing of cracks, joints, and voids.

.4 Ensure joint surfaces are sound and free of all moisture, dust, oils, and other materials that may adversely affect sealant bond.

.5 Minimum standard of cleaning for brick surfaces shall be grinding or equivalent to remove all traces of existing sealant and to expose clean substrate.

.6 Clean metal flashings and mullions so as not to damage surface finishes.

.7 On non-porous substrates, use a two-wipe method when cleaning. First wipe shall contain the solvent, followed immediately by second wipe with a clean cloth to collect any re-deposited material loosened by the first wipe.

.8 After cleaning, ensure that joints are dry, dust free, and frost free before applying sealant.

.9 Examine joint sizes and correct to achieve depth ratio of one-half of joint width with minimum width and depth of 6.0 mm and maximum width of 25 mm.

.10 Install joint back-up to achieve correct joint depth.

.11 Where necessary to prevent staining, mask adjacent surfaces before priming and caulking.

.12 Apply bond breaker tape where required, in accordance with manufacturer's instructions.

.13 Prime sides of joints in accordance with manufacturer's instructions immediately before caulking.

3.3 Application

.1 Apply sealants in accordance with manufacturer's instructions. Apply 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, and embedded impurities. Tool surface neatly to produce slight concave joint.

.3 Do not use application procedures that result in toxic fumes or flammable solvents collecting and endangering workers or building occupants.

.4 Category 1: Apply sealant to following exterior locations.

.1 At leading edges and counter flashing.

.2 Around perimeter of exterior wall penetrations (window or door framing to cladding).

.3 Metal-to-metal joints.

.4 Where detailed.

.5 Category 2: Apply sealant to following interior locations:

.1 Brick-to-brick joints.

.2 At junctions of dissimilar materials.

.3 Where detailed.

.6 Cure sealants in accordance with sealant manufacturer's instructions.

3.4 Field Quality Control

.1 Provide safe access for Consultant to perform periodic reviews of various phases of the work of this Section.

.2 Notify Consultant and any testing agency that may be designated by the Consultant 24 hours in advance of work to be performed under this Section.

.3 Repair test locations.

.4 Tests may be performed at the Consultant's discretion to confirm in-situ material thickness.

3.5 Cleaning and Protection

.1 Clean adjacent surfaces immediately and leave work neat and clean. Remove excess sealant and droppings, using recommended cleaners as work progresses. Remove masking tape after tooling of joints.

.2 Protect caulked joints until sufficiently cured.

.3 Protect completed work of this Section from staining or contamination.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, material, equipment, supervision, and services necessary to:

.1 Install a drilled through-wall injection grid suitable for curtain injection through brick masonry walls/ mortar joints at face of wall.

.2 Pressure inject acrylic gel through installed injection grid to the backside of walls with ground contact for external sealing.

.3 Area inject acrylic gel into highly porous, jointed, or cracked building materials and cavities to seal against moisture ingress.

.4 Patch injection grid with manufacturer recommended patch material to within ¾” to 1” of interior face of wall and point remaining area with mortar colour-matched to existing mortar to remain.

1.2 Performance Requirements

.1 Curtain grout injection shall satisfy the following requirements:

.1 System shall be totally waterproof, flexible, and thermally compatible with the substrate under applicable service conditions.

.2 System shall not allow moisture penetration to the interior.

1.3 Submittals

.1 Upon request, submit a letter confirming the following:

.1 Workers that will perform work for this Section have a minimum of five years of experience successfully applying materials specified in this Section, or workers have been properly trained and will be supervised by someone who is properly trained and has necessary experience.

.2 Workers and supervisors have read and understand requirements described in the supplier literature and application instructions.

.3 Workers will have proper and adequate equipment, including a plural component pump so as to be able to complete the work according to provisions of this Section and supplier instructions.

.2 Submit with bid a description of products and methods to be used to seal wall cracks.

.3 Submit Safety Data Sheets (SDS) and product technical data seven days prior to arrival of equipment and material on site.

1.4 Warranty

.1 Submit a joint warranty in conjunction with supplier to Consultant that warrants the repaired areas against water leakage. Supplier and Contractor shall jointly repair areas of moisture ingress that manifest within the warranty period of five (5) years commencing from the date of Substantial Performance.

1.5 Delivery, Storage, and Handling

.1 Deliver materials to job site in sealed undamaged containers with labels intact and legible, indicating material name, date of manufacture, and lot number.

.2 Store materials in indoors or outdoors and covered, at temperatures of 5°C or higher.

2.0 PRODUCTS

2.1 Materials

.1 Products shall be solvent-free water activated polyurethane gel and have a highly elastic foam-hydro-gel and must be resistant to pressurized water.

.2 It is the responsibility of the Contractor to develop the correct mix proportions to achieve a consistent curtain injection.

2.2 Approved Products

.1 KOSTER Injection Gel G4 as manufactured by KOSTER American Corporation.

.2 KOSTER KB-FIX 1: Fast-setting, waterproof, and weatherproof mortar as manufactured by KOSTER American Corporation.

2.3 Accessories

.1 Distributor lances and injector (packer) as recommended by the supplier.

.2 KOSTER KB-Pur Cleaner or other suitable solvent recommended by the supplier.

.3 KOSTER Joint Sealant FS-H for horizontal surfaces and FS-V for vertical surfaces.

.4 KOSTER Joint Tape 20 and 30 for sealing expansion and isolation joints and cracks.

2.4 Equipment

.1 Injection shall be performed using equipment approved by curtain wall gel supplier and capable of continuous pumping at constant pressures.

.1 Two-component injection pumps are required with an adjustable mix ratio from 1:1 to 1:15 feature. Example: KOSTER Acrylic Gel Pump (supplied by KOSTER American Corp.) or as recommended by the supplier.

.2 Solvent and moisture resistant hose.

.3 Distributor injection lances (for curtain and area injection) usually 18 mm x 300 mm or 18 mm x 550 mm supplied by KOSTER American Corp. or as recommended by the supplier.

.4 Hammer Drill: Air powered or electric with 110-volt continuous electrical supply.

2.5 Project Conditions

.1 Install material in accordance with safety and weather conditions required by the supplier or as modified by applicable rules and regulations of local, provincial, and federal authorities having jurisdiction.

.2 Curing conditions for acrylic gel:

.1 Install and cure material with temperature maintained between 5°C and 49°C.

.2 Cure times are affected by water temperature. Lower temperatures and/or excess water can extend or prevent curing.

3.0 EXECUTION

3.1 Preparation

.1 Thoroughly review entire surface of area to be chemical gel injected to determine applicability of gel materials in respect to thickness of wall or floor, existence to any foreign materials harmful to application of chemical gel used, inspection of soil grade, deterioration of concrete surface and existing cracks which shall be repaired and sealed prior to application.

.2 If Contractor finds any cracks/joints being too wide to receive an application of gel material to be used, submit to Consultant a complete report regarding locations and minimum and maximum thickness and length of cracks/joints. Consultant will indicate required crack detailing in conformance with supplier requirements.

.3 Where any detrimental foreign materials exist, Contractor shall follow recommendations of chemical gel supplier, subject to Consultant's approval, in respect to material and methods of cleaning or removing foreign materials.

.4 Holes are drilled through the construction member to be sealed in a grid of maximum 12" (300 mm) horizontally and vertically, every second row centrically offset, or in a consistent grid pattern where second row is directly below first packer placed. Diameter of holes depends on packers chosen.

.5 Existing joints are cleaned out and closed using suitable means prior to injection with Koster KB-Fix 1. Along crack, holes are drilled on alternating sides of the crack at a 45-degree angle to the surface at a maximum distance of 19.5" (495 mm) from each other on each side.

3.2 Application

.1 Chemical gel shall be pumped and pressure injected in lance or packers that have been inserted into pre-drilled holes. Packers compatible with the gel material to be used shall be installed.

.2 Applicator shall allow gel material sufficient time to flow into all lances and/or packers on its own.

.3 Contractor shall clean surfaces of excess chemical gel used by proper means recommended by the manufacturer and/or supplier. Lances and/or packers shall not extend beyond the plane of the surface of the existing concrete.

.4 Contractor shall be responsible for performing test injections at a minimum of three selected locations to finalize on material selections, injection procedures with mixing ratios for viscosity, and testing procedures prior to the start of work.

3.3 Clean Up

.1 Scrape clean wall surfaces affected by the Work.

.2 Infill and smooth injection array. The last ¾” to 1” of infill is to be with mortar colour-matched to existing jointing.

.3 Remove all debris and surplus material from site and leave work area in a condition acceptable to Consultant.

END OF SECTION

PART 1 - GENERAL

1.1 Work Included: As detailed or scheduled in the contract documents, supply of:

.1 Steel frame products including frames, transom frames (glazed or paneled), sidelight and window assemblies, fire-rated and non-rated, interior and exterior.

.2 Steel panels, fixed or removable, flush or rabbetted, similar in construction to steel doors, for use in steel frame product.

.3 Steel doors, swing type, flush, with or without embossed face sheets, with or without glazed or louvered openings, fire-rated, with or without temperature rise ratings, and non-rated.

1.2 References

.1 ANSI/NFPA 80-1999, Standard for Fire Doors and Fire Windows

.2 ASTM A653/A653M-05a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process

.3 ASTM C553-02, Specification for Mineral Fiber Blanket Insulation for Commercial and Industrial Applications

.4 ASTM C578-05, Specification for Rigid, Cellular Polystyrene Thermal Insulation

.5 ASTM C591-01, Specification for Un-Faced Pre-formed Rigid Cellular Polyisocyanurate Thermal Insulation

.6 ASTM C592-04, Specification for Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction

.7 ASTM C1289-05a, Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

.8 CAN4-S104-M80, Standard Method for Fire Tests of Door Assemblies

.9 CAN4-S106-M80, Standard Method for Fire Tests of Window and Glass Block Assemblies

.10 CGSB 41-GP-19MA (1984), Rigid Vinyl Extrusions for Windows and Doors

.11 CSA W59-2003, Welded Steel Construction (Metal Arc Welding)

.12 CSDMA, Recommended Dimensional Standards for Commercial Steel Doors and Frames, 2000

.13 CSDMA, Selection and Usage Guide for Steel Doors and Frames, 1990

.14 CSDMA, Recommended Specifications for Commercial Steel Door and Frame Products – 08 11 00, 2006

1.3 Submittals

.1 Submit shop drawings in accordance with Division 01.

.2 Indicate each type of door, frame, steel, construction and core.

.3 Indicate material thickness, mortises, reinforcements, anchorages, locations of exposed fasteners, openings (glazed, paneled or louvered) and arrangement of standard hardware.

.4 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule of the Architect.

.5 Contractor responsible for coordination and installation of products provided under this Section shall;

.1 Verify and provide to the contractor responsible for the supply of steel door and frame products, actual opening sizes and field conditions by field measurement before fabrication. Submittal drawings shall reflect measurements and conditions provided, and product manufactured accordingly. Coordinate field measurements with fabrication and construction schedules to avoid delays.

.2 Verify that substrate conditions, whether existing or installed under other Sections, are as detailed in the Architect's drawings, and are acceptable for product installation in accordance with the manufacturer's instructions.

.6 Manufacturer shall not proceed with fabrication without receipt of approved submittal drawings and approved hardware schedule.

1.4 DEFINITIONS

.1 Base Metal Thickness: Thickness dimensions are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic coated steel sheets.

.2 Opening Sizes: Standard metric door sizes indicated on the Drawings, are considered nominal dimensions, measured from frame rabbet width and height, with allowances for nominal clearances between head, jamb and door bottom in accordance with CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames.

1.5 QUALITY ASSURANCE

.1 Manufacturer: Obtain hollow metal doors and frames from single source of supply and from a single manufacturer, and as follows:

.1 Fabricate work of this Section to meet the requirements of the Canadian Steel Door and Frame Manufacturer's Association, Manufacturing Specification for Doors and Frames as a minimum, and as further modified in this section.

.2 Fabricator shall be a member in good standing of the Canadian Steel Door and Frame Manufacturer's Association.

.2 Supplier: Obtain hollow metal doors and frames from single source of supply and from a single manufacturer.

.3 Installer: Use installers who are experienced with the installation of hollow metal doors and frames of similar complexity and extent to that required for the Project.

.4 Testing Agencies: Provide doors produced under label service program of a testing agency acceptable to Authorities Having Jurisdiction, and as follows:

.1 Steel Fire Rated Doors and Frames: Labelled and listed by an organization accredited by Standards Council of Canada for ratings specified or indicated.

.2 Provide fire labelled frame products for those openings requiring fire protection ratings, as scheduled:

.1 List by nationally recognized agency having factory inspection service and construct as detailed in Follow-up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

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

1.6 DELIVERY, STORAGE AND HANDLING

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off-the-ground, under cover storage location. Do not load any area beyond the design limits.

.2 Adequately protect units against rust and damage during manufacture, delivery and storage.

.3 Store materials on planks in a dry area and cover to protect from damage. Make good immediately any damage done. Clean scratches and touch-up with rust-inhibitive primer.

1.7 SITE CONDITIONS

.1 Site Measurements: Verify actual dimensions of openings by site measurements before fabrication and indicate measurements on shop drawings; coordinate fabrication schedule with construction progress to avoid delaying the Work.

.2 Established Measurements: Establish dimensions and proceed with fabricating doors and frames without site measurements where site measurements cannot be made without delaying the Work; coordinate construction to ensure that actual site dimensions correspond to established dimensions.

1.8 Warranty

.1 Materials and workmanship shall be warranted by the manufacturer for a period of one (1) year from date of substantial performance.

PART 2 - PRODUCTS

2.1 Materials

.1 Acceptable Materials: Steel doors and frame product manufactured in accordance with this Specification by CSDMA members, are eligible for use on this project.

.2 Steel: Commercial grade steel to ASTM A653, CS, Type B, Coating Designation ZF75 (A25) minimum. Minimum steel thicknesses shall be in accordance with Appendix 1 of the CSDMA, "Recommended Specifications for Commercial Steel Door and Frame Products".

.3 Door Core Materials

.1 Honeycomb (Interior Doors). Structural small cell 25.4 mm (1") maximum kraft paper 'honeycomb'. Weight: 36.3 kg (80lb.) per ream minimum, density: 16.5 kg/m3 (1.03 pcf) minimum, sanded to required thickness.

.2 Polyisocyanurate (Exterior Doors). Rigid, modified polyisocyanurate, fire retardant treated, closed cell board. Density; 32 kg/m3 (2.0 pcf) minimum, thermal values; RSI 1.9 (R 11.0) minimum, in accordance with ASTM C591 (un-faced) or C 1289 (faced).

.4 Primers

.1 Rust inhibitive touch-up only.

.5 Miscellaneous

.1 Door Silencers. Single stud rubber/neoprene type.

.2 Exterior Top Caps. Rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19MA.

.3 Frame Thermal Breaks. Rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19MA.

2.2 Fabrication - Frame Products

.1 Exterior frame product shall be 14 gauge. Exterior frames shall be welded type construction, thermally broken. Exterior transom frames, sidelight and window assemblies shall be welded type construction, thermally broken. Interior frame product shall be 14 gauge. Interior frames and window assemblies shall be welded type construction. Interior transom frames shall be welded type construction. Interior sidelight assemblies shall be welded type construction.

.2 Frame product shall be mortised, blanked, reinforced, drilled and tapped at the factory for templated hardware only, in accordance with the approved hardware schedule and templates provided by the hardware supplier.

.3 Mortised cutouts shall be protected with steel guard boxes (may be omitted on dry wall applications).

.4 Frame product shall be reinforced only, where required, for surface mounted hardware, anchor hinges, thrust pivots, pivot reinforced hinges, or non-templated hardware. Drilling and tapping is by others, on site, at time of installation.

.5 Provide anchorage appropriate to floor, wall and frame construction. Each wall anchor shall be located immediately above or below each hinge reinforcement on the hinge jamb and directly opposite on the strike jamb. For rebate opening heights up to and including 1520 mm (60") provide two (2) anchors, and an additional anchor for each additional 760 mm (30") of height or fraction thereof, except as indicated below. Frames in previously placed concrete, masonry or structural steel shall be provided with anchors located not more than 150 mm (6") from the top and bottom of each jamb, and intermediate anchors at 660 mm (26") on centre maximum. Fasteners for such anchors shall be provided by others.

.6 Minimum reinforcing, anchor and other component gauges shall be in accordance with Table 1 of the CSDMA, "Recommended Specifications for Commercial Steel Door and Frame Products".

.7 Each door opening shall be prepared for single stud rubber door silencers, three (3) for single door openings, two (2) for double door openings, except on gasketed frame product.

.8 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

.9 Fire-rated frame products shall be provided for those openings requiring fire protection as determined and scheduled by the Architect. Frames, transom and sidelight assemblies shall be listed for conformance with CAN4-S104. Window assemblies shall be listed for conformance with CAN4-S106. All fire-rated frame products shall bear the label of, and be listed by a nationally recognized testing agency having a factory inspection service. Labeling shall be in accordance with NFPA 80, the listing authority's policies and label materials, and shall identify the manufacturer. Fire-rated frame products shall be constructed as listed for labeling in the Follow-Up Service Procedures/Factory Inspection Manuals issued by the listing agency to individual manufacturers

.10 Provide grout guards fabricated from not less than 0.016 in. (0.4 mm) thick steel at all hardware mortises on frame product to be grouted.

2.3 Welded Type Construction

.1 Frame product shall be accurately mitered or mechanically jointed.

.2 As defined in Appendix 2 of the CSDMA, "Recommended Specifications for Commercial Steel Door and Frame Products", frame product perimeter corner joints shall be:

.1 Face welded; continuously welded on the profile faces, with exposed faces filled and ground to a smooth, uniform, seamless surface.

.3 Joints at mullions, sills and center rails shall:

.1 Be coped accurately, butted and tightly fitted.

.2 At intersecting flush profile faces, be securely welded, filled and ground to a smooth, uniform, seamless surface.

.3 At intersecting recessed profile faces, be securely welded to concealed reinforcements, with exposed hairline face seams.

.4 At all other intersecting profile elements, have exposed hairline face seams.

.4 Welding shall conform to CSA W59.

.5 Where frame product is to be installed prior to the adjacent partition, a floor anchor shall be securely attached to the inside of each jamb profile. Each floor anchor shall be provided with two

(2) holes for securing to the floor. For conditions that do not permit the use of a floor anchor, an additional wall anchor, located within 150 mm (6") of the base of the jamb, shall be substituted.

.6 Weld in two (2) temporary jamb spreaders per door opening to maintain proper alignment during shipment and handling, which shall not be used for installation.

.7 Glazing stops shall be formed steel channel, minimum 16 mm (0.625") height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.

.8 When required due to site access, when advised by the contractor responsible for coordination or installation, as specified on the Architect's drawings or due to shipping limitations, frame product for large openings shall be fabricated in sections as designated on the approved submittal drawings, with splice joints for field assembly and welding by others.

.9 Prior to shipment, mark each frame product with an identification number as shown on the approved submittal drawings.

2.4 Fabrication – Doors

.1 General

.1 Exterior doors shall be laminated core construction.

.2 Interior doors shall be welded stiffener construction.

.3 Longitudinal edges shall be continuously welded, filled and sanded with no visible edge seams.

.4 Doors shall be mortised, blanked, reinforced, drilled and tapped at the factory for template hardware only, in accordance with the approved hardware schedule and templates provided by the hardware supplier.

.5 Holes 12.7 mm (0.5") diameter and larger shall be factory prepared, except mounting and through-bolt holes, which are by others, on site, at time of hardware installation. Holes less than 12.7 mm (0.5") diameter shall be factory prepared only when required for the function of the device (for knob, lever, cylinder, thumb or turn pieces) or when these holes over-lap function holes.

.6 Doors shall be reinforced only, where required, for surface mounted hardware, anchor hinges, thrust pivots, pivot reinforced hinges, or non-templated hardware. Drilling and tapping is by others, on site, at time of installation.

.7 Top and bottom of doors shall be provided with inverted, recessed, welded steel channels. Exterior doors, and where otherwise scheduled by the Architect, shall be provided with flush steel top caps.

.8 Minimum reinforcing and component gauges shall be in accordance with Table 1 of the CSDMA, "Recommended Specifications for Commercial Steel Door and Frame Products".

.9 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.

.10 Fire-rated doors shall be provided for those openings requiring fire protection and temperature rise ratings, as determined and scheduled by the Architect. Such products shall be listed for conformance with CAN4-S104. All fire-rated doors shall bear the label of, and be listed by a nationally recognized testing agency having a factory inspection service. Labeling shall be in accordance with NFPA 80, the listing authority's policies and label materials, and shall identify the manufacturer. Fire-rated doors shall be constructed as listed for labeling in the Follow-Up Service Procedures/Factory Inspection Manuals issued by the listing agency to individual manufacturers.

.11 Prior to shipment, mark each door with an identification number as shown on the approved submittal drawings.

.2 Laminated Core Construction

.1 Both face sheets for exterior doors shall be formed from a sheet of minimum 16 gauge (1.34 mm) steel with polyisocyanurate core, laminated under pressure to face sheets.

.2 Both face sheets for interior doors shall be formed from a sheet of minimum 18 gauge (1.06 mm) steel with honeycomb core laminated under pressure to face sheets.

PART 3 - EXECUTION

.1 Site Storage and Protection of Materials

.1 Doors and frame product shall be removed from their wrappings or coverings upon receipt on site, be stored in a vertical position, and be spaced with blocking to permit air circulation between them.

.2 All materials shall be thoroughly inspected upon receipt and all discrepancies, deficiencies and/or damages shall be immediately reported, in writing, to the supplier.

.3 All damages incurred during shipment shall be immediately reported, in writing, to the supplier.

.4 Any scratches or disfigurement of doors or frame product caused by shipping or handling shall be promptly cleaned and touched-up with a zinc-rich primer.

.2 Installation

.1 Prior to installation, remove temporary shipping spreaders.

.2 Prior to installation, the area of floor on which the frame is to be installed, and within the path of the door swing, shall be checked and corrected for flatness.

.3 Door and frame product shall be checked for correct size, swing, rating and opening number.

.4 Caulk perimeter of frames between frame and adjacent material.

.5 Set frames plumb, square, level and at correct elevation.

.6 Fire-rated door and frame product shall be installed in accordance with the terms of their listings, NFPA-80, or the local Authority Having Jurisdiction (AHJ).

.7 Secure anchorages and connections to adjacent construction.

.8 Brace frames rigidly in position while building-in. Install wood spreaders at third points of frame rebate height to maintain frame width. Provide vertical support at centre of head for openings exceeding 1200 mm (48") in width.

.9 During the setting of frame product, check and correct as necessary for opening width, opening height, square, alignment, twist and plumb, in accordance with the CSDMA, "Recommended Dimensional Standards for Commercial Steel Doors and Frames".

.10 Grout guards and junction boxes are intended to protect hardware mortises and tapped holes from masonry grout of 4 in. (101 mm) maximum slump consistency that is hand troweled in place.

.11 Frame products are not intended or designed to act as forms for grout or concrete. Grout hollow metal sections in "lifts" or take precautions otherwise to ensure that frames are not deformed or damaged by the hydraulic forces that occur during this process.

.12 Keep hollow metal surfaces free of grout, tar, and/or other bonding materials or sealers. Promptly clean grout, tar, and/or other bonding materials or sealers off of frame product and doors.

.13 Remove wood spreaders after frames have been built-in.

.14 Make allowance for deflection to ensure structural loads are not transmitted to frame product.

.15 Install doors, and hardware in accordance with hardware templates and manufacturer's instructions.

.16 Adjust operable parts for correct clearances and function.

.17 Install louvers, glazing and door silencers.

.18 Finish paint in accordance with Section 09 90 00.

END OF SECTION

1 General

1.1 SUMMARY

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

.1 Interior Solid Core Wood Doors, as indicated in the Door Schedule

1.2 REFERENCE STANDARDS

.1 AWMAC (Architectural Woodwork Manufacturers' Association of Canada) - Quality Standards Illustrated (QSI), latest edition.

.2 CAN/CSA-0132.2 Series - Wood Flush Doors.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Shop Drawings:

.1 Submit shop drawings showing types of cores and construction details, glazing and stops, openings required, material designation and door schedules.

.3 Samples:

.1 Submit for Consultant's review, if requested, two 305mm x 305mm (12" x 12") corner samples of each type of door specified herein showing construction, workmanship and finish including face veneers, core materials, edge strips and stops.

1.4 QUALITY ASSURANCE

.1 Except where otherwise specified, meet requirements of CAN/CSA-0132.2 Series and applicable provisions of AWMAC Quality Standards Illustrated (QSI), Custom Grade.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location.

.2 Do not permit delivery of work to job site until building is sufficiently dry, wet trades are completed and the moisture readings of surfaces in proposed storage area is less than 18%.

.3 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Store doors flat on level surface. Protect materials with suitable non-staining waterproof coverings, but allow air circulation at sides.

.4 Label each door with manufacturers' name, product identification, door size and type.

1.6 WARRANTY

.1 Warrant that the doors shall be free from defects in materials or workmanship in accordance with General Conditions but for a period of one (1) year and agree to promptly make good defects by replacing defective doors in finish to match adjacent similar doors or of original door finish to match by and in a manner satisfactory to Owner. Defects shall include, but not be limited to delamination of edges, warp, twist, bow exceeding 1/4".

.2 "Replace" as used herein includes installing hardware, finishing, hanging and fitting.

2 Products

2.1 ACCEPTABLE MANUFACTURERS

.1 The following manufacturers are acceptable provided they comply with the requirements of this section:

.1 Baillargeon

.2 Lampton Doors

.3 Mowhawk Flush Doors

.4 VT Industries

.5 Or approved equivalent.

2.2 MATERIALS

.1 Conform to Quality Standards for Architectural Woodwork published by Architectural Woodwork Manufacturers Association of Canada (AWMAC) for Architectural Grade Doors, except where specified otherwise.

.2 Unless otherwise specified herein, materials shall comply with requirements of CAN/CSA O132.2.

.3 Wood for cores: White Pine, Western Red Cedar or other approved low density species, kiln dried to 5% to 8% moisture content.

.4 Particle board for cores: CAN3-O188.1-M, extruded particle board having spruce particles in melamine based binder, minimum density of 480 kg/cu.m. (30 pcf).

.5 Door facing: High Pressure Decorative Laminate Face Panels

.1 HPDL Faces: High-pressure decorative laminates complying with NEMA LD 3. Vertical and post formable grade laminates are not acceptable.

.2 Colors, Patterns, and Finishes: As selected by Architect from Nevamar, Pionite or Formica standard colour range (allow for 2 colours).

.6 Flitch assembly: Uniform, clean, four piece book matched Maple, without open defects, patches, plastic repair or natural characteristics which in the opinion of the Consultant are detrimental to appearance.

.7 Crossbanding: 1/16" thick hardwood veneer, both faces of core.

.8 Edge Bands: Laminated to core with adhesive:

.1 Stiles: Laminated softwood and 5/8" thick hardwood edge, total width 4-1/2", at wood veneer faced doors provide hardwood edge matching wood veneer, at plastic laminate faced doors provide hardwood edge, between plastic laminate faces.

.2 Rails: 2-3/4" softwood.

.9 Wood Stiles, Rails and Hardware Reinforcement: Low density hardwood species, kiln dried to 8% moisture content.

.10 Stiles and Rails: Hardwood. Stile thickness minimum 1-1/2" and rail thickness minimum 1-1/8".

.11 Adhesive: Conforms to CAN/CSA-0132.2 Series, Type II.

.12 Sealer:

.1 Interior alkyd primer-sealer, conforming to CAN/CGSB-1.84.

2.3 FABRICATION - GENERAL

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

.2 Completely seal wood top, bottom and edges and edges of cut-outs, before units are shipped from the manufacturer's mill or are placed in the open air or unheated storage areas at the mill which would allow change in the specified moisture content of the wood.

.1 Apply sealer in accordance with the manufacturer's printed instructions without dilution or alteration of any kind. Give particular attention to finish.

.2 Obtain approval of Consultant of the finishes before proceeding with sealing. Should this procedure not be followed replace all doors which have been improperly sealed.

.3 Provide blocking for closers, panic hardware, locksets and other door hardware as required.

.4 Cut-Outs: Fabricate doors in factory for cut-outs to receive glass lites as indicated on drawings and schedules. Stops shall be solid hardwood to match face veneer of doors with cut-outs, in single length pieces sized to suit openings with accurately Mitred corners finished in the proper plane. Fit loose stops and tack in place.

.5 Bevel edges of single acting doors 3 mm (1/8") on lock side and 1.5 mm (1/16") on hinge side.

.6 Undercut doors for carpet in the plant.

2.4 FABRICATION - SOLID CORE DOORS

.1 Flush wood doors: Solid core to AWMAC Standard.

.1 Solid Particleboard Core: Minimum 57 mm stile and rail frame bonded to particleboard core and as follows:

.1 Reinforcement: Wood blocking.

.2 Construction: 5-ply

.2 Door Thickness: 45 mm overall, unless otherwise indicated on the Drawings.

3 Execution

3.1 EXAMINATION

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

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

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

3.2 INSTALLATION

.1 Install doors and hardware in accordance with manufacturer's printed instructions; refer to Section 08 70 00 and Hardware Schedule for hardware types and groups; pre-drill pilot holes for hinges, cylindrical locks and similar surface mounted hardware; cut mortises and pre-drill pilot holes for recessed hinges.

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

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

.4 Install transom and side panels using concealed fasteners or countersunk screws concealed with wood plugs matching panel in grain and colour in metal door frames.

.5 Install stops and louvers ready to receive finish.

.6 Glaze doors at site with glass of type and thickness indicated, in accordance with Section 08 80 00 using elastomeric glazing sealant as specified in Section 07 92 00; secure glass in place with removable wood stops.

3.3 CLOSEOUT ACTIVITIES

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

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

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

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

END OF SECTION

1.0 GENERAL

1.1 REFERENCES

.1 ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

.3 ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.4 ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

.5 ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

.6 ASTM A480/A480M-04; 2004 - Standard Specification for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.

.7 ASTM A653/A653M-03; 2003 - Standard Specification for Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.8 ASTM A666-00; 2000 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

.9 National Fire Protection Association NFPA 80, 2013 Edition - Standard for Fire Doors and Fire Windows.

.10 Underwriters Laboratories (UL) 10B, 1997 Edition - Standard for Fire Tests of Door Assemblies.

1.2 SUBMITTALS

.1 Submit under provisions of Section 01 33 00 – Submittals.

.2 Product Data: Manufacturer's data sheets on each product specified, including:

.1 Preparation instructions and recommendations

.2 Storage and handling requirements and recommendations.

.3 Details of construction and fabrication.

.4 Installation methods.

.3 Shop Drawings: Include detailed plans, elevations, details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent construction.

.1 Show controls, locking devices, detectors, fusible links, and other accessories.

.4 Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

.5 Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.

.6 Manufacturer’s Certificates: Certify products meet or exceed specified requirements.

.7 Closeout Submittals: Operation and maintenance data.

1.3 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.

.2 Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

.3 Fire Rated Door Assemblies: Assemblies complying with NFPA 80 that are tested and labeled by a qualifying testing agency for fire protection ratings indicated and based on testing at as close to neutral pressure as possible according to UL 10B.

1.4 PROTECTION

.1 Store products in manufacturer’s unopened packaging until ready for installation.

.2 Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

.3 Store materials in a dry, warm, ventilated weathertight location.

1.5 PROJECT CONDITIONS

.1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.6 COORDINATION

.1 Coordinate Work with other operations and installation of adjacent finish materials to avoid damage to installed materials.

1.7 WARRANTY

.1 Warranty: Manufacturer's warranty that all parts and components, except counterbalance spring and finish, are to be free from defects in materials and workmanship for 5 years. Counterbalance springs to be warrantied for 1 year.

2.0 PRODUCTS

2.1 MANUFACTURERS

.1 Acceptable Manufacturers: CHI Overhead Doors, as distributed by Atlas Overhead Doors, 75 Wildcat Road, Toronto, ON. Tel: 416.663.1574, Email: info@atlasdoors.ca. Note: may be available through other distributors. **Product: 7522**

.1 Equivalent products as per 01 25 13.

2.2 PERFORMANCE REQUIREMENTS

.1 Fire Rated Counter Doors

.1 Fire Door Construction: Confirm to UL 10B.

.2 Installed Fire Door Assembly: Conform to NFPA 80.

.3 Operation: Design complete door assembly including operator for usage of up to 20 cycles per day.

2.3 MATERIALS

.1 Galvanized Steel Sheet: Galvanized commercial steel, (CS type) per ASTM A653/A653M, G90 and G60 coating class.

2.4 DOOR ASSEMBLY

.1 Basis of Design: CHI Overhead Doors Model 7522

.2 Fire Rating Classification

.1 1 hour rating, listed by Underwriters Laboratories (U.L.)

.3 Construction

.1 Curtain: Constructed from interlocking slats formed from the following:

.1 Material: 22 gauge galvanized steel

.2 Finish: Hot-dipped galvanized in accordance with ASTM A653 and with baked on enamel primer coat and polyester finish coat.

.3 Powder Coat to match interior surface of window frames.

.4 Profile: Flat, non-insulated 1-1/2 inches high by ½ inches deep.

.5 Bottom Bar: Steel angle bolted to curtain, with adjustable tubular compression weather seal. Painted Black.

.2 Guides: Two piece, box shaped guides and pack out angle

.1 Guide Material Steel

.2 Finish: Match Curtain Finish

.3 Head Plate: Rectangular steel plate, with precision sealed ball bearing supporting drive side axle.

.4 Barrel Assembly: Steel pipe sized for maximum deflection under full load not to exceed 0.03” per foot of span with threaded rings or lugs welded to barrel assembly for curtain attachment.

.5 Springs: Spring tension assembly supported within barrel by precision ball bearings. Curtain weight counterbalanced by oil tempered, helically wound torsion springs; grease packed and mounted on steel torsion shafts with cast spring plug. Designed for usage up to 20 cycles per day.

.6 Hood: Shaped to fit within the head plates and with intermediate supports as required.

.1 Hood Material: Minimum 24 gauge galvanized steel

.2 Hood Finish: Match Curtain Finish

.3 Provide head plate covers to match hood.

.7 Locking Mechanism: Plated steel slide bolt locks with padlock provisions.

.8 Mounting: Between jamb and under lintel.

.9 Jamb Construction: Provide to suit existing masonry construction.

.10 Automatic Closing Device: Equip each fire rated door with an automatic closing device or release holder mechanism and governor unit complying with NFPA 80. Automatic closing device shall be designed for activation by the following:

.1 Connected to building fire detection, smoke detection, and alarm systems through manufacturer's UL labeled release device.

.11 Manual Operation: Manual push up operated, utilizing partial spring tension release to initiate closure.

.1 Governor: If required by the size of manual push up door, provide a governing device to maintain the closing speed in a range from 6 inches to 24 inches per second per NPFA 80 requirements.

3.0 EXECUTION

3.1 EXAMINATION

.1 Verify opening sizes, tolerances and conditions are acceptable.

.2 Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

.3 If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

.1 Maintain security of the building at all times during demolition work.

.2 Provide and maintain fire prevention equipment and alarms accessible during demolition.

3.3 INSTALLATION

.1 Restrict operations to designated access routes.

.2 Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

.3 Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

.4 Fit and align assembly including hardware; level and plumb, to provide smooth operation.

.5 Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 90 00.

.6 Install perimeter trim and closures.

3.4 ADJUSTING

.1 Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.

.2 Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

.1 Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.

.2 Remove labels and visible markings.

.2 Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

.1 Protect installed products until completion of project.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for design, supply and installation of a four-sided capped in glazed timber curtain wall system, identified as **CW1** in drawings and schedules, consisting of, but not limited to, the following:

.1 Fixed, low emissivity (Low E), triple glazed, insulated glazing units (IGU).

.2 Connections to structural support systems, fasteners, and accessories required for a complete installation of the glazed timber curtain wall system.

.3 High thermal performance glazed/aluminum framed swing doors.

.2 Drawings contain details that suggest directions for solving some of the major design requirements; these details can be developed further by the Contractor provided that the final installation adheres to aesthetic criteria established by the drawings and specified dimensions with all elements in planes as drawn, maintaining their relationships with all other building elements.

.3 Work of this Section is intended to be designed and supplied by a single source curtain wall manufacturer and installed by a manufacturer trained and approved glazing installer; having experience designing and installing systems of similar complexity and scope to that described in this Section including glazing, and architectural structural steelwork required for complete installation.

1.2 REFERENCE STANDARDS

.1 North American Fenestration Standard (NAFS):

.1 NAFS-08 - Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440-08, NAFS - North American Fenestration Standard/Specification for windows, doors, and skylights

.2 National Fenestration Rating Council (NFRC):

.1 ANSI/NFRC 100-2020, Procedure for Determining Fenestration Product U-factors

.2 ANSI 117 - Standard Specification for Structural Glued Laminated Timber of Softwood Species 2020.

.3 ANSI A190.1 - Standard for Wood Products - Structural Glued Laminated Timber 2017.

.4 ANSI/NRFC 400-2020, Procedure for Determining Fenestration Product Air Leakage

.5 ANSI/NFRC 500-2020, Procedure for Determining Fenestration Product Condensation Resistance Values

.3 American Architectural Manufacturers Association (AAMA):

.1 AAMA/NWWDA 101/I.S.2-97, Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors

.2 AAMA 502-12, Voluntary Specification for Field Testing of Newly Installed Fenestration Products

.3 AAMA 1503-09, Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections

.4 American Society for Testing and Materials (ASTM):

.1 ASTM A653/A653M-17, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process

.2 ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

.3 ASTM B221-14, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes

.4 ASTM C542-05(2017), Standard Specification for Lock-Strip Gaskets

.5 ASTM E283-04(2012), Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

.6 ASTM E330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference

.7 ASTM E331-00(2016), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference

.5 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass

.2 CAN/CGSB-12.3-M91, Flat, Clear Float Glass

.3 CAN/CGSB-12.8-97, Insulating Glass Units

.4 CAN/CGSB-12.9-M91, Spandrel Glass

.5 CGSB 12.20-M89, Structural Design of Glass for Buildings

.6 CAN/CGSB-51.11-92, Mineral Fibre Thermal Insulation Blanket

.7 CAN/CGSB-1.108-M89, Bituminous Solvent Type Paint

.8 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating

.6 American Architectural Manufacturers Association (AAMA):

.1 AAMA/NWWDA 101/I.S.2-97, Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors

.2 AAMA 501.4 - Recommended Static Test Method for Evaluating Window Wall, Curtain Wall and Storefront Systems Subjected to Seismic and Wind-Induced Inter-Story Drift 2018

.3 AAMA 502-12, Voluntary Specification for Field Testing of Newly Installed Fenestration Products

.4 AAMA 505-17, Dry Shrinkage and Composite Performance Thermal Cycling Test Procedure

.5 AAMA 1503-09, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections

.7 Canadian Standards Association (CSA):

.1 CAN/CSA A440-00/A440.1-00, Windows/User Selection Guide to CSA Standard CAN/CSA A440-00, Windows

.2 CSA-G40.20-04/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel

.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 W47.2-11, Certification of Companies for Fusion Welding of Aluminum.

.6 CSA W59-03(2008), Welded Steel Construction (Metal Arc Welding), Metric.

1.3 PREINSTALLATION MEETING

.1 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings, attended by the Contractor, the Subcontractor's representative and foreman for this project, the Consultant, materials supplier(s), and other relevant personal before commencement of work for this Section.

1.4 WORK SUPPLIED BUT INSTALLED BY OTHER SECTIONS

.1 Supply inserts, anchors and other items to be built into work of other Sections and required for support of wall system.

.2 Provide clear instructions and, if required setting templates to ensure accurate setting of components.

1.5 DESIGN REQUIREMENTS

.1 The building envelope shall be designed and constructed to control air leakage into, or out of the conditioned space, for a targeted post-retrofit air leakage rate of 1.0 L/s/m2 at 50 Pa.

.2 Within parameters specified assume complete design responsibility for entire timber glazed curtain wall system.

.3 Details and information indicated on drawings are schematic, showing general intent only and shall not be considered or construed to be the engineering design for the system or to be complete or adequate to meet the design criteria.

.4 Make thorough examination of drawings and details, check anchorage, structural deflections, shading factors, size and shape of glass, system of sealing, location of heating units, interfacing requirements with work of other Sections and other factors influencing design and performance of curtain wall system, and be fully cognizant of requirements.

.5 Design, fabricate and erect curtain wall system to meet or exceed the minimum requirements identified in this Section.

1.6 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Shop Drawings:

.1 Furnish complete shop and erection drawings required for the work of this Section to the Consultant for review prior to fabrication.

.2 Co-ordinate shop drawings for work of this Section with those for other trades to ensure correct interface details required to provide watertight installation.

.3 Shop drawings shall incorporate plans, elevations, sections and details for all work in this Section. The details shall show and specify all wood, metal and glass thicknesses, types and finishes, areas to be sealed and sealant materials, gaskets, glazing methods, direction and magnitude of thermal expansion, type of construction including joinery, fasteners and welds, all anchorage assemblies and components, the fabrication and erection tolerances for the work in this Section and the adjoining related work of other Sections.

.4 Upon Consultant's request furnish complete design calculations for the curtain wall bearing seal of the professional engineer responsible for their preparation

and all pertinent information affecting the design, including wind reactions, shading effects and the failure probability for the thermal glazing units as evidence of compliance with the design criteria.

.5 Provide “As-built” Shop Drawings after completion of the mock-up design and construction.

.3 Delegated Design Submittals:

.1 Include structural and glazing framing members structural and physical characteristics and engineering calculations.

.2 Identify dimensional limitations. Include load calculations at points of attachment to building structure.

.4 Test Data:

.1 If requested by Consultant, submit test data from a recognized independent testing agency, acceptable to Consultant, verifying that specified requirements are being met. Test results may be from a previous testing program conducted on a system similar to that specified herein.

.5 Certificates:

.1 Passive House System Certificate: Show required certification for the project climate zone (as recognized by PHI).

.2 Statement signed by glass manufacturer clearly stating that glass used on this project is part of manufacturer’s system and are acceptable to manufacturer.

.3 Statement signed by the glass manufacturer that the glass manufacturer has reviewed the contract documents and can issue warranty incorporating components for system; Letters signed by installer for this section are not acceptable.

.6 Samples:

.1 Submit duplicate minimum 2" x 4" samples of each type of aluminum finish and wood finish specified.

.2 Upon Consultant's request furnish samples of glass types, gaskets, tapes and sealants.

.7 Maintenance and Glazing Instructions:

.1 On completion of work of this Section, supply maintenance and glazing instructions for insertion into the Operating and Maintenance Manual.

.2 Operation and Maintenance Data: Instructions for cleaning and maintenance of wood finishes.

1.7 QUALITY ASSURANCE

.1 System Manufacturer's Qualifications:

.1 Minimum five (5) years continuous experience in successful production of work of type and quality specified. Submit proof of experience upon Consultant's request.

.2 Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing:

.1 Insulating Glass Certification Council (IGCC).

.2 Safety Glazing Certification Council (SGCC).

.2 Designer Qualifications:

.1 Design curtain wall and its structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of which the Project is located.

.3 Fabricators Qualifications:

.1 Company specializing in performing the work of this section with minimum 5 years of experience on projects of similar size and complexity.

.2 A senior, qualified manufacturer's representative shall be at the site during erection of system to direct the various stages of operations.

.4 Pre-Construction Testing:

.1 Laboratory tests to be conducted on at least one full size sample bay taken from the curtain wall manufactured for the Project, including operable components.

.2 Submit certified copies of test results from an approved independent testing agency to confirm compliance with the CSA A440 minimum specified A, B, C ratings.

.3 Additional windows may be specified for testing at the discretion of the Consultant.

.4 The test data to be submitted to the Consultant for review and approval prior to installation. Include cost of testing in the Contract Price.

1.8 MOCK-UPS

.1 Construct mock-ups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution before installing materials indicated in this Section.

.2 Build mock-ups using exposed and concealed materials indicated for the completed Work.

1.9 STORAGE, DELIVERY, HANDLING AND PROTECTION

.1 Co-ordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location. Do not load any area beyond the design limits.

.2 Assembled units and their component parts shall be transported, handled and stored in a manner to preclude damage of any nature.

.3 Ship and store pre-glazed units in upright position only or use method which will positively prevent extrusion of sealants and shifting of glass within framing.

.4 Accessory materials required for erection at the site shall be delivered to the site in manufacturer's labelled containers.

.5 Remove all units or components which are cracked, bent, chipped, scratched or otherwise unsuitable for installation and replace with new.

1.10 SITE CONDITIONS

.1 Provide safe and adequate equipment on the site to execute the work of this Section, including scaffolding, staging, hoisting, safety protection equipment, tools, plant and other equipment required for the completion of the work of this Section.

.2 Coordinate and verify, by measurement at the job site, all dimensions affecting the work of this Section. Submit written notifications to the Consultant any field dimensions and conditions which are at variance with those on the reviewed shop drawings. The decision regarding corrective measures shall be obtained from the Consultant prior to the fabrication of the item affected.

1.11 WARRANTY

.1 Warrant work of this Section against any defects in materials and workmanship in accordance with the General Conditions, but for a period of two (2) years and agree to promptly and without cost to Owner and Tenant make good defects which become evident during warranty period. Without restricting the generality of the warranty, defects shall include leaking, deformation of members, breaking of glass due to thermal or structural movement, discolouration of finishes and failure of sealants.

.2 Warrant insulating glass units in accordance with General Conditions for a period of five (5) years. Warrant that units will be free from material obstruction of vision as a result of dust or film formation on internal glass surfaces by any cause other than extrinsic glass breakage.

.3 Warrant that any unit failing shall be removed and replaced without cost to the Owner and Tenant.

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design products are named in this Section; additional manufacturers offering similar glazed aluminum curtain wall systems may be incorporated into the work provided they meet the performance requirements established by the named products.

.2 Acceptable Materials Manufacturers: Subject to compliance with requirements specified in this Section and as established by the Basis-of-Design Materials, manufacturers offering products that may be incorporated into the Work include; but are not limited to, the following:

.1 RP Technik

.2 Or approved equivalent.

2.2 DESCRIPTION OF WORK

.1 Responsibility: Professional Engineer is responsible for designing glazed timber curtain wall system based on design loads and reactions provided by the Consultant, and verifying that safety factor is appropriate for intended installation and meets requirements of the Authority Having Jurisdiction.

.2 Design Requirements: Design and size system components in accordance with CGSB 12.20 and ASTM E330; free from defects impairing strength, durability and appearance including anchorage capable of withstanding specified loading without failure, and as follows:

.1 Exposed Fasteners: Fabricated from same materials design to prevent high stress concentration at glass connection points, colour and finish as material as that to which they are applied and having exposed surfaces with same inherent texture and colour for similar locations throughout system.

.2 Wind (Horizontal) and Structural (Vertical) Loads: Design and fabricate assemblies and systems to resist loads required by Building Code.

.3 Engineering Design: Use Professional Engineer, registered in the Province of the Work, and that has experience in the work required by this Section to prepare structural calculations and design details.

.3 Design Loads and Performance Criteria: Design timber curtain wall framing system capable of withstanding design loads within limits and under design loads indicated in this Section, and as follows:

.1 Structural Deflection and Movement: Allow for movement and deflection of structural support framing; design tension framing system connections to

accommodate structural deflections such that loading is not transferred to glass curtain wall system:

.1 Building Movement: Design for movements of supporting structure including twist, column shortening, long term creep, and deflection from uniformly distributed and concentrated live loads and storey drift under combined wind and gravity loads in accordance with the Building Code.

.2 Lateral Loads: Design for q50 wind loads using low importance factors listed in the Building Code for deflection and strength, modified by the appropriate exposure, gust and pressure (internal and external) factors in accordance with Building Code structural commentaries.

.3 Periodic Maintenance Equipment Loads: Account for loads arising from window cleaning or other maintenance equipment.

.4 Deflection of Framing Members: Limit deflection to the following requirements with full recovery of glazing materials:

.1 Deflection Normal to Wall Plane: Limited to L/175 of clear span for spans up to 14', and to L/240 of clear span plus 1/4" for spans greater than 14' or an amount that restricts edge deflection of individual glazing lites to 19mm, whichever is less.

.2 Deflection Parallel to Glazing Plane: Limited to amount not exceeding an amount that reduces glazing bite to less than 75% of design dimension and that reduces edge clearance between framing members and glazing or other fixed components to less than 1/8".

.3 Limit length of cantilever deflection to 2/175 length of the cantilevered member where framing members overhang an anchor point.

.2 Thermal Loads and Movement: Allow for glass movement arising from thermal changes as follows, accounting for surface temperatures of materials due to both solar heat gain and night time sky heat loss:

.1 Normal Ambient Temperature Range: 40 deg C based on -16 deg C ambient winter and 24 deg C ambient summer; adjust calculations to account for colour treatments or coatings on curtain wall framing members and glass.

.2 Structural Movement: Allow for thermal movement with no buckling of structural components, stress on glass, glazing edge seal failure, sealant failure, excess stress on curtain wall framing, anchors and fasteners, or reduction of performance in accordance with AAMA 505.

.3 Building Envelope Performance Criteria: Design glass and glazing systems to allow for the following:

.1 The building envelope shall be designed and constructed to control air leakage into, or out of the conditioned space, for a targeted post-retrofit air leakage rate of 1.0 L/s/m^2 at 50 Pa., as indicated in Section 01 83 16.

.2 Water Penetration Under Static Pressure: Design system for zero water penetration when tested in accordance with ASTM E331 at a minimum differential static pressure of 20% of positive design wind load, but not less than 475 Pa

2.3 WARRANTY

.1 Warrant work of this Section against any defects in materials and workmanship in accordance with the General Conditions, but for a period of two (2) years and agree to promptly and without cost to Owner and Tenant make good defects which become evident during warranty period. Without restricting the generality of the warranty, defects shall include leaking, deformation of members, breaking of glass due to thermal or structural movement, discolouration of finishes and failure of sealants.

.2 Warrant insulating glass units in accordance with General Conditions for a period of ten (10) years. Warrant that units will be free from material obstruction of vision as a result of dust or film formation on internal glass surfaces by any cause other than extrinsic glass breakage.

.3 Warrant that any unit failing shall be removed and replaced without cost to the Owner and Tenant.

2.4 MATERIALS

.1 Timber Frame Structural Profiles:

.1 Species:

.1 Douglas Fir Glulam, unless otherwise indicated on the Drawings.

.2 Profile Depth: Up to 254mm (10”), as indicated on the Drawings.

.3 Profile Thickness: Standard 50mm (2”).

.4 Features:

.1 Framing Members: Manufacturer's standard glulam framing members of dimensions required to support imposed loads.

.2 Species: Douglas Fir Glulam, unless otherwise indicated on the Drawings.

.5 Timber Curtain Wall Connection Materials:

.1 No exposed connecting materials unless approved.

.2 Concealed mullion connectors: Manufacturer’s standard. Provide adjustable connectors that can be adapted to mullion depths Indicated. Design connectors for facilitate one and two-sided connections.

.6 Exposed connections:

.1 Bolts – Zinc plated, hot dipped galvanized if required. Sizing determined based on project requirements.

.2 Screws – Zinc plated. Sizing determined based on project requirements.

.3 Plates –Painted steel. Size and thickness determined based on project requirements.

.2 Aluminum:

.1 Extrusions: AA6063-T5 alloy, anodizing quality, conforming to ASTM B221-12.

.2 Plate and Sheet: AA1100-H14 alloy, anodizing quality unless otherwise indicated minimum 0.125" thick, conforming to ASTM B209-10, with special hardness for flat aluminum spandrel panels.

.3 Exposed surfaces of aluminum shall be free of die marks, scratches, blisters, "leave-off" marks, or other blemishes, whether left unfinished or finished.

.4 Aluminum Caps: ASTM B221 6063 T5 grade aluminum.

.3 Structural Steel Sections and Steel Plate:

.1 CSA-G40.20/G40.21, Grade 260W.

.4 Galvanized Steel Sheet:

.1 Commercial grade, stretcher levelled or temper rolled, with galvanized zinc G90 (Z275) coating conforming to ASTM A653/A653M.

.5 Glass:

.1 Types and Composition: As indicated in Section 08 80 00.

.1 System to accept 44mm thick, triple pane glazing.

.2 Glazing Materials:

.1 Glass Retaining Member Seals: PVC or neoprene conforming to ASTM C542-90, 75 to 85 Durometer A hardness, teflon coated, compressible, with corner joints under compression to ensure vertical to horizontal neoprene pressure contact.

.2 Glazing Tape: Extruded high-grade macro-polyisobutylene tape with continuous integral synthetic rubber spacer having a 50 shore A hardness.

.3 Setting Blocks: Neoprene conforming to ASTM C542, with 75 to 85 Durometer A hardness.

.3 Insulation Materials:

.1 Packing Insulation: Loose mineral fibre insulation, Type II, as indicated in Section 07 21 16.

.4 Perimeter Sealant Materials:

.1 Sealant: Multi-component, chemical curing type sealant conforming to ASTM C920.

.2 Provide cleaners, primers and bond breakers as recommended by the sealant manufacturer.

.3 Basis of Design Materials:

.1 Spectrem 1 by Tremco (Canada) Ltd.

.2 DOW 790 by Dow Corning,

.3 Or approved equivalent.

.4 Joint Back-Up: Round, closed cell extruded polyethylene non-outgassing foam, Shore A hardness of 20, tensile strength 140 to 200 KPa, oversized 30-50%, compatible with sealant and primer, non-adhering to sealant.

.5 Zinc Rich Paint:

.1 Ready mixed, zinc rich primer conforming to CAN/CGSB-1.181, 'Sealtight Galvafroid Zinc-Rich Coating' by W.R. Meadows of Canada Limited, or 'Zinc Clad No.7 Organic Zinc Rich Primer' by Sherwin Williams Company of Canada Ltd., or approved equivalent.

.6 Bituminous Paint:

.1 Conforms to CAN/CGSB-1.108, Type 2.

.7 Fasteners: '400' Series stainless steel, or '300' Series stainless steel.

.8 Flexible Flashings: Flexible EPDM rubber sheet, minimum .060" (60 mils) thick, by Lexcan Limited, or by Dunlop Construction Products Inc., or by Firestone Building Products Company, or approved equivalent.

.9 Provide door adapters and other components as required to complete the work of this Section.

2.5 GLAZED TIMBER CURTAIN WALL FRAMING

.1 Manufacturer's standard timber framing members of thickness required and reinforced as required to support imposed loads.

.2 Exterior Frame – Curtain Wall:

.1 Construction: Thermally broken, pressure plate glazed.

.2 Dimensions of Frame Profile: 2” sightline; Glazing throat to accommodate insulated glazing units indicated in Section 08 80 00.

.3 Exterior Aluminum Cover Cap: 17mm (43/64”) thick profile.

.4 Glazing Method: Glazed from exterior.

.5 Interior Timber Cover Cap:

.1 Paint grade timber species, as selected by the Consultant.

.2 Profile Finish and Dimensions: As indicated on the Drawings.

.6 Operable Units: None.

.7 Thermal performance (frame): Minimum U-Value 1.02 W/m^{2}K.

.8 Thermal performance (glass): As per Spec 08 80 00.

.9 Basis-of-Design Material: RP Technic; Series rp tec 55-1, or approved equivalent.

2.6 HIGH PERFORMANCE ALUMINUM ENTRANCE SWING DOORS

.1 Aluminum-frame with structural reinforced PA-facing shell. Inner insulation core of high density PUfoam. Door opens towards the outside for manual swing operation, reinforced as required to withstand traffic conditions.

.2 Exterior Door Type – High Thermal Performance:

.1 Dimensions of Frame Profile: 144mm sightline.

.2 Pane thickness: 54 mm (6/18/6/18/6), rebate depth: 13 mm.

.3 Thermal performance (frame): Minimum U-Value 0.77 W/m^{2}K. at top/sides, 1.11 W/m^{2}K at threshold.

.4 Thermal performance (glass): As per Spec 08 80 00.

.5 Glazing Infill: As indicated in Section 08 80 00.

.6 Basis-of-Design Material: WG75 entrance door outward operable by Jiangsu Baiheng Energy Saving Technology Co Ltd, or approved equivalent.

2.7 HIGH PERFORMANCE DOOR HARDWARE

.1 Provide door hardware in accordance with the requirements of this Section; using products that are recommended and supplied by entrance system manufacturer; in accordance with referenced standards, meeting requirements for description, quality, type, and function listed in hardware schedule.

.2 Manufacturer’s heavy duty hardware units in sizes and types as required to meet entrance use as indicated on Drawings, with the following opening force limitations:

.1 Egress Doors: Maximum 135 N to set door in motion and not more than 70 N to open door to minimum required width.

.2 Accessible Interior Doors: Maximum 20 N to operate door through entire range of movement.

.3 Delayed Egress Locks: Lock releases within 15 seconds after applying a force of not more than 70 N for not more than 3 seconds.

.4 Latches and Exit Devices: Not more than 70 N required to release latch.

.3 Door Hardware Schedule: As indicated in the Door Hardware Schedule and Hardware Groups, appended to Section 08 70 00.

2.8 FABRICATION

.1 Fit and assemble component parts in shop as far as practicable. Work that cannot be permanently shop assembled shall be fitted, assembled, marked and disassembled to assure proper fitting in field. Identify shop assembled components on shop drawings for location and erection at Site.

.2 Aluminum components shall be extruded sections and shapes, unless otherwise specified or shown.

.3 Timber components shall be milled to final thickness and finished prior to assembly, unless otherwise specified.

.4 Components required, for which extruded sections are not available shall be accurately formed to profiles indicated. Use minimum 14 gauge sheet aluminum unless otherwise indicated.

.5 All fastenings and connections shall be concealed unless approved by Consultant.

.6 Joints between horizontal and vertical mullions shall be accurately cut and fitted. Horizontal and vertical mullions shall be in true plane with interior and exterior faces in line.

.7 Mechanically joined sections shall have "hairline" joints.

.8 Reinforce members as required to withstand loads and to maintain deflection within allowable limits.

.9 Internally reinforce framing members where work of other trades is to be fastened thereto.

.10 Fabricate expansion joints between mullion sections with formed extruded aluminum internal sleeve sections, secure to permit joint function and maintain true alignment of sections.

.11 Install air cut-offs in continuous vertical members to prevent stack effect of enclosed air columns.

.12 Framing members shall have internally formed keyed slots to receive and retain preformed gaskets, seals and thermal separators.

.13 Pressure plates shall be designed with integrally formed keyed slots to receive seals and of thickness necessary to provide permanent, uniform, sealing pressures for glazing units, without deformation.

.14 Provide inconspicuous, baffled weep holes to properly drain curtain wall cavities to exterior.

.15 Fabricate system to accommodate and interface with work of other Sections by means of rabbets, interlocks, miscellaneous angles, trim and filler sections as required.

.16 Factory glaze system modules as far as practicable. Effect glazing seal in accordance with wall system and glass manufacturer's recommendations and so as to meet specified design and performance requirements.

.17 Fabricate extruded or formed aluminum sills to profiles indicated to suit wall condition and minimum 3/32" thick. Provide drip deflectors at sill ends and at abutting vertical surfaces. Open ends of sills shall be fitted with neatly applied closure plates. Anchors shall be designed not to work loose after installation. Unless otherwise detailed provide "flush" slip joint at intermediate sill joints.

.18 Prepare timber curtain wall framing for installation of doors, finish door hardware including, but not limited to; deadlocks, handicap power door operators and other door finish hardware as specified within these documents.

.19 Install all door hardware on doors. Test all doors on completion of installation and adjust as required for smooth and efficient operation.

.20 Form covers, closures, mouldings and trim integral with, or immediately adjacent to work of this Section to profiles indicated on drawings, and as required for a complete installation.

2.9 FINISHES

.1 Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

.2 Protect finish with strippable protective film.

.3 Aluminum: As Fabricated Finish (Mill Finish); AA-M10 fabricated mechanical finish.

.1 Two (2) Coat PVDF or FEVE Coating – Exterior Surfaces:

.1 Manufacturer's standard 2 coat, thermo-cured system consisting of specially formulated inhibitive primer and colour topcoat, and apply coating to exposed metal surfaces in accordance with AAMA 2605 and with coating and resin manufacturers' written instructions.

.2 Colour: As selected by Consultant from manufacturer's full product range.

.3 Basis of Design Materials: Duranar XL, or approved equivalent.

.4 Timber – Interior Surface:

.1 Sanded timber surface after installation to remove roughness and planer marks. Sanding shall be done with the grain of the wood and finished with fine grit paper to leave a smooth scratch-free surface suitable to receive the paint or natural finishes to be applied over as specified in Section 09 90 00.

.5 Steel (Concealed):

.1 Hot-dip galvanized in accordance with CAN/CSA-G164, with minimum coating of 2 oz./sq.ft., or zinc rich paint.

.6 Isolate where necessary to prevent electrolysis due to dissimilar metal-to-metal contact or metal-to-masonry and concrete contact. Use bituminous paint, butyl tape or other approved divorcing material.

3 Execution

3.1 EXAMINATION

.1 Check structural elements and adjoining work of other Sections on which work of this Section is dependent, verify governing dimensions, floor elevations, floor to floor heights, minimum clearances between curtain wall and timber frame. Confirm that conditions are

satisfactory before proceeding. Commencement of work of this Section indicates acceptance of surfaces and conditions.

3.2 ERECTION

.1 Erect curtain wall system plumb, level and square, in correct relation to work of other Sections, within a maximum non-cumulative deviation of 1/8" per 12' length of member, and with members accurately fitted and aligned at joints and intersections.

.2 Anchor system to building structure, adjusting as required to meet erection tolerances and secure to prevent movement other than that which is expected due to structural deflection and creep and thermal expansion and contraction.

.3 Provide all devices and components required for erection of system.

.4 Provide flashings, fillers, covers and sealants indicated and as required to render system weathertight and to meet specified performance criteria. Ensure effective seal at laps, end joints and changes of direction.

.5 Provide continuity of thermal and air seal/vapour barriers with adjacent thermal and air seal/vapour barrier systems. Pack spaces between frames and adjacent building elements and where shown with fibrous insulation.

.6 Seal joints between wall system and adjacent building elements with sealant in strict accordance with requirements of Section 07 92 00.

.7 Use concealed fastenings only.

.8 Touch up steel anchoring components, after installation, with zinc rich paint.

.9 Erection Tolerances: Install glazed aluminum curtain wall systems to the following maximum tolerances:

.1 Plumb: 3mm in 3048mm (1/8" in 10') with aggregate total not exceeding 6mm in 12192mm (1/4" in 40’).

.2 Level: 3mm in 6069mm (1/8" in 20') with aggregate total not exceeding 6mm in 12192mm (1/4" in 40’).

.3 Alignment: Limit misalignment of two adjoining glass panes abutting in the same plane as follows:

.1 Limit offset from true alignment to 1.6mm (1/16") where surfaces meet in-line or are separated by reveal or protruding element up to 13mm (1/2") wide.

.2 Limit offset from true alignment to 3mm (1/8") where surfaces are separated by reveal or protruding element from 13mm to 25mm (1/2" to 1") wide.

.3 Limit offset from true alignment to 6mm where surfaces are separated by reveal or protruding element of 25mm (1") or wider.

.4 Joint Width: Maintain sealant space between glass and adjacent construction to an average of 16mm (5/8"), with a variation of no more than +3mm (1/8") and -6mm (1/4").

.5 Location: Limit variation from plane to 3mm in 3658mm (1/8" in 12’) with aggregate total not exceeding 13mm (1/2") over total length.

3.3 FINAL CLEANING

.1 Remove protective coatings and coverings from prefinished components; clean structural components and fittings; remove excess sealants and other substances that detract from finished appearance after completion of installation.

.2 At completion of work of this Section, remove all labels from glass and clean inner and outer faces of glass and all exposed metal and timber surfaces at interior and exterior. Replace scratched or broken glass and make good any damaged materials, all in accordance with Division 01.

.3 Coordinate protective measures required to prevent damage or deterioration of structural glass system from subsequent construction activities.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for design, supply and installation of a low-rise, narrow sightline, four-sided capped glazed curtain wall system, identified as CW2 & CW3 in drawings and schedules, consisting of, but not limited to, the following:

.1 Fixed, low emissivity (Low E) sealed glass units.

.2 Connections to structural support systems, fasteners, and accessories required for a complete installation of the glazed aluminum curtain wall system.

.2 Work of this Section is intended to be designed and supplied by a single source curtain wall manufacturer and installed by a manufacturer trained and approved glazing installer; having experience designing and installing systems of similar complexity and scope to that described in this Section including glazing, and architectural structural steelwork required for complete installation.

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM):

.1 ASTM A653/A653M-17, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process

.2 ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

.3 ASTM B221-14, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes

.4 ASTM C542-05(2017), Standard Specification for Lock-Strip Gaskets

.5 ASTM E283-04(2012), Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

.6 ASTM E330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference

.7 ASTM E331-00(2016), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass

.2 CAN/CGSB-12.3-M91, Flat, Clear Float Glass

.3 CAN/CGSB-12.8-97, Insulating Glass Units

.4 CAN/CGSB-12.9-M91, Spandrel Glass

.5 CGSB 12.20-M89, Structural Design of Glass for Buildings

.6 CAN/CGSB-51.11-92, Mineral Fibre Thermal Insulation Blanket

.7 CAN/CGSB-1.108-M89, Bituminous Solvent Type Paint

.8 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating

.3 American Architectural Manufacturers Association (AAMA):

.1 AAMA 505-17, Dry Shrinkage and Composite Performance Thermal Cycling Test Procedure

.2 AAMA 1503-09, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections

.4 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

1.3 WORK SUPPLIED BUT INSTALLED BY OTHER SECTIONS

.1 Supply inserts, anchors and other items to be built into work of other Sections and required for support of wall system.

.2 Provide clear instructions and, if required setting templates to ensure accurate setting of components.

1.4 DESIGN AND PERFORMANCE REQUIREMENTS

.1 Within parameters specified assume complete design responsibility for entire curtain wall system.

.2 Details and information indicated on drawings are schematic, showing general intent only and shall not be considered or construed to be the engineering design for the system or to be complete or adequate to meet the design criteria.

.3 Make thorough examination of drawings and details, check anchorage, structural deflections, shading factors, size and shape of glass, system of sealing, location of heating units, interfacing requirements with work of other Sections and other factors influencing design and performance of curtain wall system, and be fully cognizant of requirements.

.4 Design, fabricate and erect curtain wall system to meet or exceed the minimum requirements identified in this Section.

.5 Testing:

.1 On-Site pressurized water testing as per ASTM E1105; One (1) test.

1.5 PREINSTALLATION MEETING

.1 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings, attended by the Contractor, the Subcontractor's representative and foreman for this project, the Consultant, materials supplier(s), and other relevant personal before commencement of work for this Section.

1.6 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

.2 Shop Drawings:

.1 Furnish complete shop and erection drawings required for the work of this Section to the Consultant for review prior to fabrication.

.2 Co-ordinate shop drawings for work of this Section with those for other trades to ensure correct interface details required to provide watertight installation.

.3 Shop drawings shall incorporate plans, elevations, sections and details for all work in this Section. The details shall show and specify all metal and glass thicknesses, types and finishes, areas to be sealed and sealant materials, gaskets, glazing methods, direction and magnitude of thermal expansion, type of construction including joinery, fasteners and welds, all anchorage assemblies

and components, the fabrication and erection tolerances for the work in this Section and the adjoining related work of other Sections.

.4 Upon Consultant's request furnish complete design calculations for the curtain wall bearing seal of the professional engineer responsible for their preparation and all pertinent information affecting the design, including wind reactions, shading effects and the failure probability for the thermal glazing units as evidence of compliance with the design criteria.

.3 Test Data:

.1 If requested by Consultant, submit test data from a recognized independent testing agency, acceptable to Consultant, verifying that specified requirements are being met. Test results may be from a previous testing program conducted on a system similar to that specified herein.

.4 Samples:

.1 Submit duplicate minimum 2" x 4" samples of each type of aluminum finish specified.

.2 Upon Consultant's request furnish samples of glass types, gaskets, tapes and sealants.

.5 Maintenance and Glazing Instructions:

.1 On completion of work of this Section, supply maintenance and glazing instructions for insertion into the Operating and Maintenance Manual.

1.7 QUALITY ASSURANCE

.1 System Manufacturer's Qualifications:

.1 Minimum five (5) years continuous experience in successful production of work of type and quality specified. Submit proof of experience upon Consultant's request.

.2 Erector's Qualifications:

.1 Manufacturer's forces or forces licensed by manufacturer. Work of this Section shall be performed by workers especially trained and experienced in this type of work. A senior, qualified manufacturer's representative shall be at the site during erection of system to direct the various stages of operations.

1.8 STORAGE, DELIVERY, HANDLING AND PROTECTION

.1 Co-ordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location. Do not load any area beyond the design limits.

.2 Assembled units and their component parts shall be transported, handled and stored in a manner to preclude damage of any nature.

.3 Ship and store pre-glazed units in upright position only or use method which will positively prevent extrusion of sealants and shifting of glass within framing.

.4 Accessory materials required for erection at the site shall be delivered to the site in manufacturer's labelled containers.

.5 Remove all units or components which are cracked, bent, chipped, scratched or otherwise unsuitable for installation and replace with new.

1.9 SITE CONDITIONS

.1 Provide safe and adequate equipment on the site to execute the work of this Section, including scaffolding, staging, hoisting, safety protection equipment, tools, plant and other equipment required for the completion of the work of this Section.

.2 Coordinate and verify, by measurement at the job site, all dimensions affecting the work of this Section. Submit written notifications to the Consultant any field dimensions and conditions which are at variance with those on the reviewed shop drawings. The decision regarding corrective measures shall be obtained from the Consultant prior to the fabrication of the item affected.

1.10 WARRANTY

.1 Warrant work of this Section against any defects in materials and workmanship in accordance with the General Conditions, but for a period of two (2) years and agree to promptly and without cost to Owner and Tenant make good defects which become evident during warranty period. Without restricting the generality of the warranty, defects shall include leaking, deformation of members, breaking of glass due to thermal or structural movement, discolouration of finishes and failure of sealants.

.2 Warrant insulating glass units in accordance with General Conditions for a period of five (5) years. Warrant that units will be free from material obstruction of vision as a result of dust or film formation on internal glass surfaces by any cause other than extrinsic glass breakage.

.3 Warrant that any unit failing shall be removed and replaced without cost to the Owner and Tenant.

2 Products

2.1 DESCRIPTION OF WORK

.1 Responsibility: Professional Engineer is responsible for designing glazed aluminum curtain wall system based on design loads and reactions provided by the Consultant, and verifying that safety factor is appropriate for intended installation and meets requirements of the Authority Having Jurisdiction.

.2 Design Requirements: Design and size system components in accordance with CGSB 12.20 and ASTM E330; free from defects impairing strength, durability and appearance including anchorage capable of withstanding specified loading without failure, and as follows:

.1 Exposed Fasteners: Fabricated from same materials design to prevent high stress concentration at glass connection points, colour and finish as material as that to which they are applied and having exposed surfaces with same inherent texture and colour for similar locations throughout system.

.2 Wind (Horizontal) and Structural (Vertical) Loads: Design and fabricate assemblies and systems to resist loads required by Building Code.

.3 Engineering Design: Use Professional Engineer, registered in the province of the Work, and that has experience in the work required by this Section to prepare structural calculations and design details.

.3 Design Loads and Performance Criteria: Design curtain wall framing system capable of withstanding design loads within limits and under design loads indicated in this Section, and as follows:

.1 Structural Deflection and Movement: Allow for movement and deflection of structural support framing; design tension framing system connections to accommodate structural deflections such that loading is not transferred to glass curtain wall system:

.1 Building Movement: Design for movements of supporting structure including twist, column shortening, long term creep, and deflection from uniformly distributed and concentrated live loads and storey drift under combined wind and gravity loads in accordance with the Building Code.

.2 Lateral Loads: Design for q50 wind loads using low importance factors listed in the Building Code for deflection and strength, modified by the appropriate exposure, gust and pressure (internal and external) factors in accordance with Building Code structural commentaries.

.3 Periodic Maintenance Equipment Loads: Account for loads arising from window cleaning or other maintenance equipment.

.4 Deflection of Framing Members: Limit deflection to the following requirements with full recovery of glazing materials:

.1 Deflection Normal to Wall Plane: Limited to L/175 of clear span for spans up to 14', and to L/240 of clear span plus 1/4" for spans greater than 14' or an amount that restricts edge deflection of individual glazing lites to 19mm, whichever is less.

.2 Deflection Parallel to Glazing Plane: Limited to amount not exceeding an amount that reduces glazing bite to less than 75% of design dimension and that reduces edge clearance between framing members and glazing or other fixed components to less than 1/8".

.3 Limit length of cantilever deflection to 2/175 length of the cantilevered member where framing members overhang an anchor point.

.2 Thermal Loads and Movement: Allow for glass movement arising from thermal changes as follows, accounting for surface temperatures of materials due to both solar heat gain and night time sky heat loss:

.1 Normal Ambient Temperature Range: 40 deg C based on -16 deg C ambient winter and 24 deg C ambient summer; adjust calculations to account for colour treatments or coatings on curtain wall framing members and glass

.2 Structural Movement: Allow for thermal movement with no buckling of structural components, stress on glass, glazing edge seal failure, sealant failure, excess stress on curtain wall framing, anchors and fasteners, or reduction of performance in accordance with AAMA 505.

.3 Building Envelope Performance Criteria: Design glass and glazing systems to allow for the following:

.1 Provide airtight layer with 1.0 air changes per hour, verified through testing to ensure no loss of heat through leakage, and no ingress of moisture, humidity, pollutants or vapour.

.2 Water Penetration Under Static Pressure: Design system for zero water penetration when tested in accordance with ASTM E331 at a minimum differential static pressure of 20% of positive design wind load, but not less than 475 Pa.

.3 Triple glazed windows as standard with Maximum U-value less than 0.8W/m2K.

2.2 MATERIALS

.1 Aluminum:

.1 Extrusions: AA6063-T5 alloy, anodizing quality, conforming to ASTM B221-12.

.2 Plate and Sheet: AA1100-H14 alloy, anodizing quality unless otherwise indicated minimum 0.125" thick, conforming to ASTM B209-10, with special hardness for flat aluminum spandrel panels.

.3 Exposed surfaces of aluminum shall be free of die marks, scratches, blisters, "leave-off" marks, or other blemishes, whether left unfinished or finished.

.2 Structural Steel Sections and Steel Plate:

.1 CSA-G40.20/G40.21, Grade 260W.

.3 Galvanized Steel Sheet:

.1 Commercial grade, stretcher levelled or temper rolled, with galvanized zinc G90 (Z275) coating conforming to ASTM A653/A653M.

.4 Glass:

.1 Types and Composition: As indicated in Section 08 80 00.

.2 Glazing Materials:

.1 Glass Retaining Member Seals: PVC or neoprene conforming to ASTM C542-90, 75 to 85 Durometer A hardness, teflon coated, compressible, with corner joints under compression to ensure vertical to horizontal neoprene pressure contact.

.2 Glazing Tape: Extruded high-grade macro-polyisobutylene tape with continuous integral synthetic rubber spacer having a 50 shore A hardness.

.3 Setting Blocks: Neoprene conforming to ASTM C542, with 75 to 85 Durometer A hardness.

.3 Insulation Materials:

.1 Packing Insulation: Loose mineral fibre insulation, Type II, as indicated in Section 07 21 16.

.4 Perimeter Sealant Materials:

.1 Sealant: Multi-component, chemical curing type sealant conforming to ASTM C920.

.2 Provide cleaners, primers and bond breakers as recommended by the sealant manufacturer.

.3 Basis of Design Materials:

.1 DYmeric 240 by Tremco (Canada) Ltd.

.2 Sonolastic NP2 by Sonneborn Building Products, division of ChemRex Inc.,

.3 CWS/CCS by Dow Corning,

.4 or approved equivalent.

.4 Joint Back-Up: Round, closed cell extruded polyethylene non-outgassing foam, Shore A hardness of 20, tensile strength 140 to 200 KPa, oversized 30-50%, compatible with sealant and primer, non-adhering to sealant.

.5 Zinc Rich Paint:

.1 Ready mixed, zinc rich primer conforming to CAN/CGSB-1.181, 'Sealtight Galvafroid Zinc-Rich Coating' by W.R. Meadows of Canada Limited, or 'Zinc Clad No.7 Organic Zinc Rich Primer' by Sherwin Williams Company of Canada Ltd., or approved equivalent.

.6 Bituminous Paint:

.1 Conforms to CAN/CGSB-1.108, Type 2.

.7 Fasteners: '400' Series stainless steel, or '300' Series stainless steel.

.8 Flexible Flashings: Proglaze ETA by Tremco, or approved equivalent.

.9 Provide door adapters and other components as required to complete the work of this Section.

2.3 CURTAIN WALL FRAMING

.1 Manufacturer's standard extruded aluminum framing members of thickness required and reinforced as required to support imposed loads.

.2 Exterior Frame – Curtain Wall:

.1 Construction: Thermally broken, pressure plate glazed.

.2 Dimensions of Frame Profile: 2” sightline; Glazing throat to accommodate insulated glazing units indicated in Section 08 80 00.

.3 Cover: Matching width of frame profile, and supplied by aluminum framed entrance and storefront manufacturer to ensure compatibility.

.4 Glazing Method: Glazed from exterior.

.5 Installation Method: Single span, storefront.

.6 Operable Units: None.

.7 Basis of Design Materials:

.1 Alumicor Limited; Thermawall 2600

.2 Windspec Inc.; 5500HTP

.3 Commdoor; Series 8000

.4 Or approved equivalent.

2.4 ALUMINUM ENTRANCE SWING DOORS

.1 Manufacturers extruded aluminum glazed doors for manual swing operation, reinforced as required to withstand traffic conditions.

.2 Exterior Door Type – Wide stile, high-performance, polyamide strut thermal break; 57.2mm (2-1/4”) thick.

.1 Glazing Infill: Standard 25mm (1”) thick.

.2 Dual weather-stripping.

.3 Mechanically fastened and welded corner construction for strength and durability.

.4 Sight Line: 63.5mm (2-1/2”).

.5 Sizes:

.1 Stiles: 100mm (4")

.2 Top Rail: 98mm (3-7/8”)

.3 Center Rail: 100mm (4")

.4 Bottom Rail: 178mm (7")

.6 Basis-of-Design Material: ThermaPorte 7700, Style T400A by Alumicor Limited, or approved equivalent.

2.5 DOOR HARDWARE

.1 Provide door hardware in accordance with the requirements of this Section; using products that are recommended and supplied by entrance system manufacturer; in accordance with referenced standards, meeting requirements for description, quality, type, and function listed in hardware schedule.

.2 Manufacturer's heavy duty hardware units in sizes and types as required to meet entrance use as indicated on Drawings, with the following opening force limitations:

.1 Egress Doors: Maximum 135 N to set door in motion and not more than 70 N to open door to minimum required width.

.2 Accessible Interior Doors: Maximum 20 N to operate door through entire range of movement.

.3 Delayed Egress Locks: Lock releases within 15 seconds after applying a force of not more than 70 N for not more than 3 seconds.

.4 Latches and Exit Devices: Not more than 70 N required to release latch.

.3 Patio Door Hardware:

.1 Lock Handle Assembly: Multi-point locking system with gearbox lock body fastened to door stile.

.1 Basis of Design Material: Giesse/Savio, Lock Handle Assembly, Model No. 74031xx., or approved equivalent.

.2 Deadbolt: Thumbturn deadbolt lock with keyed cylinder and gearbox lock body fastened to door stile.

.1 Basis of Design Material: Giesse Group, Deadbolt, Model No 3131, or approved equivalent.

.3 Multi-Point Lock Assembly: Combination lock handle and deadbolt assembly with gearbox lock fastened to door style operating six (6) locking points.

.1 Basis of Design Material: Giesse Group, Multi-Point Lock Assembly, Model No. 04628, or approved equivalent.

.4 Hinges: Heavy duty aluminum hinges with stainless steel covers at two (2) locations.

.5 Trims:

.1 Strikes: Provide strike with black plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

.2 Concealed Overhead Holders: In accordance with BHMA A156.8, Grade 1.

.3 Surface Mounted Holders: In accordance with BHMA A156.16, Grade 1.

.4 Door Stops: In accordance with BHMA A156.16, Grade 1, floor or wall mounted as appropriate for door location indicated with integral rubber bumper.

.1 GJ-100 Series by Glynn-Johnson, to suit condition.

.5 Silencers: In accordance with BHMA A156.16, Grade 1.

.6 Thresholds: Raised thresholds bevelled with a slope of not more than 1:2, with maximum height of ½"; in accordance with BHMA A156.21.

.1 Thresholds by K.N. Crowder Mfg. Inc., or approved equal, to suit condition.

2.6 FABRICATION

.1 Fit and assemble component parts in shop as far as practicable. Work that cannot be permanently shop assembled shall be fitted, assembled, marked and disassembled to assure proper fitting in field. Identify shop assembled components on shop drawings for location and erection at Site.

.2 Aluminum components shall be extruded sections and shapes, unless otherwise specified or shown.

.3 Components required, for which extruded sections are not available shall be accurately formed to profiles indicated. Use minimum 14 gauge sheet aluminum unless otherwise indicated.

.4 All fastenings and connections shall be concealed unless approved by Consultant.

.5 Joints between horizontal and vertical mullions shall be accurately cut and fitted. Horizontal and vertical mullions shall be in true plane with interior and exterior faces in line.

.6 Mechanically joined sections shall have "hairline" joints.

.7 Reinforce members as required to withstand loads and to maintain deflection within allowable limits.

.8 Internally reinforce framing members where work of other trades is to be fastened thereto.

.9 Fabricate expansion joints between mullion sections with formed extruded aluminum internal sleeve sections, secure to permit joint function and maintain true alignment of sections.

.10 Install air cut-offs in continuous vertical members to prevent stack effect of enclosed air columns.

.11 Framing members shall have internally formed keyed slots to receive and retain preformed gaskets, seals and thermal separators.

.12 Pressure plates shall be designed with integrally formed keyed slots to receive seals and of thickness necessary to provide permanent, uniform, sealing pressures for glazing units, without deformation.

.13 Provide inconspicuous, baffled weep holes to properly drain curtain wall cavities to exterior.

.14 Fabricate system to accommodate and interface with work of other Sections by means of rabbets, interlocks, miscellaneous angles, trim and filler sections as required.

.15 Factory glaze system modules as far as practicable. Effect glazing seal in accordance with wall system and glass manufacturer's recommendations and so as to meet specified design and performance requirements.

.16 Fabricate extruded or formed aluminum sills to profiles indicated to suit wall condition and minimum 3/32" thick. Provide drip deflectors at sill ends and at abutting vertical surfaces. Open ends of sills shall be fitted with neatly applied closure plates. Anchors shall be designed not to work loose after installation. Unless otherwise detailed provide "flush" slip joint at intermediate sill joints.

.17 Prepare aluminum curtain wall framing for installation of doors, finish door hardware including, but not limited to; deadlocks, handicap power door operators and other door finish hardware as specified within these documents.

.18 Install all door hardware on doors. Test all doors on completion of installation and adjust as required for smooth and efficient operation.

.19 Form covers, closures, mouldings and trim integral with, or immediately adjacent to work of this Section to profiles indicated on drawings, and as required for a complete installation.

2.7 FINISHES

.1 Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

.2 Protect finish with strippable protective film.

.3 Concealed Aluminum: As Fabricated Finish (Mill Finish); AA-M10 fabricated mechanical finish.

.1 Two (2) Coat PVDF or FEVE Coating – Exterior Surfaces:

.1 Manufacturer's standard 2 coat, thermo-cured system consisting of specially formulated inhibitive primer and colour topcoat, and apply coating to exposed metal surfaces in accordance with AAMA 2605 and with coating and resin manufacturers' written instructions.

.2 Colour: As selected by Consultant from manufacturer's full product range.

.3 Basis of Design Materials: Duranar XL, or approved equivalent.

.4 Acrylic Enamel Finish – Interior Surfaces:

.1 One (1) Coat Acrylic Extrusion Coating:

.1 AA-C12 Chemical Finish, cleaned with inhibited chemicals; C40 Chemical Finish, conversion coating; Rx Acrylic Coating, manufacturer’s standard single coat factory spray applied acrylic coating; prepare, pre-treat and apply coating to exposed metal surfaces to 0.020 mm or thicker in accordance with AAMA 2603 and with coating manufacturer’s written instructions.

.2 Colour: As selected by Consultant from manufacturer's full product range.

.3 Basis of Design Materials: PPG Duracron, or approved equivalent.

.5 Steel (Concealed):

.1 Hot-dip galvanized in accordance with CAN/CSA-G164, with minimum coating of 2 oz./sq.ft., or zinc rich paint.

.6 Isolate where necessary to prevent electrolysis due to dissimilar metal-to-metal contact or metal-to-masonry and concrete contact. Use bituminous paint, butyl tape or other approved divorcing material.

3 Execution

3.1 EXAMINATION

.1 Check structural elements and adjoining work of other Sections on which work of this Section is dependent, verify governing dimensions, floor elevations, floor to floor heights, minimum clearances between curtain wall and structural frame. Confirm that conditions are satisfactory before proceeding. Commencement of work of this Section indicates acceptance of surfaces and conditions.

3.2 ERECTION

.1 Erect curtain wall system plumb, level and square, in correct relation to work of other Sections, within a maximum non-cumulative deviation of 1/8" per 12' length of member, and with members accurately fitted and aligned at joints and intersections.

.2 Anchor system to building structure, adjusting as required to meet erection tolerances and secure to prevent movement other than that which is expected due to structural deflection and creep and thermal expansion and contraction.

.3 Provide all devices and components required for erection of system.

.4 Provide flashings, fillers, covers and sealants indicated and as required to render system weathertight and to meet specified performance criteria. Ensure effective seal at laps, end joints and changes of direction.

.5 Provide continuity of thermal and air seal/vapour barriers with adjacent thermal and air seal/vapour barrier systems. Pack spaces between frames and adjacent building elements and where shown with fibrous insulation.

.6 Seal joints between wall system and adjacent building elements with sealant in strict accordance with requirements of Section 07 92 00.

.7 Use concealed fastenings only.

.8 Touch up steel anchoring components, after installation, with zinc rich paint.

.9 Erection Tolerances: Install glazed aluminum curtain wall systems to the following maximum tolerances:

.1 Plumb: 3mm in 3048mm (1/8" in 10') with aggregate total not exceeding 6mm in 12192mm (1/4" in 40’).

.2 Level: 3mm in 6069mm (1/8" in 20') with aggregate total not exceeding 6mm in 12192mm (1/4" in 40’).

.3 Alignment: Limit misalignment of two adjoining glass panes abutting in the same plane as follows:

.1 Limit offset from true alignment to 1.6mm (1/16") where surfaces meet in-line or are separated by reveal or protruding element up to 13mm (1/2") wide.

.2 Limit offset from true alignment to 3mm (1/8") where surfaces are separated by reveal or protruding element from 13mm to 25mm (1/2" to 1") wide.

.3 Limit offset from true alignment to 6mm where surfaces are separated by reveal or protruding element of 25mm (1") or wider.

.4 Joint Width: Maintain sealant space between glass and adjacent construction to an average of 16mm (5/8"), with a variation of no more than +3mm (1/8") and -6mm (1/4").

.5 Location: Limit variation from plane to 3mm in 3658mm (1/8" in 12’) with aggregate total not exceeding 13mm (1/2") over total length.

3.3 FINAL CLEANING

.1 Remove protective coatings and coverings from prefinished components; clean structural components and fittings; remove excess sealants and other substances that detract from finished appearance after completion of installation.

.2 At completion of work of this Section, remove all labels from glass and clean inner and outer faces of glass and all exposed metal surfaces at interior and exterior. Replace scratched or broken glass and make good any damaged materials, all in accordance with Division 01.

.3 Coordinate protective measures required to prevent damage or deterioration of structural glass system from subsequent construction activities.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for supply and installation of triple glazed, aluminum-clad wood windows, having a combination of both fixed and operable sealed glass units, as indicated on the Window Schedule on Drawing A0.1 Schedules.

.2 Drawings contain details that suggest directions for solving some of the major design requirements; these details can be developed further by the Contractor provided that the final installation adheres to aesthetic criteria established by the drawings and specified dimensions with all elements in planes as drawn, maintaining their relationships with all other building elements.

1.2 REFERENCE STANDARDS

.1 North American Fenestration Standard (NAFS):

.1 NAFS-08 - Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440-08, NAFS - North American Fenestration Standard/Specification for windows, doors, and skylights

.2 National Fenestration Rating Council (NFRC):

.1 ANSI/NFRC 100-2020, Procedure for Determining Fenestration Product U-factors

.2 ANSI/NRFC 400-2020, Procedure for Determining Fenestration Product Air Leakage

.3 ANSI/NFRC 500-2020, Procedure for Determining Fenestration Product Condensation Resistance Values

.3 American Architectural Manufacturers Association (AAMA):

.1 AAMA/NWWDA 101/I.S.2-97, Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors

.2 AAMA 502-12, Voluntary Specification for Field Testing of Newly Installed Fenestration Products

.3 AAMA 1503-09, Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections

.4 Canadian Standards Association (CSA):

.1 CAN/CSA A440-00/A440.1-00, Windows/User Selection Guide to CSA Standard CAN/CSA A440-00, Windows

.2 CSA-G40.20-04/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel

.3 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures

.4 CSA W47.2-11, Certification of Companies for Fusion Welding of Aluminum.

.5 CSA W59-03(2008), Welded Steel Construction (Metal Arc Welding), Metric.

.5 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-1.108-M89, Bituminous Solvent Type Paint

.2 CAN/CGSB-51.20-M87, Expanded Polystyrene Thermal Insulation

.6 American Society of Testing and Materials (ASTM):

.1 ASTM A167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

.2 ASTM B209-06/B209M-06,

.3 ASTM E90-09(2016), Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

.4 ASTM E283/E283-19, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

.5 ASTM E330/E330-14(2021), Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference

.6 ASTM E331-00(2016), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

.7 ASTM E1105-15, Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference

1.3 PREINSTALLATION MEETING

.1 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings, attended by the Contractor, the Subcontractor's representative and foreman for this project, the Consultant, materials supplier(s), and other relevant personal before commencement of work for this Section.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

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

.1 Product Data: Submit product data including construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.

.2 Shop Drawings:

.1 Submit Shop Drawings prepared by or under the supervision of Professional Engineer, familiar with curtain wall construction, and registered to practice in the Province of the Work, detailing fabrication and assembly of glazed aluminum systems. Seal and sign Shop Drawings by same Professional Engineer.

.2 Clearly indicate each type of window, door, extrusion profiles, method of installation, hardware reinforcement, anchorages and locations of exposed fasteners, finishes and glazing.

.3 Indicate structural attachment of entire assembly back to supporting structure. Identify locations of tempered glass in accordance with OBC.

.3 Certificates:

.1 Passive House System Certificate: Show required certification for the cool temperate climate zone (phB) as recognized by PHI.

.2 Statement signed by glass manufacturer clearly stating that glass used on this project is part of manufacturer’s system and are acceptable to manufacturer.

.3 Statement signed by the glass manufacturer that the glass manufacturer has reviewed the contract documents and can issue warranty incorporating components for system; Letters signed by installer for this section are not acceptable.

1.5 PROJECT CLOSEOUT SUBMISSIONS

.1 Provide operations and maintenance information in accordance with Division 01.

.2 Submit data for cleaning of finishes and maintenance of operational hardware.

1.6 QUALITY ASSURANCE

.1 Qualifications: Provide proof of qualifications when requested by the Consultant:

.1 Installer: Use personnel experienced with the materials specified, with work of similar complexity to that indicated for the project, and who are acceptable to manufacturer.

.2 Pre-Construction Testing:

.1 Laboratory tests to be conducted on at least one full size sample taken from each batch of windows manufactured for the Project, including operable components.

.2 Submit certified copies of test results from an approved independent testing agency to confirm compliance with the CSA A440 minimum specified A, B, C ratings.

.3 Additional windows may be specified for testing at the discretion of the Consultant.

.4 The test data to be submitted to the Consultant for review and approval prior to installation. Include cost of testing in the Contract Price.

1.7 SYSTEM DESCRIPTION

.1 Triple-glazed thermally-broken aluminum windows, certified by Passive House Institute at time of bid qualification, designed and installed to withstand local 1:10 year wind loading requirements in accordance with OBC, NBC, Climatic Information for Building Design in Canada and Wind Loads for Cladding and Windows – with maximum deflection of 1/175 of clear span under full design load, seismic loading, and minimum guard loads.

.2 Include mullion reinforcing as required to meet design criteria.

1.8 DESIGN REQUIREMENTS

.1 The building envelope shall be designed and constructed to control air leakage into, or out of the conditioned space, for a targeted post-retrofit air leakage rate of 1.0 L/s/m^2 at 50 Pa.

.2 Field records including positive and negative pressure air change test results.

.3 Structural Loads:

.1 Wind Loads: As indicated on Structural Drawings.

.4 Deflection of Framing Members:

.1 Deflection Normal to Wall Plane: test pressure to be wind load indicated on Structural Drawings.

.2 Deflection Parallel Glazing Plane: Test pressure to be 1.5 times wind pressure.

.3 Deflection of members carrying full dead load to not exceed amount that will reduce glass bite below 75% of design dimension or edge clearance between member and fixed glass or other fixed member above to less than 3mm (1/8”).

.4 Clearance between the member and operable door or window to be at least 1.5mm (1/16”).

.5 Structural Performance: Provide systems identified in this Section, tested according to ASTM E330 as follows:

.1 When tested at positive and negative wind-load design pressures, systems do not show evidence that deflection is exceeding specified limits.

.2 When tested at 150% of positive and negative wind-load pressures, systems, including anchorage, do not show evidence of material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.

.3 Test Durations: As required by design wind velocity, but not less than 10 seconds.

.6 Provide flashing and trim systems to prevent water leakage to the building interior. Include flashings with frames to divert water away from glazing edges.

.7 Air and Vapour Seal: Maintain continuous air barrier and vapour control layer throughout assembly as indicated on the Drawings.

.8 Internal Drainage System: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system to exterior by weep drainage network.

.9 Provide aluminum-clad wood framed window systems, including anchorage, capable of withstanding, without failure, the effects of the following:

.1 Cool Temperate Climate Passive House Certified Component.

.2 Thermal movements: Design thermal barrier connection to achieve complete metal to metal separation between main framing and glass retention members except for screw fasteners. Framed section shall have a maximum U-value of 0.81 W/m^2K.

.3 Movements of supporting structure including, but not limited to, deflection from uniformly distributed and concentrated live loads

.4 Dimensional tolerances of building frame and other adjacent construction

.10 Failure of performance requirements will be considered to include, but not be limited to, the following:

.1 Deflection exceeding specified limits;

.2 Thermal stresses transferred to building structure;

.3 Framing members transferring stresses, including those caused by thermal and structural movements, to glazing;

.4 Glazing-to-glazing contact in structural silicone glazed systems;

.5 Noise or vibration created by wind and thermal and structural movements;

.6 Loosening or weakening of fasteners, attachments, and other components;

.7 Sealant failure;

.8 Failure of operating units to function properly.

1.9 PERFORMANCE VERIFICATION TESTING

.1 Performance Testing:

.1 Windows will be performance tested by an independent testing agency designated by the Consultant.

.2 All in situ testing, except for re-testing, shall be paid directly by the Owner.

.3 Coordinate testing activities with the testing agency. Provide timely notice to affected parties prior to scheduled testing.

.4 Testing agency shall distribute written results of all tests within three days of completing testing.

.2 Field testing shall include:

.1 Water Penetration: in accordance with ASTM E1105-15.

.2 Air Leakage: in accordance with ASTM E783-02(2010).

.3 Testing Stage 1 – Mock-Up Testing:

.1 Prior to installation of any windows, the mock-up shall be tested to verify compliance with specified air and water penetration performance requirements. Testing area shall include the window and surrounding building envelope components.

.2 Upon passing the mock-up test, installation of the remaining windows may proceed.

.4 Testing Stage 2 – In Situ Testing:

.1 Throughout the progress of the Work and at the discretion of the Owner, up to 5% of installed windows may be tested for air and water penetration to verify compliance with specified performance requirements.

.5 Re-Testing:

.1 Should testing result in a failure to meet specified performance requirements:

.1 Re-test the failed unit and test one (1) additional window at Contractor's expense.

.2 Provide a written explanation of the cause of the failure and propose a recommendation to ensure specified performance requirements are met for all windows. Further testing will not be scheduled until this written explanation is received.

.3 Any proposed modifications to the window design or installation are subject to review and acceptance by the Consultant and the Owner.

.4 The cost of retesting including the Testing Agency, and the Engineers and Owners time, will be paid by the Contractor.

1.10 SITE CONDITIONS

.1 Site Measurements: Verify actual locations of structural supports by site measurements before fabrication and indicate measurements on Shop Drawings.

.2 Established Dimensions: Establish dimensions and proceed with fabrication, where site measurements cannot be made without delaying the Work; coordinate construction to ensure that actual dimensions correspond to established dimensions.

.3 Ambient Conditions: Confirm installation requirements for ambient and surface temperatures of sealants with manufacturer and apply sealants when temperatures are greater than manufacturer's stated minimum from time of application until sealants have cured.

1.11 MOCK-UPS

.1 Construct mock-ups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution before installing materials indicated in this Section.

.2 Build mock-ups using exposed and concealed materials indicated for the completed Work.

.3 Mock-Up Requirements:

.1 1 window installed. Location to be agreed between contractor and consultant.

.4 Provide performance testing by independent testing agency for water penetration and air leakage.

.1 Mock-up to be tested before remaining windows are installed and in-situ testing as well.

.2 If testing results in failure, re-test the failed unit and one (1) additional window at Contractor's expense to ensure compliance.

1.12 WARRANTY

.1 Provide manufacturers written guarantee, signed and issued in the name of Owner, to replace the following items for defective material and workmanship for the time stated from date of Substantial Performance:

.1 Framing, Panels and Glazing: Failure of performance requirements specified in Contract Documents; 5 years

.2 Sealed Glass Units: Misting, dusting and seal failure; 5 years

.3 Sealants: Failure to maintain seal; 5 years

.4 Aluminum Brake Shapes: Oil canning and de-laminations; 5 years

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design products are named in this Section; additional manufacturers offering similar Products may be incorporated into the work provided they meet the performance requirements established by the named products provided they submit requests for substitution in a minimum of five (5) days in advance of Bid Closing.

.2 Acceptable Materials and Manufacturers: Subject to compliance with requirements specified in this Section and as established by the Basis-of-Design Materials, manufacturers offering products that may be incorporated into the Work include; but are not limited to, the following:

.1 Aluminum-Clad Wood Windows:

.1 Fenstur/Wescon Cedar Products; 106mm Wood-Alu Window

.2 Or approved equivalent

2.2 WINDOWS DESIGN CRITERIA

.1 Provide high-efficiency tilt-and-turn aluminum-clad wood windows with keyed locked-turn available only to building maintenance, to meet Passive House Thermal Conductive

standards, windows to be certified components for use in project climate by Passive House Institute, Darmstadt, Germany.

.2 Glass and Glazing.

.1 Glazing Assemblies: As indicated in Section 08 80 00.

.2 All insulated glazed units (IGU) must be triple glazed units, IGU type as scheduled.

.3 Tempered Glass: CAN/CGSB 12.1-M91, minimum 6mm thick, must be heat treated and tempered all 3 panes.

.4 IGU Edge Spacer: Swisspacer Ultimate, or approved equivalent.

.5 Psi Value of Edge Spacer: Equal to 0.021 W(mK) or better.

2.3 PERFORMANCE REQUIREMENTS

.1 Design windows in accordance with following CAN/CSA A440S1 (17), Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440-17, North American Fenestration Standard/Specification for windows, doors, and skylights:

.1 Performance class: CW.

.2 Minimum Performance Grade (PG): PG30.

.3 Air tightness:

.1 Operable: A3; 0.5 L/s/m2 at 75 Pa

.2 Fixed: 0.2 L/s/m2 at 75 Pa

.4 Uniform Load Structural Test pressure (STP): 3240 Pa

.5 Minimum Positive Design Pressure: 1140 Pa

.6 Minimum Negative Design Pressure: 1140 Pa

.7 Minimum Water Penetration Test Pressure: 300 Pa

.8 Condensation Resistance:

.1 Operable: I56

.2 Fixed: I60

2.4 MATERIALS

.1 Timber Structural Profiles:

.1 Wood Species: As selected by the Consultant, from the manufacturers standard wood types

.2 Profile Depth and Thickness: As indicated on the Drawings.

.2 Aluminum: Materials recommended by manufacturer for type of use and finish indicated, and as follows:

.1 Sheet and Plate: In accordance with ASTM B209/B209M, and ANSI H35.1 AA1100-H14, or AA5005-H32 or H34, anodizing quality.

.2 Extruded Bars, Rods, Profiles, and Tubes: In accordance with ASTM B221/B221M), and ANSI H35.1 AA6063-T5 or T6, anodizing quality.

.3 Extruded Structural Pipe and Tubes: In accordance with ASTM B429, and ANSI H35.1 AA6061-T6 or AA6063-T6, anodizing quality.

.4 Structural Profiles: In accordance with ASTM B308/B308M, anodizing quality.

.5 Welding Rods and Bare Electrodes: CSA W59.2.

.3 Steel Reinforcement: Coat steel with manufacturer's standard corrosion resistant primer applied immediately after surface preparation and pre-treatment, and as follows:

.1 Rolled Sheet or Strip: CSA G40.20/G40.21.

.2 Structural Shapes, Plates and Bars: CSA G40.20/G40.21.

.4 Brackets and Reinforcements: Manufacturer's standard high strength aluminum with non-staining, nonferrous shims for aligning system components.

.5 Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.

.1 Use self locking devices where fasteners are subject to loosening or turn out from thermal and structural movements, wind loads, or vibration.

.2 Reinforce members as required to receive fastener threads.

.3 Use only concealed fasteners, unless use of exposed fasteners has been accepted in writing by the Consultant. When approved, use exposed fasteners with countersunk Phillips screw heads.

.4 Finish exposed portions to match framing system.

.5 Use slip joint linings, spacers, and sleeves at movement joints of material and type recommended by manufacturer.

.6 Anti-Rotation Channels: Extruded aluminum anti-rotation channel designed to mechanically retain air seal membrane to the face of the tubular back section.

.7 Anchors: Three way adjustable anchors that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

.8 Concealed Flashing: Manufacturer's standard corrosion resistant, non-staining, non-bleeding flashing compatible with adjacent materials.

.9 Glazing Sealants: Provide a multi component structural silicone sealant for pre-assembled glazing units.

.1 Basis of Design Materials:

.1 Proglaze II by Tremco;

.2 Illmod 600 by Tremco;

.3 983 by Dow Chemical;

.4 Or approved equivalent.

.10 Transition Membranes: Full length mechanically anchored, extruded silicone rubber transition membrane to perimeter of frame profile to provide continuous air/vapour retarder to adjacent wall construction:

.1 Basis-of-Design Materials: Tremco Proglaze ETA Engineered Transition Assembly, or approved equivalent.

.11 Glazing Gaskets: Manufacturer's standard sealed corner pressure glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers; as recommended by manufacturer for joint type.

.12 Dielectric separator: Bituminous paint CAN/CGSB-1.108.

.13 Thermal separator: Provided by window manufacturer.

.14 Fibrous Insulation: Refer to Section 07 21 16.

.15 Fasteners: To ASTM A167, stainless steel, type 304 selected to prevent galvanic action with the components fastened, of suitable size to sustain imposed loads.

.16 Supporting angles, plates, bars, rods, and other steel accessories: Mild steel CAN3-G40.20/G40.21, shop painted with zinc chromate primer, thickness as required to sustain imposed loads and in no case less than 5 mm thick.

.17 Metal air seal/vapour barrier (by window supplier) to be bonded to window frame and extend behind wood mounting frame as indicated on details. Seal all corners to maintain air sea/vapour retarder. Note that flexible flashing with continuous metal retaining strip will be supplied and installed by the interior finishing contractor.

.18 Sill Angle: Extruded aluminum sill to suit sill depth, with perpendicular turn up to under sill and back with custom preformed black EPDM sill joint seal and with aluminum sliding closure.

2.5 HARDWARE

.1 Windows:

.1 Operable hopper/awning windows to have single lever operator/multi-point locking, as supplied by the window manufacturer.

2.6 INSECT SCREENS

.1 Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches, and as follows:

.1 Fabricate screens and frames in accordance with CAN/CSA A440 and CAN/CGSB 79.1.

.2 Fabricate insect screens to fully integrate with window frame.

.3 Locate screens on outside of window and provide for each operable exterior sash.

.2 Screen Frames:

.1 Extruded Aluminum or Aluminum Tubular Framing Sections: Aluminum sections having 1/32” minimum nominal wall thickness, with finish matching aluminum window members.

.3 Screen Fabric:

.1 Screen Class: Class A in accordance with CAN/CGSB 79.1.

.2 Screen Strength: S2 in accordance with CAN/CSA A440 and CAN/CGSB 79.1.

.3 Screen Style: Style 1 in accordance with CAN/CGSB 79.1.

.4 Fabric Mesh Material: Aluminum Wire: Charcoal grey or black finish; in accordance with CAN/CGSB 79.1.

2.7 FABRICATION

.1 Fit and assemble all Work in the shop insofar as practical.

.2 Carefully fit and match all Work for continuity of line and design, using rigidly secured joints with hairline contact, unless otherwise shown.

.3 Reinforce members and joints with steel plates, bars, rods or angles for rigidity and strength as needed to fulfill performance requirements. Use concealed stainless steel fasteners for jointing which cannot be welded.

.4 Separate unlike metals or alloys with a heavy coating of bituminous paint, separator gaskets or slip gaskets as required to prevent galvanic action.

.5 Provide weepholes in the glazing recess and an airseal at the interior glassline.

2.8 FINISHES

.1 Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

.2 Protect finish with strippable protective film.

.3 As Fabricated Finish (Mill Finish): AA-M10, as fabricated mechanical finish.

.4 High Performance Organic Finish:

.1 Two (2) Coat PVDF or FEVE Coating:

.1 Manufacturer's standard 2 coat, thermo-cured system consisting of specially formulated inhibitive primer and colour topcoat, and apply coating to exposed metal surfaces in accordance with AAMA 2605 and with coating and resin manufacturers' written instructions.

.2 Colour: As selected by Consultant from manufacturer's full product range.

.3 Basis of Design Materials: Duranar XL, or approved equivalent.

.5 Timber – Interior Surface:

.1 Finish: prefinished/factory painted; colour to be selected by Consultant from manufacturers standard colour range.

.6 Steel (Concealed):

.1 Hot-dip galvanized in accordance with CAN/CSA-G164, with minimum coating of 2 oz./sq.ft., or zinc rich paint.

.7 Isolate where necessary to prevent electrolysis due to dissimilar metal-to-metal contact or metal-to-masonry and concrete contact. Use bituminous paint, butyl tape or other approved divorcing material.

3 Execution

3.1 INSPECTION

.1 Inspect Work and conditions affecting the Work of this Section. Proceed only after deficiencies, if any, have been corrected.

.2 Ensure that all flashings built-in or provided by others integrate with system to divert moisture to exterior.

.3 Ensure that all reglets, anchor blocks or inserts required to receive system are correctly located and installed.

.4 Ensure that all anchors and setting or installing components provided by this Section for installation are properly located and installed.

.5 Ensure that building air and vapour retarding membranes can be sealed to window units to maintain system integrity.

3.2 PREPARATION

.1 Obtain all dimensions from the job site.

.2 Provide data, dimensions and components, anchors and assemblies to be installed by others in proper time for installation.

3.3 ERECTION

.1 Erect Work in strict accordance with manufacturer's written instructions.

.2 Conceal all anchors and fitments. Exposed heads of fasteners not permitted. All joints in exposed work to be flush hairline butt joints.

.3 Use anchors that will permit sufficient adjustment for accurate alignment. Make allowance for deflection of building structure.

.4 Build in and provide any supplementary reinforcing and bracing required by assembly loads and deflections.

.5 Secure Work adequately to structure in a manner not restricting thermal and wind movement.

.6 Correctly locate and install flashings, deflectors and weep holes to ensure proper drainage of moisture to exterior.

.7 Maintain alignment with adjacent Work.

.8 Isolate aluminum surfaces from adjacent dissimilar materials and metals with coatings of bituminous paint.

.9 Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

3.4 GLAZING

.1 Ensure all stops, gaskets, splines, seals etc., are perfectly aligned and ready to receive glazing and insulated panels as specified herein.

.2 Install glazing to approved details and instruction, using material specified.

.3 Glazing stops, snap covers shall be of a continuous length from corner to corner and be fitted at corners.

.4 All preformed tapes or gaskets shall be of a continuous length corner to corner and shall be cut over length to prevent stretching. Joints, splices and corners shall be mitred and sealed.

.5 Clean all contact surfaces of glazing with solvent and wipe dry. Ensure all glazing channels are clean, true to line, and free of dirt or debris and that weep and drainage vents are open.

.6 Rest glazing on setting blocks at 1/4 points.

.7 Install shims at sides to align glass units.

3.5 SEALANT

.1 Caulk and seal full perimeter of windows to building air/vapour retarder to provide and maintain the designed air/vapour/thermal barrier integrity and weather tightness.

.2 Install sealants and back-up materials in strict accordance with manufacturer's written instruction.

3.6 TOLERANCES

.1 Maximum Variation from Level or Plumb: 3mm in 900mm (1/8” in 3’).

3.7 FIELD QUALITY CONTROL

.1 Window Site Tests:

.1 Costs for first tests by independent testing agency are included in the Work of this Project.

.2 Re-testing costs which are required, are to be paid for by window manufacturer or installer, depending on the failure. Fully cooperate with testing agency.

.1 Preform field tests 1% of the windows and not less than five windows. Minimum of 2 windows to be tested before 5% of the windows are installed. Number of tests may increase, depending on failure rate of window tests.

.2 Test window mock-up to determine if windows meet CAN/CSA A440 for standard indicated in description above.

.3 If window mock-up fails to meet requirements indicated in this Section, reasons for failure to be determined by testing agency. Make repairs to window units and re-test at window manufacturer or installers cost until tested window passes the requirements.

.4 If non-mock-up window fails to meet requirements indicated in this Section, reasons for failure to be determined by testing agency. Make repairs to window units and re-test at window manufacturer or installers cost until tested window passes the requirements.

.1 Plus, test two (2) different window units at window manufacturer or installers cost to ensure windows are preforming as required.

3.8 ADJUSTING AND CLEANING

.1 At completion and continuously as Work proceeds, remove all surplus materials, debris and scrap.

.2 At completion of Work, remove all protective surface covering film and wrappings. Clean all glass, panels and frames using mild soap or other cleaning agent approved by manufacturer.

.3 Remove all excess glazing or joint sealing materials from exposed surfaces. Clean and polish glass.

.4 Adjust operating hardware to function properly, without binding and to provide tight fit at contact points and weather-stripping.

END OF SECTION

1 General

1.1 SUMMARY

.1 Supply and install door hardware listed in the Hardware Schedule, establishes the quality standards, finishes, manufacturers and functions, and meets all current barrier free design standards required by authorities having jurisdiction.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Submission of Substitutions: Materials other than the named products for the Project may be acceptable to the Consultant, subject to Specification 01 25 00.

.2 Pre-installation Conference: Arrange a preconstruction meeting in accordance with Division 01 to discuss the following:

.1 Keying Conference: Conduct keying conference between the Owner, the Contractor and manufacturer to review and finalize requirements, at the Project site and incorporate decisions into final keying schedule after reviewing door hardware keying system.

.2 Electrified Hardware Conference: Conduct pre-installation conference at Project site and review methods and procedures related to electrified door hardware.

.3 Coordination: Obtain and distribute templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Coordinate with shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware.

1.3 SUBMITTALS

.1 Provide required information in accordance with Division 01.

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

.1 Product Data: Submit product data indicating installation details, material descriptions, dimensions of individual components and profiles, and finishes.

.2 Shop Drawings: Submit shop drawings indicating details of electrified door hardware including, but not limited to, the following:

.1 Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer installed and site installed wiring.

.3 Samples:

.1 Submit samples of complete line of hardware and finishes, if and when requested, to accompany any proposal for substitution. Fully label each sample as to manufacture, type, size and location for use proposed.

.4 Hardware Schedule: Submit door hardware schedule prepared by Architectural Hardware Consultant (AHC), detailing fabrication and assembly of door hardware, including make, model, material, function, size, finish, and other pertinent information.

.3 Do not order hardware from manufacturers until samples have been approved. Hardware and finishes supplied shall be identical with approved samples.

1.4 PROJECT CLOSEOUT SUBMISSION

.1 Operation and Maintenance Data: Provide operations and maintenance information in accordance with Division 01.

.2 Spare Parts and Tools: Submit unique parts and tools for maintaining hardware system in accordance with Division 01.

1.5 DELIVERY, HANDLING AND PROTECTION

.1 Pack hardware in suitable wrappings and containers to protect from injury during shipping and storage. Enclose accessories, fastening devices and other loose items with each item. Mark packages for easy identification as indicated on approved delivery schedule. Hand over hardware to designated installer.

1.6 WARRANTY

.1 Warrant door closers to remain free from defects in materials and workmanship in accordance with the General Conditions, but for a period of five (5) years, and locks and locksets for two (2) years. Agree to promptly make good defects which become apparent within warranty periods without cost to Owner.

2 Products

2.1 GENERAL

.1 Supply to the job site all items of finishing hardware as indicated in the Hardware Scheduled appended to this Section. All items to be supplied with complete and adequate fixing and anchoring devices necessary for satisfactory installation into or upon the various surfaces to which it is to be affixed.

.2 Cooperate with all trades using hardware supplied under this Section.

.3 Render a complete service to the metal fabrication contractor wherein full cooperation is assured them of the supply of hardware information, and templates as requested.

.4 Supply for installation by others where specified, as scheduled or indicated on the drawings.

.5 Provide six, (6) copies of the hardware specification for field construction and office use.

.6 All hardware shall be of the best quality and design, construction and finish, free from all defects.

.7 All blank strikes shall be ASA with no lip.

.8 Lock strikes shall be ASA with lip.

.9 All deadlock strikes shall be ASA with no lip.

.10 Where door pulls are scheduled on one side of door and a push plate on the other side, the contractor shall be responsible for fixing, so that the pull shall be secured through the door from the reverse side and the push plate installed to cover the thru bolts which will be countersunk flush with door.

.11 All door closers shall be non sized and where possible non handed. They shall be sized and adjusted by the installer to suit the site conditions.

.12 Panic sets are to be of style specified and completely plated.

.13 Before installing any hardware, carefully check all architectural drawings of Work requiring hardware, verify door swings, door and frame material and operating conditions. Ensure hardware will fit Work.

.14 Provide ULC approved hardware to ULC labelled doors.

.15 Check shop drawings and frame and door lists affecting hardware type and installation. Certify to correctness or advise Consultant in writing of required revisions.

.16 Templates:

.1 Check hardware schedule, drawings and specifications. Furnish promptly to applicable trades any patterns, templates, template information and manufacturer's literature required for proper preparation for and application of hardware, in ample time to facilitate progress of Work.

.2 Exposed screws for installing hardware shall have Phillips or Robertson heads.

.3 All door closers shall have back-checking features and shall be of proper size to operate door efficiently.

.4 Use no wall stops on drywall.

.5 Rim Panic Device strikes shall be mortise type application. Equip panic devices with hex bolts.

.17 Hinges

.1 Provide mortise type hinges, steel based for interior doors and stainless steel or brass for exterior doors or interior doors exposed to moisture.

.2 Provide hinges with stainless steel pins; non removable for exterior and public interior exposure, non rising for non security exposure.

.3 Provide full length continuous geared hinges, continuous pin and barrel hinges or full mortise type heavy weight butt hinges on all high frequency use or extreme weighted doors.

.4 Where doors are required to swing 180 degrees, provide ball bearing type swing clear hinges sufficient to clear trim.

.18 Locks, Cylinders, Latches and Bolts

.1 Locks are to be ANSI Grade 1 mortise type unless specified otherwise.

.2 Equip all locks with anti-friction latches with auxiliary latch guard. All fire rated doors must have a minimum latch throw as indicated on the fire door label.

.3 Where lever trim is required, provide levers containing concealed mounting and constructed of solid cast or forged material.

.4 Locks must be lever type.

.5 Provide locks in accordance with current barrier free accessibility requirements as set out by the OBC or by the jurisdiction having authority, when located in the barrier free path of travel.

.6 Strikes shall be ANSI standard size with curved lip strikes for latch bolts and no lip strikes for deadlocks. Provide complete with wrought iron boxes finished to match strike.

.7 Provide Cylinders and thumb turns with the correct cam or tailpiece to operate hardware correctly. Coordinate with Section 08 44 13 Glazed Aluminum Curtain Wall when applicable.

.8 Automatic flush bolts are to be equipped on all fire rated pairs of doors with regular use. Provide a coordinator in conjunction with automatic flush bolts.

.9 Provide a filler bar when using coordinators for a clean architectural appearance.

.19 Keying

.1 Provide a keying system for approval by the Owner.

.2 Costs of final keying shall be paid for by project Cash Allowance.

.20 Exit Device

.1 All exit devices installed on labelled fire doors shall carry a ULC or Warnock Hersey Label.

.2 Coordinate exit devices with astragals, coordinators, carry open bars and thresholds for correct and safe operation.

.3 All exit devices shall have exposed metal to match architectural finishes used on other hardware.

.4 Exit devices are push pad style only.

.5 Provide non-fire rated exit devices with hex key dogging feature (Cylinder dogging may be required in lieu of hex key dogging).

.6 Provide Power supplies of same manufacturer when using electrified exit devices.

.7 Match style and finish of trims on exit devices for locksets used.

.21 Closers

.1 All closers shall be hydraulically controlled and full rack and pinion in operation.

.2 All closers shall be fully adjustable including the following features: back check, speed control, and latch speed control.

.3 Provide mounting plates where required on special frame applications.

.4 Install all necessary attaching brackets, mounting channels, and cover plates where necessary for correct application of door closers.

.5 Supply to the Owner any special keys and wrenches as usually packed with door closers.

.6 Closers complete with a cover unless specified otherwise by the Consultant. Provide cover of matching architectural finish to the other hardware used in the project.

.7 Coordinate closers with overhead stops & holders.

.22 Push Plates and Door Pulls

.1 Provide and install stainless steel plates in type #304 stainless steel and install secure with screw fastening.

.2 Length of kick plates shall be 1-1/2" less than door width for single doors and 1" less than door width for doors in pairs.

.3 All stainless steel plates are 0.050" thick, free of rough or sharp edges. Corners and edges to have slight radiuses. Install kick plates and armor plates on both sides of the door with 3M tape or counter sunk screws as specified.

.4 Where door pulls are scheduled on one side of door and push plates on other side, issue installations instructions to ensure that the pull is secured through door from reverse side and countersunk flush with door installation of push plate. Locate push plate to cover fasteners for door pulls.

.23 Door Stops and Holders

.1 Wall stops are only to be used on wall conditions such as block or masonry. If necessary to mount on drywall, provide proper backing to ensure no damage to the wall.

.2 Supply floor stops of sufficient height to suit floor conditions and the undercut of the door.

.3 Provide gray rubber exposed resilient parts.

.4 Surface mount overhead door stops may be used unless they conflict with the door closer. All overhead stops are to be set to 90 degree opening unless stated otherwise.

.5 All door stops shall be heavy duty and of high quality.

.24 Door Seals and Thresholds

.1 Perimeter seals must be provided that fully seal all gaps between the floor, door and frame. Perimeter seal must protect against weather, smoke and sound.

.2 Frame gasketing must be constructed of neoprene. The aluminum housing must have a rib to prevent against distortion during installation.

.3 Provide aluminum frames with felt inserts by door supplier.

.4 Install Thresholds in a manner that ensures the door bottom comes in full contact.

.5 All thresholds shall be aluminum and installed with lead shields and stainless steel screws.

.6 Cut ends of thresholds to follow exactly the door frame profile.

.7 Provide barrier-free thresholds to all units identified as barrier free (BF) on balcony doors.

3 Execution

3.1 INSTALLATION

.1 Subcontractor installing the hardware shall carefully follow manufacturers' instructions for installation of all finish hardware.

.2 For mounting heights of various hardware items refer to the following, unless otherwise indicated on the Drawings:

.1 Locksets: 1024mm (40-5/16") from centre of lever to finished floor.

.2 Deadlocks: 1220mm (48") from centre of cylinder to finished floor.

.3 Mortise Night Latches: 1024mm (40-5/16") from centre of cylinder to finished floor.

.4 Panic Bolts: 1024mm (40-5/16") from centre of crossbar to finished floor.

.5 Push Plates: 1143mm 45" from centre of plate to finished floor.

.6 Guard Bars: 1024mm (40-5/16") from centre of bar to finished floor.

.7 Door Pulls: 1067mm (42") from centre of pull to finished floor.

.8 Blank Strike: 1024mm (40-5/16") from centre of strike to finished floor.

.9 Blank Fronts: 1024mm (40-5/16") from centre of strike to finished floor.

3.2 PERFORMANCE

.1 Adjustment and Cleaning:

.1 Provide services of competent mechanic without additional cost to Owner. Mechanic shall inspect installation of all hardware furnished under this Section and supervise all adjustments (by trades responsible for fixing) necessary to leave hardware in perfect working order.

3.3 HARDWARE SCHEDULE

.1 Refer to attached Schedule of Finishing Hardware.

END OF SECTION

Hardware Group Schedule

Heading #1

1 Single door DB100, Exterior From Lobby B100 (LHR)
1 Single door DB106, Exterior From Storage B106 (RHR)

Type: A, 914 x 1219 x 76 - ALUM DR x ALUM FR - 45min

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
2	Hinge	Hinge to Suit - By Door System Supplier			
1	Storeroom Lockset	Lockset to Suit Door Type- By Door System Supplier			
1	Construction Core	1C-7 Keyed Alike		Best	
1	Cylinder Permanent Core	1CX 7 W 2 x CORMAX SFIC x 626	626	BEST	
1	Surface Closer	8916 ISJ x Top Jamp x Stop Arm x 689	689	dormakaba	
1	Weatherstripping	Complete set of Weather Seals and Door Sweep by Door Supplier			

Note: Hinges, lockset with lever handles (to match selected lever design and SFIC cylinder) and weatherstripping - By Door Supplier

Heading #2

1 Single door DB101, Lobby B100 From Elevator Machine Room B101 (LHR)
1 Single door DB102, Stair 115 From Laundry B102 (RHR)
1 Single door DB115, Stair 115 To Lockers/Lobby B100 (LH)

Type: D, 914 x 2032 x 45 - HM DR x HM FR - 45min

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Standard Hinge	NRP-CB168 (4 1/2" x 4)	US26D	BEST	
1	Storeroom Lockset	B-AU 4605LN 626 x SFIC x Less Core	626	Yale	
1	Construction Core	1C-7 Keyed Alike		Best	
1	Cylinder Permanent Core	1CX 7 W 2 x CORMAX SFIC x 626	626	BEST	
1	Surface Closer	8916 DS	689	dormakaba	
1	Kick Plate	GSH 80 x 8" x 2"LDW	US32D	Gallery	
1	Gasketing	5050C x Opening Size (2H x 1W)	B	NGP	

Heading #3

1 Single door DB103, Laundry B102 To IT Room B103 (LH)
1 Single door DB104, Laundry B102 To Mechanical B104 (LH)

Type: D, 914 x 2032 x 45 - HM DR x HM FR

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Standard Hinge	CB168 (4 1/2" x 4)	US26D	BEST	
1	Storeroom Lockset	B-AU 4605LN 626 x SFIC x Less Core	626	Yale	
1	Construction Core	1C-7 Keyed Alike		Best	
1	Cylinder Permanent Core	1CX 7 W 2 x CORMAX SFIC x 626	626	BEST	
1	Door Closer	8916 AF89 REG	689	dormakaba	
1	Floor Door Stop	GSH 209 C26D	US26D	Gallery	
1	Kick Plate	GSH 80 x 8" x 2"LDW	US32D	Gallery	
1	Gasketing	5050C x Opening Size (2H x 1W)	B	NGP	

Heading #4

1 Single door DB105, Laundry B102 To Electrical B105 (LH)

Type: D, 914 x 2032 x 45 - HM DR x HM FR - 1 HR

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Standard Hinge	CB168 (4 1/2" x 4)	US26D	BEST	
1	Storeroom Lockset	B-AU 4605LN 626 x SFIC x Less Core	626	Yale	
1	Construction Core	1C-7 Keyed Alike		Best	
1	Cylinder Permanent Core	1CX 7 W 2 x CORMAX SFIC x 626	626	BEST	
1	Door Closer	8916 AF89 REG	689	dormakaba	
1	Wall Door Stop	GSH 250	US32D	Gallery	
1	Kick Plate	GSH 80 x 8" x 2"LDW	US32D	Gallery	
1	Gasketing	5050C x Opening Size (2H x 1W)	B	NGP	

Heading #5

1 Single door DB105a, Exterior From Electrical B105 (RHR)

Type: A, 914 x 2134 x 76 - ALUM DR x ALUM FR - 1 HR

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Hinge	Hinge to Suit - By Door System Supplier			
1	Storeroom Lockset	Lockset to Suit Door Type- By Door System Supplier			
1	Construction Core	1C-7 Keyed Alike		Best	
1	Cylinder Permanent Core	1CX 7 W 2 x CORMAX SFIC x 626	626	BEST	
1	Door Closer	8916 TJ x BP89	689	dormakaba	
1	Wall Door Stop	GSH 250	US32D	Gallery	
1	Kick Plate	GSH 80 x 8" x 2"LDW	US32D	Gallery	
1	Weatherstripping	Complete set of Weather Seals and Door Sweep by Door Supplier			
1	Door Position Switch	DC- By Security Contractor			

Note: Hinges, lockset with lever handles (to match selected lever design and SFIC Cylinder) and weatherstripping - By Door Supplier

Heading #6

1 Single door D100, Exterior From West Vestibule (RHR)

Type: C, 959 x 2191 x 45 - ALUM/IGU-02 DR x ALUM FR

ADO, Card Access

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
1	Continuous Hinge	EPT-661 HD UL x Door Height	AL	BEST	
1	Electrical Power Transfer	EPT-12C		BEST	
1	Elec. Exit Device w/REX	MLR2403 x TS x NCA03	630	BEST	
1	Cylinder	12E72 Rim Cyl CORMAX	626	BEST	
1	Construction Core	1C-7 Keyed Alike		Best	
1	Door Pull	GSH 1180-2 TB C32D	US32D	Gallery	
1	Power Supply for MLR	RPSMLR2		BEST	
1	Frame Wire Harness	WH-192P		BEST	
1	Door Wire Harness	WH-50P		BEST	
1	Auto. Door Operator	ED250 Low Energy x Fine Cover x Push Side Mounting x CA		dormakaba	
1	Controller-Relay	CX-33		Camden	
2	Touchless Switch	CM-324-SGLR/42		Camden	
1	Overhead Door Stop Concealed	1020 SL to Suit Opening Size	US32D	ABH	
1	Gasketing	Gasketing- By Door Supplier			
1	Threshold	8425 x Opening Width		NGP	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	
2	Door Position Switch	DC- By Security Contractor			
1	Card Reader	CR-By Security Contractor			

NOTE: Operators only supply and install. 120VDC is required at the head of the door for all Barrier-free door operators, 15A dedicated circuit. Wall/Frame must be reinforced for automatic operator mounting, all conduit and back boxes with pull cords are to be provided by the electrical contractor . All low voltage wiring and connection by Security Contractor.

Remote unlocking at Supervisor's office - By Security Contractor
One Door position switch interfaced with alarm system and the other with Access control system - By Security Contractor

Method of Operation:
Out side /key side : Authorized credential allows entry. Door auto opening by Wave to Open actuator; Key access as needed
Exit side : Allows free egress; Door auto opening by Wave to Open actuator
Failed Condition: Door remains locked and secured; Allows free egress

Heading #7

1 Single door D100a, West Vestibule From Corridor 101 (RHR)

Type: B, 984 x 2134 x 54 - ALUM/IGU-01 DR x ALUM FR

ADO, Card Access

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
1	Continuous Hinge	EPT-661 HD UL x Door Height	AL	BEST	
1	Electrical Power Transfer	EPT-12C		BEST	
1	Magnetic Lock	MAG Lock -By Security Contractor			
1	Power Supply	PS-By Security Contractor			
1	Elec. Exit Device w/REX	MLR2403 x TS x NCA03	630	BEST	
1	Cylinder	12E72 Rim Cyl CORMAX	626	BEST	
1	Construction Core	1C-7 Keyed Alike		Best	
1	Door Pull	GSH 1180-2 TB C32D	US32D	Gallery	
1	Power Supply for MLR	RPSMLR2		BEST	
1	Frame Wire Harness	WH-192P		BEST	
1	Door Wire Harness	WH-50P		BEST	
1	Auto. Door Operator	ED100 Low Energy x Fine Cover x Push Side	CA	dormakaba	
1	Controller-Relay	CX-33		Camden	
2	Touchless Switch	CM-324-SGLR/42		Camden	
1	Overhead Door Stop Concealed	1020 SL to Suit Opening Size	US32D	ABH	
1	Gasketing	Gasketing- By Door Supplier			
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	
1	Emergency Fire Pull	Fire Pull-By Electrical Contractor			
2	Door Position Switch	DC- By Security Contractor			
2	Card Reader	CR-By Security Contractor			

NOTE: Operators only supply and install. 120VDC is required at the head of the door for all Barrier-free door operators, 15A dedicated circuit. Wall/Frame must be reinforced for automatic operator mounting, all conduit and back boxes with pull cords are to be provided by the electrical contractor . All low voltage wiring and connection by Security Contractor.

MAG lock connected to Fire Panel to release upon activation. (Usage of MAG Lock subject to AHJ Approval)
Remote unlocking from Supervisor's office and Central Control - By Security Contractor
One Door position switch interfaced with alarm system and the other with Access control system - By Security Contractor

Method of Operation
Entry/Vestibule side : Authorized credential allows entry; Use actuators for door auto opening
Exit/Corridor side : Authorized credential allows exit, Use actuators for door auto opening; Activate Fire Pull for emergency exit
Failed condition : Mag lock releases upon loss of power, door remains unlocked , allows ingress and egress.

Heading #8

1 Single door D101, Corridor 101 From Preschool Corridor 108 (LHR)

Type: F, 965 x 2134 x 45 - HM/FGL DR x HM FR - 45min

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Standard Hinge	CB168NRP (5" x 4 1/2")	US26D	BEST	
1	Classroom Lockset	B-AU 4608LN 626 x SFIC x Less Core	626	Accentra	
1	Construction Core	1C-7 Keyed Alike		Best	
1	Cylinder Permanent Core	1CX 7 W 2 x CORMAX SFIC x 626	626	BEST	
1	Surface Closer	8916 AF89P x PA x 689	689	dormakaba	
1	Wall Door Stop	GSH 250	US32D	Gallery	
1	Kick Plate	GSH 80 x 8" x 2"LDW	US32D	Gallery	
1	Gasketing	5050C x Opening Size (2H x 1W)	B	NGP	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	

Heading #9

1 Single door D102, Corridor 101 To Servery 102 (RH)

Type: E, 965 x 2134 x 45 - HM/FGL DR x HM FR - 45min

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Standard Hinge	CB168 (5" x 4 1/2")	US26D	BEST	
1	Classroom Lockset	B-AU 4608LN 626 x SFIC x Less Core	626	Accentra	
1	Construction Core	1C-7 Keyed Alike		Best	
1	Cylinder Permanent Core	1CX 7 W 2 x CORMAX SFIC x 626	626	BEST	
1	Door Closer	8916 AF89 REG	689	dormakaba	
1	Wall Door Stop	GSH 250	US32D	Gallery	
1	Kick Plate	GSH 80 x 8" x 2"LDW	US32D	Gallery	
1	Gasketing	5050C x Opening Size (2H x 1W)	B	NGP	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	

Heading #10

1 Single door D103, Corridor 101 To Universal WC 103 (LH)

Type: D, 965 x 2134 x 45 - HM DR x HM FR - 45min

Universal Washroom Door, ADO, Card Access

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Standard Hinge	CB168 (5" x 4 1/2")	US26D	BEST	
1	Storeroom Lockset	B-AU 4605LN 626 x SFIC x Less Core	626	Yale	
1	Construction Core	1C-7 Keyed Alike		Best	
1	Cylinder Permanent Core	1CX 7 W 2 x CORMAX SFIC x 626	626	BEST	
1	Electric Strike	F2164 x Fail Secure	32D	dormakaba	
1	Auto. Door Operator	ED100 Low Energy x Fine Cover x Pull Side Mounting	CA	dormakaba	
1	Touchless Switch Restroom System	CX-WC16 Kit (CX-33 xCM-331/43S-SGLRxCM-331/42SW-SGLR xCM-325/42SW x CX-MDA)		Camden	
1	Universal Emergency Call Kit	CX-WEC10 Kit (CM-450R/12 x CM-AF501SO x CM-AF141SO x CM-SE21A)		Camden	
1	Kick Plate	GSH 80 x 8" x 2"LDW	US32D	Gallery	
1	Wall Door Stop	GSH 250	US32D	Gallery	
1	Gasketing	5050C x Opening Size (2H x 1W)	B	NGP	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	
1	Card Reader	CR-By Security Contractor			

NOTE: Operators only supply and install.120VDC is required at the head of the door for all Barrier-free door operators, 15A dedicated circuit. Wall/Frame must be reinforced for automatic operator mounting, all conduit and back boxes with pull cords are to be provided by the electrical contractor.

ADO and Electric strike tied to Fire panel to release upon activation of Fire Alarm.
Method of Opeartion:
Out side /key side : Authorized credential allows entry. Door auto opening by Wave to Open actuator; Key access as needed
Exit side/Inside : Wave to Lock switch inside sets the doors in privacy mode. Using Wave to Open switch inside or opening the door manually resets the door to 'un-occupied'
Failed Condition/Power loss: Door remains locked and secured; Allows free egress.
Use manual key to gain entry when an emergency call button is activated.

Heading #11

1 Single door D104, Preschool Corridor 108 To Infant Vestibule 104 (LH)

Type: G, 965 x 2134 x 45 - HM/TGL DR x HM FR

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Standard Hinge	CB168 (5" x 4 1/2")	US26D	BEST	
1	Classroom Security Lockset	B-AU 5318LN 626	626/626	Yale	
2	Construction Core	1C-7 Keyed Alike		Best	
2	Cylinder Permanent Core	1CX 7 W 2 x CORMAX SFIC x 626	626	BEST	
1	Door Closer	8916 AF89 REG	689	dormakaba	
1	Wall Door Stop	GSH 250	US32D	Gallery	
1	Kick Plate	GSH 80 x 8" x 2"LDW	US32D	Gallery	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	
1	Gasketing	5075C x Opening Size (2H x 1W)	B	NGP	
1	Gasketing	5060C x Opening Size (2H x 1W)	B	NGP	
2	Gasketing-Corner Pad	60FP		NGP	
1	Auto Door Bottom-Mortise	423N x Door Width		NGP	

Heading #12

1 Single door D104a, Infant Outdoor Play Area L1 From Infant Play Room (LHR)

Type: B, 965 x 2134 x 54 - ALUM/IGU-01 DR x ALUM FR

Card Access

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Hinge	Hinge to Suit - By Door System Supplier			
1	Exit Device	2403 x NCA-03	630	BEST	
1	Cylinder	12E72 Rim Cyl CORMAX	626	BEST	
1	Construction Core	1C-7 Keyed Alike		Best	
1	Door Pull	GSH 1180-2 TB C32D	US32D	Gallery	
1	Rim Electric Strike	F0162 x Fail Secure	32D	dormakaba	
1	Frame Wire Harness	WH-192P		BEST	
1	Door Closer	8916 TJ x BP89	689	dormakaba	
1	Overhead Door Stop Concealed	1020 SL to Suit Opening Size	US32D	ABH	
1	Gasketing	Gasketing- By Door Supplier			
1	Threshold	8425 x Opening Width		NGP	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	
1	Motion Request to Exit	REX-By Security Contractor			
2	Door Position Switch	DC- By Security Contractor			
1	Card Reader	CR-By Security Contractor			

NOTE: All conduit and back boxes with pull cords are to be provided by the electrical contractor . All low voltage wiring and connection by Security Contractor.

One Door position switch interfaced with alarm system and the other with Access control system - By Security Contractor

Method of Operation:
Out side /key side : Authorized credential allows entry; Key access as needed
Inside/ Exit side : Allows free egress
Failed Condition: Door remains locked and secured; Allows free egress

Heading #13

1 Single door D104b, Infant Play Room 104a To Infant Sleep Room 104b (RH)

Type: F, 965 x 2134 x 45 - HM/TGL DR x HM FR

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Standard Hinge	CB168 (5" x 4 1/2")	US26D	BEST	
1	Classroom Lockset	B-AU 4608LN 626 x SFIC x Less Core	626	Accentra	
1	Construction Core	1C-7 Keyed Alike		Best	
1	Cylinder Permanent Core	1CX 7 W 2 x CORMAX SFIC x 626	626	BEST	
1	Door Closer	8916 AF89 REG	689	dormakaba	
1	Wall Door Stop	GSH 250	US32D	Gallery	
1	Kick Plate	GSH 80 x 8" x 2"LDW	US32D	Gallery	
1	Gasketing	5050C x Opening Size (2H x 1W)	B	NGP	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	

Heading #14

1 Single door D105, Corridor 101 To Staff Room 105 (LH)

Type: E, 965 x 2134 x 45 - HM/FGL DR x HM FR - 45min

ADO

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Standard Hinge	CB168 (5" x 4 1/2")	US26D	BEST	
1	Classroom Lockset	B-AU 4608LN 626 x SFIC x Less Core	626	Accentra	
1	Construction Core	1C-7 Keyed Alike		Best	
1	Cylinder Permanent Core	1CX 7 W 2 x CORMAX SFIC x 626	626	BEST	
1	Electric Strike	F2164 x Fail Secure	32D	dormakaba	
1	Auto. Door Operator	ED100 Low Energy x Fine Cover x Pull Side Mounting	CA	dormakaba	
2	Touchless Switch	CM-324-SGLR/42		Camden	
1	Switch	DX4604-9C Rocker Switch			
1	Wall Door Stop	GSH 250	US32D	Gallery	
1	Kick Plate	GSH 80 x 8" x 2"LDW	US32D	Gallery	
1	Gasketing	5050C x Opening Size (2H x 1W)	B	NGP	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	

NOTE: Operators only supply and install. 120VDC is required at the head of the door for all Barrier-free door operators, 15A dedicated circuit. Wall/Frame must be reinforced for automatic operator mounting, all conduit and back boxes with pull cords are to be provided by the electrical contractor Div. 26. All low voltage wiring and connection by Div.28.

ADO and Electric Strike tied to Fire Panel to release upon activtion of Fire alarm. Door can be held open via rocker switch (mounted at an accessible location) when required

Heading #15

1 Single door D106, Corridor 101 To Supervisor's Office 106 (LH)

Type: E, 965 x 2134 x 45 - HM/FGL DR x HM FR - 45min

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Standard Hinge	CB168 (5" x 4 1/2")	US26D	BEST	
1	Keypad Lockset w/Key	9KZ 3 (Pat.) 7 DV 15 KP STK 626	626	BEST	
1	Surface Closer	8916 IS Integra Stop Arm	689	dormakaba	
1	Kick Plate	GSH 80 x 8" x 2"LDW	US32D	Gallery	
1	Gasketing	5050C x Opening Size (2H x 1W)	B	NGP	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	

Note: Keypad lock with key override - Keyed Different.

Heading #16

1 Single door D107, Corridor 101 From Toddler Play Room 107 (LHR)

Type: G, 965 x 2134 x 45 - HM/FGL DR x HM FR - 45min

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Standard Hinge	CB168NRP (5" x 4 1/2")	US26D	BEST	
1	Classroom Security Lockset	B-AU 5318LN 626	626/626	Yale	
2	Construction Core	1C-7 Keyed Alike		Best	
2	Cylinder Permanent Core	1CX 7 W 2 x CORMAX SFIC x 626	626	BEST	
1	Surface Closer	8916 AF89P x PA x 689	689	dormakaba	
1	Wall Door Stop	GSH 250	US32D	Gallery	
1	Kick Plate	GSH 80 x 8" x 2"LDW	US32D	Gallery	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	
1	Gasketing	5075C x Opening Size (2H x 1W)	B	NGP	
1	Gasketing	5060C x Opening Size (2H x 1W)	B	NGP	
2	Gasketing-Corner Pad	60FP		NGP	
1	Auto Door Bottom-Mortise	423N x Door Width		NGP	

Heading #17

1 Single door D107a, East Vestibule From Toddler Play Room 107 (LHR)

Type: B, 914 x 2134 x 54 - ALUM/IGU-01 DR x ALUM FR

Card Access

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Hinge	Hinge to Suit - By Door System Supplier			
1	Exit Device	2403 x NCA-03	630	BEST	
1	Cylinder	12E72 Rim Cyl CORMAX	626	BEST	
1	Construction Core	1C-7 Keyed Alike		Best	
1	Door Pull	GSH 1180-2 TB C32D	US32D	Gallery	
1	Rim Electric Strike	F0162 x Fail Secure	32D	dormakaba	
1	Frame Wire Harness	WH-192P		BEST	
1	Door Closer	8916 TJ x BP89	689	dormakaba	
1	Overhead Door Stop Concealed	1020 SL to Suit Opening Size	US32D	ABH	
1	Gasketing	Gasketing- By Door Supplier			
1	Threshold	8425 x Opening Width		NGP	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	
1	Motion Request to Exit	REX-By Security Contractor			
2	Door Position Switch	DC- By Security Contractor			
1	Card Reader	CR-By Security Contractor			

NOTE: All conduit and back boxes with pull cords are to be provided by the electrical contractor . All low voltage wiring and connection by Security Contractor.

One Door position switch interfaced with alarm system and the other with Access control system - By Security Contractor

Method of Operation:
Out side /key side : Authorized credential allows entry; Key access as needed
Inside/ Exit side : Allows free egress
Failed Condition: Door remains locked and secured; Allows free egress

Heading #18

1 Single door D109, Preschool Corridor 108 From Preschool Playroom 1 109 (RHR)
1 Single door D110, Preschool Corridor 108 From Preschool Playroom 2 110 (LHR)

Type: G, 965 x 2134 x 45 - HM/TGL DR x HM FR

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Standard Hinge	CB168NRP (5" x 4 1/2")	US26D	BEST	
1	Classroom Security Lockset	B-AU 5318LN 626	626/626	Yale	
2	Construction Core	1C-7 Keyed Alike		Best	
2	Cylinder Permanent Core	1CX 7 W 2 x CORMAX SFIC x 626	626	BEST	
1	Surface Closer	8916 AF89P x PA x 689	689	dormakaba	
1	Wall Door Stop	GSH 250	US32D	Gallery	
1	Kick Plate	GSH 80 x 8" x 2"LDW	US32D	Gallery	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	
1	Gasketing	5075C x Opening Size (2H x 1W)	B	NGP	
1	Gasketing	5060C x Opening Size (2H x 1W)	B	NGP	
2	Gasketing-Corner Pad	60FP		NGP	
1	Auto Door Bottom-Mortise	423N x Door Width		NGP	

Heading #19

1 Single door D109a, Infant Outdoor Play Area L1 From Preschool Playroom 1 109 (RHR)

Type: B, 965 x 2134 x 54 - ALUM/IGU-02 DR x ALUM FR

Card Access

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Hinge	Hinge to Suit - By Door System Supplier			
1	Exit Device	2403 x NCA-03	630	BEST	
1	Cylinder	12E72 Rim Cyl CORMAX	626	BEST	
1	Construction Core	1C-7 Keyed Alike		Best	
1	Door Pull	GSH 1180-2 TB C32D	US32D	Gallery	
1	Rim Electric Strike	F0162 x Fail Secure	32D	dormakaba	
1	Frame Wire Harness	WH-192P		BEST	
1	Door Closer	8916 TJ x BP89	689	dormakaba	
1	Overhead Door Stop Concealed	1020 SL to Suit Opening Size	US32D	ABH	
1	Gasketing	Gasketing- By Door Supplier			
1	Threshold	8425 x Opening Width		NGP	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	
1	Motion Request to Exit	REX-By Security Contractor			
2	Door Position Switch	DC- By Security Contractor			
1	Card Reader	CR-By Security Contractor			

NOTE: All conduit and back boxes with pull cords are to be provided by the electrical contractor . All low voltage wiring and connection by Security Contractor.

One Door position switch interfaced with alarm system and the other with Access control system - By Security Contractor

Method of Operation:
Out side /key side : Authorized credential allows entry; Key access as needed
Inside/ Exit side : Allows free egress
Failed Condition: Door remains locked and secured; Allows free egress

Heading #20

1 Single door D110a, East Vestibule From Preschool Playroom 2 (LHR)

Type: B, 914 x 2134 x 54 - ALUM/IGU-02 DR x ALUM FR

Card Access

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Hinge	Hinge to Suit - By Door System Supplier			
1	Exit Device	2403 x NCA-03	630	BEST	
1	Cylinder	12E72 Rim Cyl CORMAX	626	BEST	
1	Construction Core	1C-7 Keyed Alike		Best	
1	Door Pull	GSH 1180-2 TB C32D	US32D	Gallery	
1	Rim Electric Strike	F0162 x Fail Secure	32D	dormakaba	
1	Frame Wire Harness	WH-192P		BEST	
1	Door Closer	8916 TJ x BP89	689	dormakaba	
1	Overhead Door Stop Concealed	1020 SL to Suit Opening Size	US32D	ABH	
1	Gasketing	Gasketing- By Door Supplier			
1	Threshold	8425 x Opening Width		NGP	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	
1	Motion Request to Exit	REX-By Security Contractor			
2	Door Position Switch	DC- By Security Contractor			
1	Card Reader	CR-By Security Contractor			

NOTE: All conduit and back boxes with pull cords are to be provided by the electrical contractor . All low voltage wiring and connection by Security Contractor.

One Door position switch interfaced with alarm system and the other with Access control system - By Security Contractor

Method of Operation:
Out side /key side : Authorized credential allows entry; Key access as needed
Inside/ Exit side : Allows free egress
Failed Condition: Door remains locked and secured; Allows free egress

Heading #21

1 Single door D110b, Exterior From Preschool Playroom 2 (RHR)

Type: B, 1016 x 2134 x 54 - ALUM/IGU-02 DR x ALUM FR

Card Access

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Hinge	Hinge to Suit - By Door System Supplier			
1	Exit Device	2403 x NCA-03	630	BEST	
1	Cylinder	12E72 Rim Cyl CORMAX	626	BEST	
1	Construction Core	1C-7 Keyed Alike		Best	
1	Door Pull	GSH 1180-2 TB C32D	US32D	Gallery	
1	Rim Electric Strike	F0162 x Fail Secure	32D	dormakaba	
1	Frame Wire Harness	WH-192P		BEST	
1	Door Closer	8916 TJ x BP89	689	dormakaba	
1	Overhead Door Stop Concealed	1020 SL to Suit Opening Size	US32D	ABH	
1	Gasketing	Gasketing- By Door Supplier			
1	Threshold	8425 x Opening Width		NGP	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	
1	Motion Request to Exit	REX-By Security Contractor			
2	Door Position Switch	DC- By Security Contractor			
1	Card Reader	CR-By Security Contractor			

NOTE: All conduit and back boxes with pull cords are to be provided by the electrical contractor . All low voltage wiring and connection by Security Contractor.

One Door position switch interfaced with alarm system and the other with Access control system - By Security Contractor

Method of Operation:
Out side /key side : Authorized credential allows entry; Key access as needed
Inside/ Exit side : Allows free egress
Failed Condition: Door remains locked and secured; Allows free egress

Heading #22

1 Single door D112, Corridor 101 To Janitor 112 (LH)
1 Single door D113, Stair 113 From Corridor 101 (RHR)

Type: D, 813 x 2134 x 45 - HM DR x HM FR - 45min

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
3	Standard Hinge	CB168 (5" x 4 1/2")	US26D	BEST	
1	Classroom Lockset	B-AU 4608LN 626 x SFIC x Less Core	626	Accentra	
1	Construction Core	1C-7 Keyed Alike		Best	
1	Cylinder Permanent Core	1CX 7 W 2 x CORMAX SFIC x 626	626	BEST	
1	Door Closer	8916 AF89 REG	689	dormakaba	
1	Wall Door Stop	GSH 250	US32D	Gallery	
1	Kick Plate	GSH 80 x 8" x 2"LDW	US32D	Gallery	
1	Gasketing	5050C x Opening Size (2H x 1W)	B	NGP	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	

Heading #23

1 Single door ED114, Exterior From East Vestibule (RHR)

Type: C, 922 x 2317 x 54 - EXIST DR x EXIST FR

Existing Door

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
2	Door Position Switch	DC- By Security Contractor			

Note: Existing door and hardware to remain; Add Door Position Switches
One Door position switch interfaced with alarm system and the other with Access control system - By Security Contractor

Heading #24

1 Single door G104, Infant Play Room 104a To Infant Vestibule 104 (RH)
1 Single door G104c, Infant Play Room 104a To Infant WC 104c (LH)
1 Single door G107a, Toddler Play Room 107 To Toddler WC 107a (LH)
1 Single door G111b, Preschool Playroom 2 110 To Preschool WC 111 (LH)

Type: H, 965 x 840 x 45 - SCW DR x WD-01 FR

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
2	Standard Hinge	CB179 (5" x 4 1/2")	US26D	BEST	
1	Secret Gate Latch	BP600100 x Polished Nickel		Richelieu	
1	Door Pull	GSH 4007-1 C32D x #5-2 Conc. Mtg	US32D	Gallery	
1	Wall Door Stop	GSH 250	US32D	Gallery	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	

Heading #25

1 Single door G111a, Preschool Playroom 1 109 To Preschool WC 111 (RH)

Type: H, 965 x 840 x 45 - SCW DR x WD-01 FR

Total Qty	Category	Product Code	Finish	Manufacturer	Remarks
2	Standard Hinge	CB179 (5" x 4 1/2")	US26D	BEST	
1	Secret Gate Latch	BP600100 x Polished Nickel		Richelieu	
1	Door Pull	GSH 4007-1 C32D x #5-2 Conc. Mtg	US32D	Gallery	
1	Hinge Pin Stop	70A x 26D	26D	Ives	
1	Finger Guard	2248A x To Suit Opening Ht (2" LDH)	A	NGP	

Note: Wall/Floor stop not feasible for door G111a. Use Hinge stop to suit site condition.

1 General

1.1 SUMMARY

.1 Furnish glazing materials and accessories to complete the fabrication and installation of:

.1 Tempered Glass and Interior Glazed Screens

.2 Exterior Insulated Glass Units

.3 Fire Rated, Ceramic Fire-Rated Glass

1.2 REFERENCE STANDARDS

.1 Insulating Glass Manufacturers Alliance (IGMA) Manual.

.2 American Society for Testing and Materials (ASTM):

.1 ASTM C542-05(2011), Standard Specification for Lock-Strip Gaskets

.2 ASTM C920-11, Standard Specification for Elastomeric Joint Sealants

.3 ASTM C1172-09e1, Standard Specification for Laminated Architectural Flat Glass

.3 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass

.2 CAN/CGSB-12.3-M91, Flat, Clear Float Glass

.3 CAN/CGSB-12.8-97, Insulating Glass Units

.4 CGSB-12.20-M89, Structural Design of Glass for Buildings

.4 National Fire Protection Association (NFPA):

.1 NFPA 80-2013, Standard For Fire Doors and Other Opening Protectives

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

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

.1 Product Data: Submit manufacturer's product data for each type of product specified. Data shall indicate compliance with specification and installation recommendations of manufacturer of products being used.

.2 Samples: Submit samples of materials if required by Consultant before commencing work of this section. Samples shall be clearly labeled with manufacturer's name and type.

.3 Shop Drawings: Submit shop drawings, to the Consultant for review prior to fabrication.

.1 Clearly indicate each type of glass and identify relationships with adjacent materials or system where glazing is being installed or supported.

.4 Samples for Verification: Submit samples for verification including sample sets showing the full range of variations expected where products involve normal colour variations.

.5 Maintenance Data: Upon completion of installation, supply instructions covering re-glazing, adjustments and other relevant maintenance data.

1.4 QUALITY ASSURANCE

.1 Conform to the requirements of the Flat Glass Marketing Association Glazing Manual, latest Edition.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements: Deliver packaged materials in their original containers with manufacturer's labels and seals intact.

.2 Storage and Handling Requirements: Store vertically, blocked off the floor in a weatherproof enclosure in original containers with manufacturers labels and seals intact until read for installation, and as follows:

.1 Install glass as soon as possible after delivery to site.

.2 Handle glass carefully to its place of installation.

.3 Prevent damage to glass, adjacent materials and surfaces.

1.6 SITE CONDITIONS

.1 Ambient Conditions: Maintain temperature, humidity and solar exposure conditions of Glass Glazing materials during shipping, storage and site installation as required by manufacturer to maintain warranty and performance of installed products.

1.7 WARRANTY

.1 Provide manufacturer’s warranty for the following types of glass listed, against defects in materials and workmanship for the period indicated, commencing from the date of Substantial Performance of Work:

.1 Seal Failure: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions.

.2 Evidence of Failure: Obstruction of vision by dust, moisture, or film on interior surfaces of glass.

.3 Allowable Specific Exclusions: Breakage resulting from thermal stress will be accepted as a limitation to the warranty in accordance with CAN/CGSB 12.20.

.4 Warranty Period: Ten (10) Years.

2 Products

2.1 MATERIALS

.1 Float Glass: In accordance with CAN/CGSB-12.3, glazing quality and as follows:

.1 Clear Glass: No tint

.2 Tempered Glass (TGL):

.1 Clear, conforming to CAN/CGSB-12.1, Type 2, Class 'B'. Tempering shall be performed using horizontal tong free method.

.3 Fire Rated, Ceramic Fire-Rated Glass (FGL-01): Material used in door and screen applications with fire rating requirements of 60 minutes with hose stream test.

.1 Fire Rated Glass: Two-ply of glass ceramic, laminated with Teflon or PVB interlayer and as follows:

.1 Thickness: 8mm

.2 Fire Rating: 60 minutes or as scheduled.

.3 Labelled: Permanent logo listing name of product, manufacturer, testing laboratory, fire rating period and safety requirements

.4 Basis-of-Design Materials:

.1 Technical Glass Products, FireLite Plus

.2 VetroTech, Keralite Select L

.3 SAFTI: Pyran Platinum L

.4 Or approved equivalent.

.4 Gaskets:

.1 Neoprene/EPDM thermoplastic rubber type gaskets of sufficient thickness to be compressed 25% when installed, having 2,000 psi tensile strength, with 50 durometer shore A hardness plus/minus 5, maximum 30% resistance to permanent set, resistance to ozone without cracking, minimum elongation at break of 300% and conforming to ASTM C542.

.2 Colour - "Black".

.5 Sealant:

.1 One component, silicone base, solvent curing sealant conforming to ASTM C920. Colour as selected Later by Consultant.

.6 Glazing Compound:

.1 Non-hardening modified oil type glazing compound.

.7 Setting Blocks:

.1 Neoprene/EPDM rubber type, 4" long, with 40 to 50 durometer shore A hardness plus/minus 5; resistant to sunlight, weathering, oxidation and permanent deformation under load and wide enough to extend from fixed stop to opposite face of glass of thickness suitable to glazing condition to provide adequate glazing "bite".

.8 Spacer Shims:

.1 Neoprene/EPDM rubber type, with 40 to 50 durometer shore A hardness plus/minus 5; resistant to sunlight, weathering, oxidation and permanent deformation under load and of adequate thickness to provide correct glass to face clearance at least 1/8".

.9 Glazing Tape:

.1 Macro-polyisobutylene preformed glazing tape, 'Polyshim' or 'Vision Strip' by Tremco Ltd., division of RPM Company, or approved equal.

2.2 INSULATING GLASS

.1 Insulating Glass Units: Provide sealed insulating glass units in accordance with CAN/CGSB-12.8 in configurations indicated, IGMA certified, and as specified herein.

.2 Manufacture sealed insulating glass units without edge channels or tape, that is, with bare glass edges.

.3 Use two stage seal method of manufacture, as follows:

.1 Primary Seal: Polyisobutylene sealing compound between glass and metal spacer/separator. Colour: Black.

.2 Secondary Seal: Structural silicone based, filling gap between the lites of glass at the edge up to the spacer/separator and primary seal. Colour: Black.

.4 Install stainless steel capillary breather tubes to equalize pressure differentials between insulating glass fabricating location and insulating glass installation location; crimp tube immediately prior to installation in accordance with glass fabricators written instructions.

.5 Insulating Glass Units (IGU):

.1 Insulated Glass Unit (IGU-01):

.1 Unit Composition:

.1 Outer Layer: minimum 4mm thick, clear tempered glass and Low-E coating on Surface #2.

.1 Low-E Coating (Surface #2 & #5) Basis of Design Materials: LoE-180 Solar by Cardinal, or approved equivalent.

.2 Gas Infill: 13mm (½"); 100% Argon filled.

.3 Middle Layer: minimum 6mm thick, clear tempered glass.

.4 Gas Infill: 13mm (½"); 90% Argon, 10% air filled.

.5 Inner Layer: minimum 4mm thick, clear tempered glass and Low-E coating on Surface #5.

.2 Unit Characteristics:

.1 Unit Thickness: 44mm

.2 Visible Light Transmittance: 65%

.3 Solar Heat Gain Coefficient (SHGC): 0.51

.4 Glass U-Value: 0.74 (w/m2*K)

.3 Basis of Design Manufacturer: Cardinal Glass Industries, or approved equivalent.

.2 Insulated Glass Unit (IGU-02):

.1 Unit Composition:

.1 Outer Layer: minimum 4mm thick, clear tempered glass and Low-E coating on Surface #2.

.1 Low-E Coating (Surface #2 & #5) Basis of Design Materials: LoE-180 Solar by Cardinal, or approved equivalent

.2 Gas Infill: 13mm (½"); 90% Argon, 10% air filled.

.3 Inner Layer: minimum 4mm thick, clear tempered glass.

.2 Unit Characteristics:

.1 Unit Thickness: 25mm

.3 Basis of Design Manufacturer: Cardinal Glass Industries, or approved equivalent.

2.3 FABRICATION AND MANUFACTURE

.1 Label each light of glass with the registered name of the product and the weight and quality of the glass.

.2 Check dimensions on site before cutting materials.

.3 Minimum bite or lap of glass on stops and rabbets as recommended by glass manufacturer. Finish surfaces shall be free of tong marks.

.4 Cut glass true to dimensions, square, plumb and level. Verify all dimensions prior to fabrication.

.5 Distortion, pock marking or defects detrimental to appearance and/or performance, as determined by the Consultant, will be rejected.

2.4 GLAZING COMPOUND FOR FIRE RATED GLAZING MATERIALS

.1 Glazing Tape: Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2%, designed for compression of 25% to effect an air and vapour seal.

.2 Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50% in both extension and compression (total 100%); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable.

.3 Acceptable materials:

.1 Dow Corning Corp., Dow Corning 795

.2 General Electric Co., Silglaze-II 2800

.3 Tremco Inc., Spectrum 2

.4 Or approved equivalent.

.4 Setting Blocks: Hardwood, glass width by 4”x ¼” thick.

.5 Spacers: Neoprene or other resilient blocks of 40 to 50 Shore A durometer hardness, adhesive-backed on one face only, tested for compatibility with specified glazing compound.

.6 Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

2.5 FABRICATION: FIRE RATED GLASS

.1 Fabricate glass and other glazing products in sizes required to glaze openings indicated for project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standards as required to comply with system performance requirements.

3 Execution

3.1 EXAMINATION

.1 Examine areas of work affecting the work of this section. Report in writing all defects, errors and discrepancies immediately to the Consultant.

.2 Commencement of work implies acceptance of surfaces and conditions.

3.2 PREPARATION

.1 Openings shall be free from moisture, frost, rust, dirt and foreign matter.

.2 Clean surface to receive sealant with a clean cloth dampened with xylol or a 50-50 mixture of acetone and xylol. Wipe dry with a clean, dry cloth.

3.3 INSTALLATION

.1 Conform to the recommendation of the glazing manual, Flat Glass Marketing Association, latest edition and as specified herein.

.2 Unless otherwise indicated on drawings otherwise, provide tempered glass at all doors, transoms, sidelights and vision lites within 2'-6" of grade and/or finished floor.

.3 Glaze doors scheduled to be glazed.

.4 Set sheet glass with draw lines horizontal.

.5 Glaze interior openings using compound or glazing tapes or gaskets.

.6 Install removable stops. Insert spacer shims between glass and stops at 24" O.C. and not less than 1/4" below "sight lines". Fill remaining voids with sealant or glazing compound to "sight lines" and trim sealant/glazing compound to produce clean, sharp, straight lines without voids or depressions.

.7 Replace loose stops in their original positions, tighten all screws.

.8 Refer to drawings and door and frame schedule for locations of each type of glass.

3.4 INSTALLATION – FIRE RATED GLASS

.1 Comply with GANA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.

.2 Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.

.3 Place hardwood setting blocks located at quarter points of glass with edge block no more than 150mm (6") from corners.

.4 Glaze vertically into labelled fire rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.

.5 Place glazing tape on free perimeter of glazing in same manner described above.

.6 Do not remove protective edge tape.

.7 Install removable stop and secure without displacement of tape.

.8 Do not pressure glaze. Knife trim protruding tape.

.9 Provide minimum ¼” edge clearance.

.10 Install vision panels in fire rated doors to requirements of NFPA 80.

.11 Install so that appropriate fire rating labels and markings remain permanently visible.

3.5 CLEANING

.1 Repair all defects caused by the work of this section. Remove as work progresses, all excess or foreign materials or droppings which would set or become difficult to remove from surfaces at time of final cleaning.

.2 Immediately prior to acceptance of work of this section by Consultant, remove temporary protection, clean and polish exposed surfaces of all work of this section. Use proper cleaning materials and methods to prevent damage to surfaces, finishes, sealer or work of other trades. Make good such damage to Consultant's satisfaction.

.3 Do not use steel wool, wire brushes or steel scrapers on any finished surfaces.

.4 Replace or make good to Consultant's satisfaction, upon completion of work of this section, all defective, scratched or damaged work, at no extra cost to the Owner.

END OF SECTION

1 General

1.1 SUMMARY

.1 Section Includes the following:

.1 Non-load-bearing steel framing systems for interior partitions.

.2 Non-load bearing steel framing systems for ULC fire rated shaftwall assemblies.

.3 Suspension systems for interior ceilings and soffits.

.4 Grid suspension systems for gypsum board ceilings.

1.2 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA):

.1 CSA S136-07, North American Specification for the Design of Cold-Formed Steel Structural Members.

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-7.1-98, Lightweight Steel Wall Framing Components

.3 American Society for Testing and Materials International (ASTM):

.1 ASTM A641/A641M-09a, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

.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 A792/A792M-10, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.4 ASTM A875/A875M-10, Specification for Steel Sheet, Zinc-5% Aluminum Alloy-coated by the Hot Dip Process.

.5 ASTM A1003/A1003M-12, Specification for Steel Sheet, Carbon, Metallic and Non-Metallic Coated for Cold Formed Framing Members.

.6 ASTM C11-10a, Standard Terminology Relating to Gypsum and Related Building Materials.

.7 ASTM C473-12, Standard Test Methods for Physical Testing of Gypsum Panel Products.

.8 ASTM C645-11a, Standard Specification for Nonstructural Steel Framing Members.

.9 ASTM C665-12, Standard Specification for Mineral-Fibre Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

.10 ASTM C754-11, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.11 ASTM C834-10, Standard Specification for Latex Sealants.

.12 ASTM C841-03(2008)e1, Standard Specification for Installation of Interior Lathing and Furring.

.13 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" to 0.112" in Thickness.

.14 ASTM C955-11c, Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases

.15 ASTM C1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.4 Canadian Sheet Steel Building Institute (CSSBI):

.1 CSSBI S6-2011, Guide Specification for Lightweight Steel Framing

1.3 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

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

.1 Product Data: Submit manufacturer's product data for each materials specified including recommended application rates and methods of installation.

.3 Informational Submittals: Provide the following submittals during the course of the work:

.1 Product Certificates: For each type of code-compliance certification for studs and tracks.

.2 Shop Drawings: Submit shop drawings showing the design, construction and relevant details of furring, enclosures and partitions which require a fire rating.

1.4 QUALITY ASSURANCE

.1 Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Stud Manufacturers Association (SSMA).

.2 Contractor executing work of this Section shall have a minimum of five (5) years continuous experience in successful installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, enclosed, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact, in accordance with GA-238 and manufacturer's recommendations.

2 Products

2.1 PERFORMANCE REQUIREMENTS

.1 Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.

.2 STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 FRAMING SYSTEMS

.1 Framing Members, General: Comply with ASTM C754 for conditions indicated.

.1 Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.

.2 Steel sheet components shall comply with ASTM C645 requirements for metal, unless otherwise indicated.

.3 Steel for non-loadbearing members shall have metallic coats that conform to ASTM A653M or ASTM A792M with minimum metallic coating weighs (mass) of Z120 and AZM150 respectively.

.4 Framing members shall comply with the CAN/CSA S136 - North American Specification for the Design of Cold Formed Steel Structural Members, for conditions indicated.

.5 Isolate where necessary to prevent electrolysis due to dissimilar metal-to-metal contact or metal-to-masonry and concrete contact. Use bituminous paint, butyl tape or other approved divorcing material.

.2 Studs and Tracks: ASTM C645.

.1 Steel Studs and Tracks:

.1 Minimum 0.0179" (25 gauge), screwable with crimped web and returned flange. Provide knockout openings in web at 150mm (6") O.C. to accommodate (if required) horizontal mechanical and electrical service lines, and bracing. Widths as indicated on drawings. Provide structural studs where indicated.

.2 Framing behind all fire resistant gypsum board shall be minimum 0.0329" (20 gauge).

.3 Where metal stud framing forms walls are to be thermally insulated as indicated on drawings, provide metal studs with integrated fastening system for glass fibre/mineral fibre insulation.

.4 Provide special shapes indicated on drawings as part of steel stud/drywall assemblies.

.3 Steel Framing for Shaft Wall Assemblies

.1 CT profile stud framing in 2 ½”, 4” or 6” depth as scheduled, gauge to suit installation.

.2 J-tabbed track profile for use at floor and ceiling of shaft wall assembly.

.4 Slip-Type Head Joints: Where indicated, provide one of the following:

.1 Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 2” (51-mm) minimum vertical movement.

.2 Double-Track System: ASTM C645 top outer tracks, inside track with 2” (51 mm) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.

.3 Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

.5 Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

.1 Minimum Base-Steel Thickness: As indicated on Drawings.

.6 Cold-Rolled Channel Bridging: Steel, 0.0538” (1.367 mm) minimum base-steel thickness, with minimum ½” (13 mm) wide flanges.

.1 Depth: As indicated on Drawings.

.2 Clip Angle: Not less than 1-1/2” x 1-1/2” (38 mm x 38 mm), 0.068” (1.72 mm) thick, galvanized steel.

.7 Hat-Shaped, Rigid Furring Channels: ASTM C645.

.1 Depth: As indicated on Drawings.

.8 Resilient Furring Channels: ½” (13 mm) deep, steel sheet members designed to reduce sound transmission.

.1 Configuration: hat shaped.

.9 Cold-Rolled Furring Channels: 0.053” (1.34 mm) uncoated-steel thickness, with minimum ½” (13 mm) wide flanges.

.1 Depth: As indicated on Drawings

.2 Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329” (0.8 mm).

.3 Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062” (1.59 mm) diameter wire, or double strand of 0.048” (1.21 mm) diameter wire.

.10 Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4” (32 mm), wall attachment flange of 7/8” (22 mm), minimum uncoated-steel thickness of 0.0179” (0.455 mm), and depth required to fit insulation thickness indicated.

2.3 SUSPENSION SYSTEMS

.1 Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062” (1.59 mm) diameter wire, or double strand of 0.048” (1.21 mm) diameter wire.

.2 Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16” (4.12 mm) in diameter.

.3 Flat Hangers: Steel sheet, in size indicated on Drawings.

.4 Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538” (1.367 mm) and minimum ½” (13 mm) wide flanges.

.1 Depth: As indicated on Drawings.

.5 Furring Channels (Furring Members):

.1 Cold-Rolled Channels: 0.0538” (1.367 mm) uncoated-steel thickness, with minimum ½” (13 mm) wide flanges, ¾” (19 mm) deep.

.2 Steel Studs and Tracks: ASTM C645.

.1 Depth: As indicated on Drawings.

.3 Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch (22 mm) deep.

.4 Resilient Furring Channels: 1/2’” (13 mm) deep members designed to reduce sound transmission.

.1 Configuration: Hat shaped.

.6 Grid Suspension System for Gypsum Board Ceilings: ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.

2.4 AUXILIARY MATERIALS

.1 General: Provide auxiliary materials that comply with referenced installation standards.

.1 Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

.2 Isolation Strip at Exterior Walls: Provide one of the following:

.1 Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.

.2 Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8” (3.2 mm) thick, in width to suit steel stud size.

3 Execution

3.1 EXAMINATION

.1 Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

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

3.2 PREPARATION

.1 Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

.1 Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

.2 Coordination with Sprayed Fire-Resistive Materials:

.1 Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24” (610 mm) o.c.

.2 After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

.1 Installation Standard: ASTM C754.

.1 Gypsum Plaster Assemblies: Also comply with requirements in ASTM C841 that apply to framing installation.

.2 Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

.2 Install framing and accessories plumb, square, and true to line, with connections securely fastened.

.3 Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

.4 Install bracing at terminations in assemblies.

.5 Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

.1 Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

.2 Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

.3 Install studs so flanges within framing system point in same direction.

.4 Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

.1 Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.

.2 Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

.1 Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

.3 Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

.4 Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

.5 Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

.6 Curved Partitions:

.1 Bend track to uniform curve and locate straight lengths so they are tangent to arcs.

.2 Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6” (150 mm) o.c.

.5 Direct Furring:

.1 Screw to wood framing.

.2 Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

.6 Z-Shaped Furring Members:

.1 Erect insulation, vertically and hold in place with Z-shaped furring members spaced 24” (610 mm).

.2 Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24” (610 mm) o.c.

.3 At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12” (305 mm) from corner and cut insulation to fit.

.7 Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8” (3 mm) from the plane formed by faces of adjacent framing.

3.6 INSTALLATION - VERTICAL SHAFTWALLS

.1 Layout per construction drawings. Secure J-Tabbed Track as perimeter framing and plumb to ceiling, floor and sides. Attached with suitable fasteners, spaced not more than 24" o.c. Apply a bead of non-hardening, flexible sealant to the perimeter.

.2 Pre-plan the stud layout 24" o.c. and adjust the spacing at either end so the end studs will not fall closer than 12" from the end.

.3 Erect the first 1" Shaftliner panel, cut 3/4"-1" less than the total height of the framed section. Plumb the panel against the web of the J-Tabbed Track and bend out tabs in J-Tabbed Track to secure panels in place.

.4 Insert C-T Stud, cut 3/4" less than overall height, into the top and bottom J-Tabbed Tracks and fit tightly over previously installed 1" panel. Allow equal clearance between top and bottom J-Tabbed Track.

.5 Install the next 1" Shaftliner inside the J-Tabbed Track and within the tabs of the C-T stud.

.6 Progressively install succeeding studs and panels as described above until the wall section is enclosed. The final panel section may be secured with tabs from the J-Tabbed Track at 12" o.c.

.7 Where wall heights exceed the standard or available length of Shaftliner panels, the panels may be cut and stacked with joints occurring within the top or bottom third points of the wall. Joints of adjacent panels should be alternately staggered to prevent a continuous horizontal joint. Gypsum panels must engage a minimum of 2 tabs.

.8 C-T Studs cannot be spliced. They must be installed full height, one piece.

.9 For doors, ducts or other large penetrations or openings, install J-Tabbed Track as perimeter framing. Use 20-gauge track with a 3" back leg for elevator doors and block cavity with 12" wide gypsum filler strips for doors exceeding 7'-0" height.

3.7 INSTALLING CEILING SUSPENSION SYSTEMS

.1 Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

.1 Hangers: 48” (1219 mm).

.2 Carrying Channels (Main Runners): 48” (1219 mm)

.3 Furring Channels (Furring Members): 24” (610 mm), unless otherwise indicated on the Drawings.

.2 Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

.3 Suspend hangers from building structure as follows:

.1 Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

.1 Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

.2 Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

.1 Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

.3 Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.

.4 Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.

.5 Do not attach hangers to steel roof deck.

.6 Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.

.7 Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.

.8 Do not connect or suspend steel framing from ducts, pipes, or conduit.

.4 Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

.5 Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

.6 Installation Tolerances: Install suspension systems that are level to within 1/8” in 12’ (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirement for supply and installation of components required for a complete gypsum board assembly with proprietary components as follows:

.1 Gypsum Board Panels:

.1 Standard Gypsum Board

.2 Fire-Rated Gypsum Board 'Type X'

.3 Glass Mat Liner Board for Fire Rated Shaftwall assembly

.4 Gypsum Ceiling Board

.5 Tile Backer Board

.6 Abuse Resistance Gypsum Board

.7 Exterior Sheathing Board

.8 Exterior Soffit Board

.2 Gypsum Wallboard Accessories:

.1 Screws, tape, joint compound and all other accessories required for gypsum board ceiling and wall partitions.

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials International (ASTM):

.1 ASTM A641/A641M-09a, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

.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 A792/A792M-10, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.4 ASTM A875/A875M-10, Specification for Steel Sheet, Zinc-5% Aluminum Alloy-coated by the Hot Dip Process.

.5 ASTM A1003/A1003M-12, Specification for Steel Sheet, Carbon, Metallic and Non-Metallic Coated for Cold Formed Framing Members.

.6 ASTM C11-10a, Standard Terminology Relating to Gypsum and Related Building Materials.

.7 ASTM C473-12, Standard Test Methods for Physical Testing of Gypsum Panel Products.

.8 ASTM C475/C475M-12, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.9 ASTM C514-04(2009)e1, Standard Specifications for Nails for the Application of Gypsum Board.

.10 ASTM C645-11a, Standard Specification for Nonstructural Steel Framing Members.

.11 ASTM C665-12, Standard Specification for Mineral-Fibre Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

.12 ASTM C754-11, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.13 ASTM C834-10, Standard Specification for Latex Sealants.

.14 ASTM C840-11, Standard Specification for Application and Finishing of Gypsum Board.

.15 ASTM C841-03(2008)e1, Standard Specification for Installation of Interior Lathing and Furring.

.16 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" to 0.112" in Thickness.

.17 ASTM C955-11c, Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases

.18 ASTM C1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.19 ASTM C1047-10a, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

.20 ASTM C1177/C1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.21 ASTM C1178/C1178M-11, Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.

.22 ASTM C1186-08, Standard Specification for Flat Fiber-Cement Sheets.

.23 ASTM C1278/C1278M-07a(2011), Standard Specification for Fiber-Reinforced Gypsum Panel.

.24 ASTM C1396/C1396M-11, Standard Specification for Gypsum Board.

.25 ASTM C1629/C1629M-06(2011), Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.

.26 ASTM C1658/C1658M-12, Standard Specification for Glass Mat Gypsum Panels.

.27 ASTM D3273-12, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

.28 ASTM D3274-09, Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Fungal or Algal Growth, or Soil and Dirt Accumulation.

.29 ASTM D3678-97(2008)e1, Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Interior-Profile Extrusions.

.2 Gypsum Association (GA):

.1 GA-214-10, Recommended Levels of Gypsum Board Finish.

.2 GA-216-10, Application and Finishing of Gypsum Board.

.3 GA-231-06, Assessing Water Damage to Gypsum Board.

.4 GA-238-03, Guidelines for the Prevention of Mold Growth on Gypsum Board.

.3 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S101-07, Standard Methods of Fire Endurance Tests of Building Construction and Materials

.2 CAN/ULC S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.3 ULC List of Equipment and Materials

.4 Underwriters' Laboratories (UL), Standards for Safety acceptable to the Standards Council of Canada (SCC)

1.3 QUALITY ASSURANCE

.1 Contractor executing work of this Section shall have a minimum of five (5) years continuous experience in successful installation of work of type and quality shown and specified.

.2 Submit proof of experience upon Consultant's request.

1.4 SUBMITTALS

.1 Provide submittals in accordance with the requirements of Division 01.

.2 Shop Drawings: Submit shop drawings showing the design, construction and relevant details of furring, enclosures and partitions which require a fire rating.

.3 Product Data: Submit manufacturer's current technical literature for each component.

.4 Samples: Supply for Consultant's review, if requested, samples of the following:

.1 Board: Submit sample of each panel product specified, 150mm (6") square.

.2 Trim: Submit sample of each type of trim specified, 305mm (12") long.

.5 Quality Assurance Submittals:

.1 Design Data, Test Reports: Provide manufacturer's test reports indicating product compliance with indicated requirements.

.2 Manufacturer's Instructions: Provide manufacturer's written installation instructions.

1.5 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, enclosed, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact, in accordance with GA-238 and manufacturer's recommendations.

.4 Protect bagged products from excessive moisture or wetting. Store metal component sections in crates to prevent damage to material. Do not use bent or deformed material.

1.6 PROJECT CONDITIONS

.1 Establish and maintain environmental conditions for application and finishing gypsum wallboard to comply with ASTM C 840 and in accordance with manufacturer's written instructions.

.2 In cold weather (outdoor temperatures less than 13 deg. C, controlled heat in the range of 13 deg. C to 21 deg. C must be provided. Recommended temperature must be maintained twenty-four (24) hours before, during, and after entire gypsum board joint finishing and until the permanent heating system is in operation or the building is occupied.

.1 Minimum temperature of 10 deg. C shall be maintained during gypsum board application.

.3 Ventilate building spaces to remove excess moisture and humidity during the drying process. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

2 Products

2.1 MATERIALS – WALLBOARD (GWB)

.1 Standard Gypsum Board:

.1 Conforming to ASTM C1396, ivory paper faced, tapered edges, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, 1/2" thick unless indicated otherwise on drawings.

.1 Sheetrock Brand Gypsum Panels by CGC Inc.

.2 ProRoc Regular by CertainTeed.

.3 ToughRock Gypsum Wallboard by Georgia-Pacific Canada.

.4 Or approved equivalent.

.2 Fire-Rated Gypsum Board 'Type X':

.1 Conforming to ASTM C1396, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, tapered edges, 16mm (5/8") thick, as indicated on drawing.

.1 Sheetrock Brand Gypsum Panels, Firecode Core by CGC Inc.

.2 ProRoc Type X by CertainTeed.

.3 ToughRock Fireguard Gypsum Board by Georgia-Pacific Canada.

.4 Or approved equivalent.

.3 Gypsum Ceiling Board:

.1 Sag Resistant Gypsum Board: Meeting requirements of ASTM C1396M, ceiling board manufactured to have more sag resistance than regular type gypsum board with long edges tapered, and as follows:

.1 Location: Ceiling surfaces.

.2 Acceptable Materials:

.1 Sheetrock Interior Ceiling Board by CGC Inc.

.2 Tough Rock CD Ceiling Board by Georgia Pacific Canada.

.3 ProRoc Interior Ceiling Board by CertainTeed.

.4 Or approved equivalent.

.4 Tile Backer Board:

.1 Glass Mat Water Resistant Gypsum Backer Board: Manufactured in accordance with ASTM C1178 and C1658 to produce greater resistance to water penetration

and to provide improved surface bonding characteristics for ceramic tile than standard gypsum board:

.1 Location: Substrate for ceramic tile.

.2 Acceptable Materials:

.1 Fiberock Aqua Tough Tile Backerboard by CGC Inc.

.2 Diamondback Tile Backer by CertainTeed.

.3 GlasRoc Tile Backer by Georgia-Pacific Canada.

.4 Or approved equivalent.

.5 Abuse Resistant Gypsum Board:

.1 Manufactured to produce greater resistance to surface indentation and impact penetration resistance than standard gypsum panels:

.1 Gypsum panels with glass fibre reinforced core, tapered edges, minimum 5/8” thickness, Type X ULC fire rating, conforming to ASTM C1396M and tested to the following performance ratings.

.2 Acceptable Materials:

.1 Sheetrock Abuse Resistant Firecode by CGC Inc.

.2 Abuse Resistant Type X by CertainTeed.

.3 ToughRock Abuse Resistant Fireguard by Georgia Pacific Canada.

.4 Or approved equivalent.

.6 Glass-Mat Liner Board:

.1 Glass Mat faced with water resistant treated gypsum core to ASTM C1658, Type X, 25mm (1’) thick, 610mm (2’0”) wide x maximum practical length. Score of 10 (no mould growth) as per ASTM D3273. Stamped with UL or ULC Classification label documenting UL or ULC Classifications for fire resistance, surface burning characteristics and noncombustibility.

.2 Acceptable product:

.1 Glass-Mat Liner Panel by CGC

.2 Equivalent per Division 01.

.7 Exterior Sheathing Board:

.1 Glass mat faced, water-resistant treated core gypsum board, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, 13mm (1/2") thick, silicone treated gypsum core, front and back faces penetrated with inorganic glass fibre mats, square edge, conforming to ASTM C1177. Mould resistant panel score of 10 when tested in accordance with ASTM D3273 and evaluated to ASTM D3274.

.1 Securock Glass-Mat Sheathing by CGC Inc.

.2 Dens-Glass Gold by Georgia-Pacific Canada.

.3 GlasRoc Sheathing by CertainTeed.

.4 Or approved equivalent.

.8 Exterior Soffit Board:

.1 Mould and moisture resistant cement board, non-combustible, 1220mm (48") wide sheets of maximum practical lengths to minimize end joints, 13mm (1/2") thick, aggregated portland cement core wrapped in polymer-coated, glass-fiber mesh. panel score of 10 when tested in accordance with ASTM D3273:

.1 Acceptable Materials:

.1 Durock by CGC Inc.

.2 PermaBase Cement Board by CertainTeed

.3 ToughRock Fireguard Soffit Board by Georgia-Pacific Canada.

.4 Or approved equivalent.

2.2 ACCESSORIES

.1 Concrete Anchors:

.1 Self-drilling tie wire anchors, "Red-Head No. T-32" by Phillips Drill Company, Division of ITT Industries of Canada Ltd., (or approved alternate).

.2 Concrete Inserts:

.1 Hot-dip galvanized "turtle back" type concrete inserts to suit conditions as approved by Consultant, by Acrow-Richmond National Concrete Accessories, Division of Premetalco Inc., (or approved alternate).

.3 Mineral Fibre Acoustical Insulation: As indicated in Section 07 21 16.

.4 Gypsum Wallboard Accessories:

.1 In general, gypsum wallboard accessories shall conform to ASTM C1047.

.2 Corner Beads:

.1 Made from galvanized steel sheet conforming to ASTM A653, minimum 0.0179" (25 gauge). Minimum width of flanges 28mm for 13mm (1-1/8" for 1/2") thick wallboard and 32mm for 16mm (1-1/4" for 5/8") thick wallboard.

.3 Casing Beads:

.1 Made from galvanized steel sheet conforming to ASTM A653, minimum 30 gauge, U-shaped designed for finishing with joint compound.

.4 Control Joints:

.1 Made from galvanized sheet steel conforming to ASTM A653, minimum 0.0179" (25 gauge), or roll-formed zinc-alloy to resist corrosion, with expansion joint material perforated flanges.

.1 'Zinc Control Joint No. 093' by CGC Inc.

.2 (or approved alternate).

.5 Reveals:

.1 Galvanized sheet steel conforming to ASTM A653, minimum 0.0179" (25 gauge), in profiles as indicated on drawings.

.5 Wallboard Screws:

.1 Corrosion resistant, self-drilling, self-tapping gypsum wallboard screws conforming to ASTM C1002 (Type S) and ASTM C954 (Type S-12), 25mm (1") long No. 6 for single layer application, 41mm (1-5/8") long No. 7 for double layer application.

.2 At fire rated construction, type and size of wallboard screw shall be same as used in fire-rating test.

.6 Joint Compound for Interior Gypsum Board:

.1 Conforming to ASTM C475 and as recommended by gypsum wallboard, fire-rated gypsum wallboard and exterior wallboard manufacturers to suit conditions.

.7 Joint Compound for Tile Backing Panels:

.1 Gypsum based tile backing board: Use setting type taping and setting type, sandable topping compounds.

.8 Joint Compound for Exterior Sheathing Boards and Soffit Panels:

.1 Fibreglass mesh tape.

.9 Joint Compound for Abuse-Resistant Panels:

.1 ToughRock™ Sandable Joint Compound, by Georgia-Pacific.

.2 Durabond/Sheetrock Setting-Type Joint Compound, by CGC Canada Inc.

.3 Or approved equivalent.

.10 Resilient Sponge Tape:

.1 Closed cell neoprene sponge type tape with self-sticking adhesive on one side. 'Permastik 122X' by Jacobs and Thompson Ltd., or foamed vinyl type tape, 'Arnofoam' by Arno Adhesive Tape Incorporated, (or approved alternate).

.11 Adhesive:

.1 Conforming to CGSB 71-GP-25M, and as recommended by manufacturer and compatible with contacted surfaces.

3 Execution

3.1 EXAMINATION

.1 Examine gypsum wallboard panels for damage and existence of mould. Install only undamaged panels.

.2 Examine gypsum wallboard in accordance with GA-231 for water damage.

.3 Examine areas and substrates, with installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.

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

3.2 PREPARATION

.1 Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

.2 Coordinate installation of gypsum board suspension systems with installation of acoustical ceiling tiles (ACT) suspension systems. Where gypsum board suspension systems abut ACT systems, ensure that ceiling tiles grid fit into gypsum grid without affecting overall design and appearance.

.3 Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION - GENERAL

.1 Conform to ASTM C840, except as otherwise specified herein. Co-operate with mechanical, electrical and other trades to accommodate fixtures, fittings and other items in wallboard areas.

.2 Review extent of temporary heat provided. Carry out the work of this Section only when temperature is maintained and controlled in the range of 13 deg. C to 21 deg. C for at least twenty-four (24) hours before installing gypsum board and shall be maintained until joint compound and adhesives are dried or cured.

.3 Bring gypsum board into contact, but do not force into place.

3.4 GYPSUM WALLBOARD - SINGLE LAYER APPLICATION

.1 Metal Studs:

.1 Apply gypsum wallboard with screws. Erect wallboard with long dimension at right angles to supports. For fire rated partitions, erect board vertically or horizontally according to the ULC listing. Locate end joints over supporting members.

.2 Locate vertical joints at least 305mm (12") from the jamb/head/sill lines of openings.

.3 For parallel application space screws at 200mm (8") O.C. at board edges at 305mm (12") O.C. on board fields.

.2 Fasteners:

.1 Perimeter screws shall be not less than 10mm (3/8") from edges and ends and shall be opposite the screws on adjacent boards.

.2 Screws shall be driven with a power screw gun and set with countersunk head slightly below the surface of the board.

.3 Joints:

.1 Finish all joints.

3.5 GYPSUM WALLBOARD - DOUBLE LAYER APPLICATION

.1 General:

.1 Lay out work to minimize end joints on the face layer and to offset parallel joints between face and base layers by at least 254mm (10"). Apply the face layer at right angles to the base layer.

.2 Base Layer:

.1 The base layer shall be same as face layer or wallboard backing board applied at right angles to framing members. Secure base layers with screws spaced 305mm (12") O.C. to each member. Perimeter screws shall be opposite the screws on adjacent boards.

.2 The surface of the erected base layer shall be straight, plumb or level, and without protrusions before the face layer is applied.

.3 Face Layer:

.1 Apply face layer at right angles to base layer with adhesive. Apply adhesive with a notched spreader to leave 10mm x 13mm (3/8" x 1/2") ribbons, 38mm (1-1/2") apart over entire back side of face layer. Erect wallboard immediately after spreading adhesive.

.2 Supplement adhesive with screw fasteners. Provide temporary support for wallboard until adhesive bond has fully developed.

.3 As an alternative to adhesive specified, joint compound mixed with water in accordance with manufacturer's directions may be used. Allow joint compound and water mixture to stand thirty (30) minutes before using.

.4 Joints:

.1 Finish joints in face layers only, unless otherwise required to achieve fire resistant ratings indicated, as hereinafter specified.

3.6 TILE BACKING PANELS

.1 Install standard gypsum board panels in areas not subject to wetting to produce a flat surface.

.2 Install water resistant gypsum board in locations requiring tile applications in washrooms, and as indicated on the Drawings.

.3 Shim surfaces to produce a uniform plane across panel surfaces where tile backing panels abut other types of panels in the same plane.

3.7 EXTERIOR SHEATHING BOARD

.1 Install exterior sheathing board to exterior walls in accordance with manufacturer's written instructions. Seal all cut edges, ends, utility holes and fastener heads, as recommended by manufacturer.

.2 Sufficient anchors must be provided on each structural stud prior to erection of stud. Sequentially lift anchors as exterior sheathing board is being installed such that each anchor rests on edge of the exterior sheathing board.

.3 Tape and fill all joints and fastener heads using materials recommended by exterior sheathing board manufacturer.

3.8 FIRE RESISTANT ASSEMBLIES

.1 Fire resistance rating of gypsum board assemblies and framing shall be as called for on drawings or schedules, and as required to conform with applicable codes and requirements of authorities having jurisdiction.

.2 Appropriate ULC designs as listed in current ULC list of equipment and materials, Volume II, Building Construction, shall be placed when applicable. Extend partitions full height through ceiling space unless otherwise noted on drawings.

.3 Vertical bulkheads in ceiling spaces over fire rated glazed partitions, doors and the like shall have same fire rating as the door or partition over which they occur. All such bulkheads shall be of drywall construction unless otherwise noted.

.4 Use fire rated gypsum board as specified.

.5 Where lighting fixtures, diffusers, and the like are recessed into fire rated ceilings or bulkheads, provide enclosure to maintain required fire rating. Form removable panel to give access to fixture outlet box.

.6 Where fire hose cabinets or other fixtures or equipment are recessed in fire rated walls or partitions, provide drywall enclosure or backing to maintain required fire rating, unless otherwise detailed.

3.9 CONTROL JOINTS

.1 Install control joints using metal control joint strip as specified where:

.1 A partition, furring or column fireproofing abuts a structural element, dissimilar wall or partition assembly, or other vertical penetration, or ceiling.

.2 A ceiling or soffit abuts a structural element, dissimilar wall or partition assembly or other vertical penetrations.

.3 Wings of "L", "U" and "T"-shaped ceiling/soffit areas are joined;

.4 Construction changes within the plane of the partition or ceiling or soffit.

.5 Partition, restrained ceiling or furring run exceeds 9144mm (30').

.6 Unrestrained ceiling dimensions exceed 15240mm (50') in either direction.

.7 Expansion or control joints occur in the base exterior wall.

.8 Wallboard is installed over masonry control joints.

.9 And elsewhere as indicated on the drawings.

.2 Install in accordance with manufacturer's instructions. Where application is on furring members and double furring members at control joints, place one furring member on each side of the control joint.

3.10 BULKHEADS

.1 Fur out bulkheads in areas indicated and as required to conceal mechanical, electrical or other services in rooms where drywall finishes are scheduled, and elsewhere if called for on drawings.

.2 Ensure hangers are installed as to prevent splaying.

3.11 PRESSED STEEL (HOLLOW METAL) FRAMES

.1 Install pressed steel (hollow metal) frames where they occur in gypsum wallboard partitions.

.2 Anchor frames securely to studs using a minimum of three (3) anchors per jamb for jambs up to 2134mm (7') high and minimum of four (4) anchors per jamb for jambs over 2134mm (7') high.

3.12 THERMAL BREAK

.1 Install self-sticking resilient sponge tape at edges of wallboard in contact with metal windows and exterior door frames to provide a thermal break.

.2 Adhere tape to casing bead and compress during installation.

3.13 FINISHING

.1 Before proceeding with installation of finishing materials ensure the following:

.1 Wallboard is fastened and held close to framing and furring.

.2 Fastening heads in wallboard are slightingly below surface in dimple formed by driving tool.

.2 Levels of Gypsum Wallboard Finish:

.1 Level 0: Temporary construction only.

.2 Level 1: Plenum areas and above ceilings. Where a fire-resistance rating is required finishing should be in accordance with reports of fire tests of assemblies that have met the requirements of the fire rating imposed.

.3 Level 2: Areas of water resistant gypsum backing board under tile, exposed areas where appearance is not critical.

.4 Level 3: Service corridors and areas to receive heavy or medium textured coatings or heavy-duty wall coverings.

.5 Level 4: Areas to receive light textured coatings or lightweight wall coverings.

.6 Level 5: Areas to receive gloss, semi-gloss or flat sheen paints and critical lighting conditions. Embed tape and apply separate first, fill, and finish coats of

joint compound to tape, fasteners, and trim flanges, and apply skim coat over entire surface for corridors, long hallways, walls and ceilings longer than 7500 mm or walls higher than 3600 mm , and for all curved or angled wall surfaces.

.3 Finish gypsum wallboard in strict accordance with ASTM C840, GA-214 and GA-216 and as follows:

.1 Fill and tape joints and internal corners and fill screw depressions in board face and smooth out along corner beads and metal strip with joint compound.

.2 Mix joint compound (powder) in accordance with manufacturer's written instructions.

.3 Prefill "V" grooves of rounded edges with special setting type joint compound using a 127mm to 150mm (5" to 6") joint finishing knife. Finish flush with tapered surface ready for tape reinforcing application. Allow prefill material to dry thoroughly before application of embedding compound and tape.

.4 Apply joint compound in thin uniform layer. Embed reinforcing tape accurately centred on joint and securely pressed in, leaving sufficient compound under tape to provide proper bond. Immediately apply skim coat over tape application. Allow to dry thoroughly before application of next coat.

.5 Apply fill coat finishing the tapered depression flush with board surfaces. Allow to dry thoroughly before application of finish coat.

.6 Apply finish coat extending slightly beyond the filler coat and feathered out onto the board surface. Do not apply finish coat to gypsum board scheduled to be sprayed with acoustic surfacing finish.

.7 Sand between coats and following the finishing coat, where necessary, and leave surface smooth and ready for painting.

.8 Finish screw depressions with filler material and finish coat as specified above.

.9 Joint and depression finish shall in no case protrude beyond the plane of the board surface.

.10 Furnish corner beads and metal trim flush with board surface using filler and finishing coats feathered out approximately 50mm (2") and 100mm (4") respectively onto the board surface.

.11 Provide metal casing beads at exposed edges, at junctions of gypsum board with dissimilar material, at control joints and at junction with columns. Casing beads are required at perimeter of gypsum wallboard ceilings and soffits. Fasten with screws at 305mm (12") O.C. along entire length.

.12 Finish gypsum board to receive a Level 4 finish, unless indicated on the Drawings as a Level 5 finish.

3.14 REPAIRS

.1 After taping and finishing has completed, and before decoration, repair all damaged and defective work, including non-decorated surfaces.

.2 Patch holes or openings 13mm (1/2") or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.

.3 Repair holes or openings over 13mm (1/2"), or equivalent size, with 16mm (5/8") thick gypsum wallboard secured in such a manner as to provide solid substrate equivalent to undamaged surface.

.4 Tape and refinish scratched, abraded or damaged finished surfaces including cracks and joints in non-decorated surface to provide smoke tight construction, fire protection

equivalent to the fire rated construction and STC equivalent to the sound rated construction.

3.15 PROTECTION

.1 Protect installed products from damage during remainder of construction period.

.2 Remove and replace panels that are damaged.

END OF SECTION

1 General

1.1 SUMMARY

.1 The work in this section includes supply and installation for the following:

.1 Porcelain Wall Tile

.2 Porcelain Floor Tile

.3 Ant-Fracturing Waterproof Membrane

.4 Edge trims, Transition Strips and Accessories

1.2 REFERENCE STANDARDS

.1 American National Standards Institute/Ceramic Tile Institute (ANSI/CTI):

.1 ANSI/CTI A108.1-2011, Specification for the Installation of Ceramic Tile: Collection of 20 ANSI/CTI A108, A118 and A136 Series of Standards on Tile Installation

.2 American Society for Testing and Materials (ASTM):

.1 ASTM C241/C241M-09, Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic

.2 ASTM C627-10, Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester

.3 ASTM C920-11, Standard Specification for Elastomeric Joint Sealants

.4 ASTM C1028-07e1, Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method

.3 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-75.1-M88, Tile, Ceramic

.4 Terrazzo, Tile and Marble Association of Canada (TTMAC):

.1 2019-2021 Specification Guide 09 30 00, Tile Installation Manual

.2 Hard Surface Maintenance Guide

1.3 EXAMINATION

.1 Examine all areas and conditions affecting work of this Section and report any discrepancies or defects which would affect finished results.

1.4 SUBMITTALS

.1 Submit submittals in accordance with Division 01.

.2 Samples:

.1 Submit sample panel of each type and colour tile, 610mm x 610mm (24" x 24").

.2 Adhere to a rigid board with setting compound, grout and a dummy control joint showing sealant as specified. Identify samples by project number, date, name of sub-contractor and tile type.

.3 Tile and grout used in the building shall correspond to appearance of approved samples in all respects. Do not install tile until samples are approved.

.4 Upon Consultant's request submit samples of base, trim and fittings.

.3 Material Lists:

.1 Prior to ordering any materials submit list of products to be used. Products proposed must be recommended by their manufacturer for purpose intended. Upon Consultant's request submit evidence of manufacturer's endorsement.

.2 Take care to ensure compatibility of all materials. Consult the manufacturers in case of doubt.

.3 The supplementary materials shall come from the same production batch as installed materials.

.4 Safety Data Sheets:

.1 Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on Site for reference by workers.

.5 Maintenance Instructions:

.1 Upon completion of the Work, furnish Consultant with copies of maintenance instructions, containing complete detailed and specific instructions for maintaining, preserving and keeping clean the surfaces of this Work and in particular, giving adequate warning of maintenance practices of materials detrimental to the work of this Section for inclusion in the Operation and Maintenance Manual.

.6 Maintenance Materials:

.1 Supply five percent (5%) extra of each colour of tile and of each tile type for future repairs by the Owner.

.2 Place maintenance materials where directed by the Owner and store in their original containers.

1.5 QUALITY ASSURANCE

.1 Subcontractor executing work of this Section shall employ installers having a minimum of five (5) years continuous experience in successful installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Work of this Section shall be executed by workers especially trained and experienced in this type of work. Have a full time, qualified representative at the Site to direct the work of this Section at all times.

.3 Ensure proper use of proprietary materials in strict accordance with the material manufacturer's directions. It shall be the responsibility of the material manufacturer or supplier to furnish these directions to the Contractor and to check periodically at the site to ensure that they are being carried out.

1.6 PRE-INSTALLATION CONFERENCE

.1 Pre-Construction Conference: Arrange a site meeting, to coincide with regular bi-weekly site meetings, attended by the Contractor, the Subcontractor's representative and foreman for this project, the Consultant, materials supplier(s), and other relevant personal before commencement of work for this Section; agenda for meeting will include; but not be limited to, the following:

.1 Substrate conditions, non-structural cracks, structural cracks and preparation requirements;

.2 Floor and wall surface irregularities and levelness tolerances, including all remedial requirements;

.3 Installation of anti-fracturing membranes and setting bed materials;

.4 Installation of tiles and grouting;

.5 Edge details and treatments;

.6 Installation of tile and grout sealers.

1.7 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Co-ordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

.4 Restrict traffic by other trades during installation.

.5 Provide adequate protection of completed tiled surfaces to prevent damage by other trades until final completion of this project. Minimum protection shall consist of 4 mil polyethylene sheets lapped 100mm (4") and taped.

.6 Heavily travelled areas shall have additional 13mm (1/2") thick fibreboard sheet protection with taped joints over polyethylene sheet protection as specified above.

.7 Protect exposed edges of floor tile with same thickness as tile x 100mm (4") wide tapered strip of plywood adhered to floor until adjoining floor finish is to be installed.

1.8 SITE CONDITIONS

.1 Ambient Conditions: Apply tile after completion of work by other Sections is complete; to surfaces sufficiently dry, clean, firm, level, plumb and free from oil or wax or any other material deleterious to tile adhesion and as follows:

.1 Temperature: Maintain tile materials and substrate temperature between TTMAC recommended minimum and maximum temperature range; unless indicated otherwise by manufacturer, for forty-eight (48) hours before and during installation until materials are fully set and cured; provide additional heat during winter months or at any other time when there is a risk that surface temperatures may drop below minimum recommended temperatures.

.2 Ventilation: Maintain adequate ventilation where Work of this Section generates toxic gases or where there is a risk of raising relative humidity to levels that could damage building finishes and assemblies.

1.9 WARRANTY

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions, but for a period of five (5) years, and agree to promptly make good defects which become evident during the warranty period without cost to the Owner.

.2 Defects shall include but not be limited to the following:

.1 Cracking and crazing;

.2 Discolouration and staining;

.3 Pitting, splitting, and;

.4 Deformation of tiles and grout.

2 Products

2.1 PERFORMANCE REQUIREMENTS

.1 Dynamic Coefficient of Friction (DCOF): Tile installed on walkway surfaces having following values as determined by testing identical products per ANSI A137.1:

.1 Level Interior Wet Spaces: A minimum wet DCOF AcuTest Value of 0.42 or higher.

.2 Level Interior Dry Spaces: A minimum wet DCOF AcuTest Value below 0.42

.2 Floor Level Tolerances: Provide materials to attain floor levelness tolerances required by this Section.

.1 Calculate quantity of materials based on the difference between the specified tolerance and the initial tolerance specified in Section 03 35 00.

.2 Measurements: As indicated in Section 03 35 00.

2.2 MATERIALS

.1 Porcelain Floor Tiles (POR-01):

.1 Size: 300mm x 600mm

.2 Finish: matte

.3 Basis of Design Model and Manufacturer: Olympia Tile, Regal Series; Or approved equivalent.

.1 Colour to be selected from full colour range, allow for 2 colours.

.2 Ceramic Wall Tile (CER-01):

.1 Size: 200mm x 500mm

.2 Finish: matte

.3 Basis of Design Model and Manufacturer: Olympia Tile; Colour and Dimension; Or approved equivalent.

.1 Colour to be selected from full colour range, allow for 2 colours

.3 Ceramic Wall Tile (CER-02):

.1 Size: 100mm x 400mm

.2 Finish: matte

.3 Basis of Design Model and Manufacturer: Olympia Tile; Colour and Dimension; Or approved equivalent.

.1 Colour to be selected from full colour range, allow for 2 colours

.4 Control Joint Caulking:

.1 As supplied by the Grout Manufacturer.

.2 Colour: To match adjacent grout, as approved by the Consultant.

.5 Tile Straight Edge Trim:

.1 Extruded clear satin anodized aluminum edge trim, 3mm (1/8”) wide at top edge; Height as required to suit tile installation; with integral perforated anchoring leg for setting the strip into the setting material.

.2 Basis of Design Materials: Schlüter Schiene AE by Schlüter.

2.3 MORTAR SETTING MATERIALS

.1 Manufacturers: Mortar and grout materials listed in this Section shall be of a uniform quality for each mortar, and grout component from a single manufacturer and each aggregate from one source or producer as follows:

.1 Flextile Ltd.

.2 MAPEI Inc.

.3 Custom Building Products Ltd.

.4 Laticrete International Inc.

.5 Or approved equivalent.

.2 Surface Preparation Materials: As indicated in Section 03 35 00.

.3 Interior Thin Set Wall System: Dry set mortar meeting or exceeding the requirements of ANSI A108.1 formulated for thin set applications of ceramic biscuit tile, factory sanded mortar consisting of portland cement, sand and additives requiring only potable water to be added for installation:

.1 Acceptable mortar materials:

.1 #51 Floor and Wall Mix by Flextile Ltd.

.2 Kerabond by MAPEI Inc.

.3 Premium Blend Thinset by by Custom Building Products.

.4 Laticrete 317 Mortar by Laticrete International Inc.

.5 Or approved equivalent.

.4 Interior Thin Set Floor System: Dry set mortar meeting or exceeding the requirements of ASTM C627 for Heavy installation using latex modified, portland cement mortar meeting requirements of ANSI A108.1:

.1 Acceptable mortar materials:

.1 #53 Floor Mix by Flextile Ltd.

.2 Kerabond by MAPEI Inc.

.3 Master Blend Thinset by by Custom Building Products.

.4 Laticrete 253 Thinset by Laticrete International Inc.

.5 Or approved equivalent.

2.4 GROUT MATERIALS

.1 Grout Colours: As selected by the Consultant from manufacturer's full product range.

.2 Portland Cement Grout for Wall and Floor Joints ≤3mm (1/8") Interior Only: factory blended polymer modified mixture meeting requirements of ANSI A108.1:

.1 Acceptable Materials:

.1 500 Series Unsanded Grout by Flextile Ltd.

.2 Ker 800 Unsanded Grout by MAPEI Inc.

.3 Polyblend Unsanded Grout by Custom Building Products.

.4 Peracolor Grout Laticrete International Inc.

.5 Or approved equivalent.

.3 Latex-Portland Cement Grout for Floors with Joints ≥3mm (1/8") Interior or Exterior: factory blended stain resistant latex modifiers, portland cement and graded silica sand and dry-set grout and meeting requirements of A108.1:

.1 Acceptable Materials:

.1 600/100 Series Sanded Grout by Flextile Ltd.

.2 Keracolour S Sanded Grout by MAPEI Inc.

.3 Polyblend Sanded Grout by Custom Building Products.

.4 Peracolor Grout Laticrete International Inc.

.5 Or approved equivalent.

2.5 WATERPROOFING ANTI-FRACTURING MEMBRANES

.1 Waterproofing Anti-Fracturing Membranes: Load bearing, reinforced, liquid applied membrane; manufactured to accommodate flood testing and reduce the incidence of thermal shock cracking to tiling installations; meeting requirements of ANSI A108.1 and as follows:

.1 Acceptable Membrane Materials:

.1 Flex WP-980 Waterproof and Crack Isolation Membrane by Flextile Ltd.

.2 Mapelastic 315 Waterproofing and Reinforcing Fabric by MAPEI Inc.

.3 Level Quik Waterproof and Anti-Fracture Membrane by Custom Building Products.

.4 Hydroban Waterproofing by Laticrete International Inc.

.5 Or approved equivalent per Specification 01 25 00

.2 Reinforcing Fabric: strong, absorbent, flexible, alkali-resistant, polyester reinforcing fabric for use at coves, corners, cracks and around drains.

.1 Acceptable product: Reinforcing Fabric by Mapei

.2 Or approved equivalent per Specification 01 25 00

2.6 ACCESSORY MATERIALS

.1 Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers and as follows:

.1 Job Site Cleaner: Phosphoric acid/nitric acid based cleaning solution mixed in accordance with cleaner manufacturer's recommendations and as recommended by tile manufacturer.

.2 Maintenance Cleaner: Non-toxic, electrolytic, biodegradable, non-ammonia containing, pH controlled cleaning solution mixed in accordance with manufacturer's recommendations.

3 Execution

3.1 EXAMINATION

.1 Maintain minimum temperature of 13 deg C at tile installation area for twenty-four (24) hours prior to curing and for twenty-four (24) hours after installation. Do not apply work to frozen surfaces.

.2 Examine carefully surfaces to which tile is to be installed and report any defects to the Consultant.

.3 Anti-Fracturing Membranes:

.1 Prepare all surfaces of non-structural and structural cracks in strict accordance with the anti-fracturing membrane manufacturer's written instructions.

.2 Prime and fill all surfaces of non-structural and structural cracks in strict accordance with the anti-fracturing membrane manufacturer's written instructions.

.4 Commencement of installation shall signify complete acceptance of surfaces and conditions.

3.2 PREPARATION

.1 Surface Preparation:

.1 Make backing surfaces level and true to a tolerance in plane of 3mm in 2439mm (±1/8” in 8’) for walls and 3mm in 3048mm (±1/8” in 10’) for floors using levelling bed mortar.

.2 Surfaces shall be structurally sound, well fastened, clean and free from dust, oil, grease, paint, tar, wax, curing agents, primers, sealers, form release agents or any deleterious substances that may act as bond barriers.

.3 Backing surfaces shall be dry and fully cured. Dampness must not exceed five percent (5%) by volume.

.2 Wood Subfloor/Substrate: Supply, installation and preparation of wood subfloor/underlayment in accordance with TTMAC requirements/Detail 313F 2009/210 (A) shall be included under this Contract.

.1 Wood underlayment shall be structurally sound, rigid, smooth, flat, clean, and permanently dry and conform with CSA-0121. The wood surface must be free of all foreign materials including, but not limited to, dust, paint, grease, oils, solvents, curing and hardening compounds, sealers, asphalt and old adhesive residue. Wood underlayment shall be double construction, each layer minimum 5/8” thick and minimum total thickness of 1 1/4".

.2 Apply both layers of underlayment with top grain at right angles to joist, and with top layer staggered to give 50% overlap of sheets of sub-floor. Gap the top layer of plywood 6mm between sheets. Attach underlayment with 30mm screws placed 152mm o.c. around perimeter and 203mm o.c. throughout the body of the panel. Underlayment screws to go through the total thickness of the assembly but should not penetrate the joists or cross bridging/solid blocking.

.3 Concrete substrate: Examine concrete substrate, repair as required to produce level, clean surface for new tile installation. Repair Work shall include levelling, filling, grinding or cutting, in accordance with Section 03 35 00.

.4 Work of other trades that are required before new tile installation (i.e. electrical conduit installed below ceramic tile) shall be installed, complete and approved before tile installation.

3.3 INSTALLATION – ANTI-FRACTURING MEMBRANES

.1 Install waterproofing anti-fracturing membrane in accordance with waterproofing manufacturer's written instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate.

.2 Do not install tile over waterproofing membrane until waterproofing has cured and been tested to determine that it is watertight.

.3 Prepare floor and wall substrates in accordance with manufacturers written instructions.

.1 All substrates should be structurally sound, stable, dry, clean and free of any substance or condition that may reduce or prevent proper adhesion.

.2 Do not use chemicals (acid etching or stripping) to prepare approved substrates.

.3 Concrete substrates should have a concrete surface profile of #2 per the International Concrete Repair Institute (ICRI). Mechanically clean and profile by diamond-cup grinding or other engineer-approved method when necessary.

.4 Application

.1 Fill all cracks, control joints and gaps in corners and coves that are greater than 1/32" (1 mm) with an appropriate filler material. Force material into crack and finish smooth with trowel. Let dry.

.2 Pre-treat cracks, corners, coves and floor wall intersections with 2 coats of waterproof membrane.

.3 Pre-treat drains by filling space between drain pipe and substrate with appropriate expansion joint materials and apply 2-coards of waterproof membrane

.5 Fabric Reinforcing Application

.1 Lay reinforcing fabric into wet waterproof membrane at all “pre-treat” sections as outlined in application section below (cracks, coves, corners and penetrations). Allow for 50mm fabric on horizontal surface and 100mm fabric on vertical surface. Use brush to press fabric into corners until liquid comes through fabric. Work out any wrinkles or bubbles.

.2 While fabric is wet, apply additional waterproof membrane over fabric until completely covered to create void-free surface. Let dry. Apply a second coat and let dry.

.3 Install reinforcing fabric through main/field areas by placing into wet first coat of waterproof membrane. Using a roller, apply pressure to the fabric, working out wrinkles or bubbles while forcing liquid waterproof membrane to come through the fabric. Overlap seams and ends of the fabric by 2" (50mm). While fabric is still wet, apply additional liquid waterproof membrane over the fabric until completely covered, creating a void-free surface. Let dry completely.

.4 Apply a second coat of liquid waterproof membrane to entire area. Let dry.

.5 Apply a bead of commercial-grade silicone or urethane sealant between the membrane and the drain flange, about 1/2" (12 mm) in from the drain opening.

.6 Bolt the drain collar into place while the sealant is still fresh.

.7 Install tile as per following section below.

3.4 INSTALLATION - GENERAL

.1 Unless otherwise specified, execute tile work according to the latest issue of Specification Guide 09 30 00, Tile Installation Manual - published by Terrazzo, Tile and Marble Association of Canada, as the minimum standard except as varied by this Specification.

.2 Thoroughly clean surfaces to which tile is to be applied.

.3 Back butter all floor tile.

.4 Neatly cut tile around fitments, fixtures, access panels, and the like. Splitting of tile is expressly prohibited except where no alternative is possible. Form intersections, corners and returns accurately.

.5 Finish surfaces flat and level or, sloped and graded as required.

.6 Joint Widths: Install tile with the following joint widths, unless indicated on drawings:

.1 Wall Tile: 1.6mm (1/16”)

.2 Floor Tile: 6mm (1/4”), unless otherwise indicated on the Drawings.

.3 Quarry Tile: As per manufacturers recommendations.

.4 Make joints consistent width and alignment within tile area.

.5 Maintain 2/3 of grout joint depth free of setting material.

.7 Joints in base shall match floor patterns. Joints shall be watertight without voids, cracks or excess grout.

.8 Lay out tile so that fields or patterns are centred on wall areas or architectural features and so that no tile less than 1/2 size occurs.

.9 Arrange and set recessed accessories in tile work so that they are evenly spaced, centred with joints and set true with correct projection. Rigidly install accessories.

.10 Provide manufacturer's standard trim pieces at changes of direction and at terminations. Unless otherwise indicated provide the following corner and edge conditions:

.1 Internal horizontal corners: Coved.

.2 External vertical and horizontal corners: Bullnosed.

.3 Internal vertical corners and unexposed edges: Square.

.11 Install tiles in patterns and locations as indicated on drawings.

.12 Install wall tile full wall height unless shown otherwise.

.13 Coordinate work of this Section with work of other Sections for items requiring to be recessed into work of this Section.

.14 Sound tiles after setting and remove and replace tiles not fully bedded.

.15 Re-point joints after cleaning to eliminate imperfections. Avoid scratching tile surfaces.

.16 Finished tile work shall be clean and free of tiles which are pitted, chipped, cracked or scratched. All damaged tile shall be removed and replaced.

.17 Where indicated on Drawings or as required, install continuous single piece metal edge trims centred under doors in closed position and other locations where tile meets other floor finishes.

3.5 MORTAR APPLICATION METHOD

.1 Thin-Set Application Method:

.1 Install wall tile to gypsum wallboard and moisture resistant wallboard in dry areas using latex modified thin-set setting bed and latex modified wall grout in strict accordance with tile manufacturers written installation instructions as per the pre-installation conference.

.2 Apply floor tile and prepare floor slabs in strict accordance with tile manufacturers written installation instructions as per the pre-installation conference.

3.6 GROUTING

.1 Grout tiles in accordance with ANSI A108.10 and as specified herein.

.2 When grouting a fresh laid floor, make certain that traffic and grouting will not cause movement of floor in setting bed. Protect floor by using kneeling boards or gypsum board to defend floor against traffic while grouting.

.3 Mix grouts and install in strict accordance with the manufacturer's instructions.

.4 Excess grout shall be removed from the surface of tiles using the edge of a rubber float held at a 45 deg angle, moving it diagonally to the joints. Fill all gaps and air holes.

.5 Do not allow grout to harden on face of tile. Refer to manufacturer's instructions for thorough removal.

.6 Floors which required damp curing shall be cured for the required length of time using heavy kraft paper, not polyethylene sheets. Consult manufacturer for instructions.

3.7 CONTROL JOINTS AND SEALING

.1 Control joints of a flexible caulking material shall be placed every 4877mm to 6096mm (16’ to 20') apart, directly over existing control joints and/or where indicated on drawings or as required in accordance with TTMAC Detail No. 301MJ-2019-2021, Details E, F and G, whichever is applicable.

.2 Control joints shall be placed around the floor perimeter at walls, around columns, and where tile abuts other hard materials or vertical surfaces. Saw cutting of tile after installation is prohibited. Tile shall be cut if required and installed along each side of control joints.

.3 Expansion joints must always be placed directly over all slab expansion joints in accordance with TTMAC Detail No. 301MJ-2019-2021, Details A and B, whichever is applicable.

.4 Locate expansion, control, contraction, and isolation joints, as indicated below, unless specifically indicated otherwise on the Drawings:

.1 Interior: 4877mm (16’) maximum: 6mm (1/4") joint width.

.5 Joints around fixtures, pipes or other fittings shall be sealed with a sealant. Refer to Section 07 92 00 for type of sealants to be used.

.1 Colour of sealant shall match grout as selected later by Consultant.

3.8 CLEANING AND PROTECTION

.1 Clean tiled areas after grouting has cured, using compatible solutions and methods as recommended by the manufacturer.

.2 Remove grout residue from tile as soon as possible.

.3 Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation.

.4 Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning.

.5 Flush surface with clean water before and after cleaning.

.6 Leave finished installation clean and free of cracked, chipped, broken, unbonded, or other tile deficiencies.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section includes requirements for supply and installation of ceilings consisting of the following, complete with exposed suspension system and trim:

.1 Acoustical tiles for interior ceilings.

.2 Suspension grid systems.

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM):

.1 ASTM C635/C635M-13a, Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings

.2 ASTM C636/C636M-13, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels

.3 ASTM E1264-14 Standard Classification for Acoustical Ceiling Products

.2 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate layout and installation of acoustic tile ceiling and suspension system with other construction that penetrates ceilings or is supported by them including; but not limited to, light fixtures, HVAC equipment, fire suppression system, and partition assemblies, and as follows:

.1 Schedule and coordinate installation of ceiling to occur after completion of overhead mechanical and electrical work.

.2 Schedule and coordinate ceiling installation with mechanical and electrical trades building in components into ceiling finish panels.

.2 Pre-Installation Conference: Conduct conference at Project site in accordance with requirements of Division 01 to discuss coordination issues with Contractor, Subcontractor and Consultant present.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01.

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

.1 Product Data: Submit product data for each type of product specified.

.2 Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling mounted items indicating the following:

.1 Ceiling suspension system members.

.2 Method of attaching suspension system hangers to building structure.

.3 Ceiling mounted items including light fixtures; air outlets and inlets; speakers; sprinklers; and special mouldings at walls, column penetrations, and other junctures of acoustic ceilings with adjoining construction.

.3 Samples for Initial Selection: Manufacturer's colour charts consisting of sections of acoustic panels, suspension systems, and trim showing the full range of colours, textures, and patterns available for each type of ceiling assembly indicated.

.4 Samples for Verification: Full size units of each type of ceiling assembly indicated; in sets for each colour, texture, and pattern specified, showing the full range of variations expected in these characteristics:

.1 150mm (6") square samples of each acoustic panel type, pattern, and colour

.2 Set of 305mm (12") long samples of exposed suspension system members, including trim, for each colour and system type required.

.5 Maintenance and Materials:

.1 Provide five percent (5%) of each type of acoustic ceiling panels and two percent (2%) of each suspension system and trim for future repairs. Identify cartons and place where directed by the Owner.

.2 Maintenance materials shall be of same production run as installed materials.

1.5 INFORMATIONAL SUBMITTALS

.1 Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

.1 Ceiling suspension-system members.

.2 Structural members to which suspension systems will be attached.

.3 Method of attaching hangers to building structure.

.4 Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.

.5 Size and location of initial access modules for acoustical tile.

.6 Items penetrating finished ceiling and ceiling-mounted items including the following:

.1 Lighting fixtures.

.2 Diffusers.

.3 Grilles.

.4 Speakers.

.5 Sprinklers.

.6 Access panels.

.7 Perimeter moldings.

.7 Show operation of hinged and sliding components adjacent to acoustical tiles.

.8 Minimum Drawing Scale: ¼” = 1’ (1:48).

1.6 QUALITY ASSURANCE

.1 The Contractor executing work of this Section shall have a minimum of five (5) years continuous experience in successful and installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

.2 Single-Source Responsibility: Provide acoustic ceilings and grid components by a single manufacturer to ensure compatibility.

.3 Letter of Certification:

.1 Contractor together with manufacturer, shall submit a written confirmation, signed by manufacturer's registered professional Engineer, stating that the suspended ceiling system will provide adequate support for electrical fixtures.

1.7 DELIVERY, STORAGE, HANDLING AND PROTECTION

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off-the-ground, under cover storage location. Do not load any area beyond the design limits.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

1.8 SITE CONDITIONS

.1 Ambient Conditions: Install acoustic unit ceilings only when building is enclosed, has sufficient heat, when overhead mechanical and electrical work is complete, and dust and moisture producing activities are complete; maintain uniform temperatures and relative humidity within range recommended by material manufacturer from the time of installation until Substantial Performance for the project; make adjustments to temperature and humidity gradually within tolerances indicated by manufacturer.

1.9 WARRANTY

.1 Acoustical Panel: Submit manufacturers standard ten (10) year written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:

.1 Panels: Sagging and warping.

.2 Grid System: Rusting and manufacturer’s defects.

2 Products

2.1 MANUFACTURERS

.1 Acceptable Materials Manufacturers: Subject to compliance with requirements specified in this Section, manufacturers offering products that may be incorporated into the Work include the following:

.1 Armstrong World Industries, Inc.

.2 CertainTeed

.3 CGC Interiors, a USG Company

.4 Or approved equivalent.

2.2 DESIGN CRITERIA

.1 Superimposed Loads: Determine superimposed loads applied to suspension systems by components of the building and verify that adequate hangers are installed to support additional loads in conjunction with normal loads of the ceiling system, and as follows:

.1 Maximum Deflection: Limit deflection to L/360 in accordance with ASTM C635 deflection test.

2.3 MATERIALS

.1 Acoustic Ceilings (ACT): Provide manufacturer's fibreglass acoustical ceiling system, tested in accordance with ASTM E84 and as follows:

.1 Surface Texture: Smooth

.2 Composition: Fiberglass

.3 Color: White

.4 Size: 610mm x 610mm x 25mm (24in x 24in x 1in)

.5 Edge Profile: Square

.6 Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton .90

.7 Articulation Class (AC): ASTM E 1111; Classified with UL label on product carton 190

.8 Flame Spread: ASTM E 1264; Class A (UL)

.9 Light Reflectance (LR) White Panel: ASTM E 1477; 0.88

.10 Dimensional Stability: HumiGuard Plus

.11 Material Ingredient Transparency: Health Product Declaration (HPD); Declare Label

.12 Life Cycle Assessment: Third Party Certified Environment Product Declaration (EPD)

.13 Acceptable Product: Optima, 3159 as manufactured by Armstrong World Industries, or equivalent

2.4 METAL SUSPENSION SYSTEM

.1 Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M and designated by type, structural classification, and finish indicated.

.1 Installation shall be by use of torsion springs, field engaged into factory supplied spring retainers, and field installed on the back of the panel on the coated extruded aluminum panel edge.

.2 Panel assembly is then lifted into place, and the torsion springs are engaged into the factory supplied “butterflies” which have been field installed during the assembly of the suspended factory supplied extruded aluminum grid.

.3 The grid system shall consist of main tees and cross tees, which shall incorporate a continuous “panel location” fin to ensure correct panel alignment during installation and future access.

.1 The suspension system shall be completely engineered and fabricated in the factory, to avoid any field cutting of the suspension components.

2.5 ACCESSORIES

.1 Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

.2 Wire Hangers, Braces, and Ties: Provide wires as follows:

.1 Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

.2 Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106” (2.69mm).

.3 Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

.4 Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

3 Execution

3.1 INSPECTION

.1 Examine the work upon which the work of this Section depends and report any defects to the Consultant. Do not commence installation until such time as all wet trades have been completed. Commencement of work implies acceptance of surface and conditions.

.2 Ensure that a uniform minimum temperature of 15 deg. C and humidity of 20 - 40% before, during and after installation is maintained.

3.2 INSTALLATION

.1 Cooperate with mechanical, electrical, drywall and other trades to accommodate fixtures, and the like. Examine mechanical and electrical drawings to establish hanger layout and ensure that ceiling hanger layout and furring are designed to span ducts, and the like, where required. Supply all hangers, including inserts for hangers and supplementary framing members as required for complete installation.

.2 Prior to installation of acoustic panels notify the Consultant for inspection and approval of suspension system.

.3 All installations shall be by skilled mechanics and in strict accordance with system manufacturer's printed directions to produce first-class, flush finished surface in true plane, free from drooping, warped, soil or damaged board or grid.

.4 Provide all additional supports, hangers and steel trapeze channel framing required to support fixtures located under mechanical ducts.

.5 Hangers, where required:

.1 Space hangers to support grid on 1220mm (48”) centres each way securely fastened to structure. Hangers shall not, under any circumstances, be secure to pipes, ducts or any electrical or mechanical items.

.2 Frame around recessed fixtures, grilles and openings with an allowance for movement. Hangers shall be plumb and not pressed against ducts, pipes or conduits.

.6 Anchors, where required:

.1 Self-drilling type, installed by means of an electrically powered drill specifically designed for this purpose.

.2 The anchor manufacturer shall evaluate the specific job conditions and advise in writing regarding anchor sizes necessary. The safe working load shall not exceed 25% of the manufacturer's stated average test loads for the anchor.

.3 Receive instruction from the anchor manufacturer regarding correct usage and comply with these requirements.

.7 Assemble ceiling system in accordance with drawings. Install ceilings centered on room axis unless noted otherwise. Lay patterned ceiling panels in one direction with pattern parallel to the shortest room dimension.

.8 Cooperate with the mechanical contractor and cut ceiling panels as required to accommodate air handling diffuser throughout the work.

.9 Install acoustic ceiling panel types as indicated on drawings and schedules.

3.3 CLEANING

.1 Thoroughly clean all acoustic ceiling surfaces upon completion of the installation.

.2 Promptly as the work proceeds and on completion, remove all surplus materials and debris resulting from the work of this Section.

END OF SECTION

PART 1 - GENERAL

1.1 References

.1 American Society for Testing and Materials (ASTM):

.1 ASTM F 2195 Standard Specification for Linoleum Tile Floor Covering.

.2 ASTM F 1869 Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

.3 ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

.4 ASTM F 1861 Standard Specification for Resilient Wall Base.

.5 ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

.6 ASTM F 1482 Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring.

.7 ASTM E 648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

.8 ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

.9 ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.

.10 ASTM E 492 Standard Test Method for Laboratory Measurement of lmpact Sound Transmission through Floor-Ceiling Assemblies Using the Tapping Machine.

.11 ASTM E 989 Standard Classification for Determination of lmpact Insulation Class (llC).

.2 National Fire Protection Association (NFPA):

.1 NFPA 253 Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

.2 NFPA 258 Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

.3 International Standards and Training Alliance (Install):

.1 Install Resilient Certification.

1.2 Submittals

.1 Product Data: Submit manufacturer's current printed Product literature, Specifications, installation instructions, and field reports in accordance with Section 01330 - Submittal Procedures.

.2 Shop Drawings: Submit Shop Drawings to indicate materials, details, and accessories in accordance with Section 01330 - Submittal Procedures including but limited to the following:

1. Submit a cut diagram indicating seam locations and roll direction. Use mitered seam layouts for corners when changing directions 180 degrees (e.g. when running material down corridors which bisect at a right angle), unless approved otherwise.

.3 Samples: Submit duplicate 12" x 12" (300 mm x 300 mm) sample pieces of sheet material.

1.3 Closeout Submittals

1 Provide maintenance data and warranty for resilient flooring for incorporation into manual specified in Section 01780 - Closeout Submittals.

1.4 QUALITY ASSURANCE

.1 Installer Qualifications: Installer experienced in performing Work of this section who has specialized in installation of Work similar to that required for this Project.

.1 Engage installer certified by flooring manufacturer

.2 Certificate: Submit certificate indicating installer qualification.

.2 Regulatory Requirements:

.1 Fire Performance Characteristics: Provide resilient linoleum sheet flooring with the following fire performance characteristics as determined by testing Products in accordance with ASTM method indicated below by a certified testing laboratory or another testing and inspecting agency acceptable to authorities having jurisdiction:

Critical Radiant Flux: Class 1 Rating per NFPA 253 (ASTM E 648) (0.45 watts/cm² or greater).

Smoke Density: Less than 450 per NFPA 258 (ASTM E 662).

.2 Provide slip resistant sheet vinyl safety flooring in compliance with the following:

1 Ontario Building Code (OBC), latest edition.

2 City of Hamilton Barrier Free Design Guidelines, latest edition

3 Workplace Safety Insurance Board (WSIB).

.3 Mock-Ups: Install at Project site a job mock-up using acceptable Products and manufacturer approved installation methods. Obtain Owner's and Consultant's acceptance of finish color, texture and pattern, and Workmanship standard. Comply with Division 1 Quality Control (Mock-Up Requirements) Section.

.1 Mock-Up Size: 3m x 3m, location as directed by Consultant.

.2 Incorporation: Mock-up may be incorporated into final construction upon Owner's approval.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 General: Comply with Division 1 Product Requirements Sections.

.2 Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

.3 Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

.4 Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

.1 Material should be stored in areas that are fully enclosed and weathertight. The permanent HVAC should be fully operational, controlled and set at a minimum of 68º F (20º C) for at least 48 hours prior to the installation.

1.6 PROJECT CONDITIONS

.1 Environmental Requirements/Conditions: In accordance with manufacturer's recommendations, areas to receive flooring should be clean, fully enclosed and weathertight. The permanent HVAC must be fully operational, controlled and set at a minimum of 68º F (20º C) for a minimum of seven days prior to, during, and seven days after the installation. The flooring material should be conditioned in the same manner for at least 48 hours prior to the installation. Areas to receive flooring shall be adequately lighted to allow for proper inspection of the substrate, installation and seaming of the flooring, and for final inspection.

.1 Temperature Requirements: Maintain air temperature in spaces where Products will be installed for time period before, during, and after installation as recommended by manufacturer.

.1 Temperature Conditions: 68° F (20° C) for a minimum of seven days prior to, during, and seven days after the installation.

1.7 SEQUENCING AND SCHEDULING

.1 Finishing Operations: Install tile flooring after finishing operations, including painting and ceiling operations, have been completed.

.2 Concrete Curing: Do not install tile flooring over concrete substrates until substrates have cured and are dry to bond with adhesive as determined by resilient flooring manufacturer's recommended bond, moisture test, and pH test.

.1 It is the Flooring Contractor’s responsibility to verify suitability of substrate.

1.8 WARRANTY

.1 Project Warranty: Refer to "Conditions of the Contract" for Project warranty provisions.

.2 Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

.1 Warranty Period: Five (5) year limited warranty commencing on Date of Substantial Completion.

1.9 MAINTENANCE

.1 Extra Materials: Deliver to Owner extra materials from same Production run as Products installed. Package Products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals (Maintenance Materials) Section.

.1 Quantity: Furnish quantity of flooring units equal to 5% of amount installed for each colour/pattern. Extra material to be Provided from same dye lot as installed material.

.2 Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra materials.

PART 2 - PRODUCTS

2.1 RESILIENT LINOLEUM TILE FLOORING (RES)

.1 Product Performance Requirements

.1 Description: Homogeneous tile linoleum of primarily natural materials consisting of linseed oil, wood flour, and rosin binders, mixed and calendered onto a polyester backing to ensure optimum dimensional stability. Pattern and color shall extend throughout total thickness of material.

.2 Size: 50cm x 50cm; 50 cm x 25cm and 100cm x 25cm as indicated on drawings

.3 Gauge: 2.5mm (1/10”)

.4 Backing: Polyester

.5 Pattern and Color: As selected by Consultant from manufacturer's full pattern/color range. Allow for 4 colours.

.6 Adhesive: As recommended by manufacturer

2 Resilient Tile Flooring must:

.1 not be manufactured or formulated with heavy metals including cadmium (Cd), chromium (Cr), lead (Pb), mercury (Hg), and nickel (Ni);

.2 not contain > 0.01 % by weight of arsenic (As);

.3 not contain > 1 % by weight of tin (Sn), and zinc (Zn);

.4 be manufactured with recycled content; and

.5 not contain or be manufactured with materials derived from species listed under CITES.

.4 The manufacturing process must adhere to Lifecycle Assessment Standards as per CAN/CSA-ISO 14040.

2.2 ACCESSORIES

.1 Resilient base: continuous, top set, complete with premoulded end stops and external corners:

.1 Type: rubber (100% PVC free, phthalate free and Red list chemical free).

.2 Style: cove.

.3 Thickness: 3.17 mm.

.4 Height: 101.6 mm.

.5 Lengths: cut lengths minimum 2400 mm.

.6 Colour: To be determined by Consultant from full colour range.

.7 Acceptable Products: Pinnacle by Roppe, Optimum Edge TS by Mannington or Baseworks by Johnsonite

.2 One Piece rubber stair tread and riser with safety Strip.

.1 Nose Type: Square with taper & relief cut.

.2 Nose Length: 1 9/16” (39.69mm)

.3 Leading Edge Thickness: ¼” (6.35mm)

.4 Back Edge Thickness: 5/64” (2mm)

.5 Tread Depth: 20 7/16” (519.12mm)

.6 Tread Length: 48” (1.22m)

.7 Safety Strip: One 2” (50.8mm) smooth carborundum insert spaced ¾” (19mm) from nose.

.8 Provide coordinated landing tile.

.9 Acceptable Product: #96 Vantage Design Tread & Riser as manufactured by Roppe or equivalent.

.3 Metal edge strips:

1. For edging between resilient sheet flooring and all other floor materials always use a flush anodized aluminum metal edging. Exact model number to be determined by the Contractor based on site conditions and height differential and to be approved by Architect prior to installation.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: Comply with manufacturer's Product data, including Product technical bulletins, Product catalog installation instructions, and Product carton instructions for installation.

3.2 EXAMINATION

.1 Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for Product installation in accordance with manufacturer's instructions (i.e. moisture tests, bond test, pH test).

.2 Material Inspection: In accordance with manufacturer's installation requirements, visually inspect materials prior to installation. Material with visual defects shall not be installed.

3.3 PREPARATION

.1 Adjacent Surfaces Protection: Protect adjacent Work areas and finish surfaces from damage during Product installation.

.2 Surface Preparation:

.1 General: Prepare floor substrate in accordance with manufacturer's instructions.

.2 Floor Substrate: Floors shall be sound, smooth, flat, permanently dry, clean, and free of all foreign materials including, but not limited to, dust, paint, grease, oils, solvents, curing and hardening compounds, sealers, asphalt and old adhesive residue.

.3 Wood Substrates: Wood substrates must be double construction with a minimum total thickness of 1 inch. Wood floors must be rigid, free from movement and have at least 18" of well-ventilated air space below. Refer to drawings for new subfloor requirements under this contract.

.4 Level all rough surfaces and fill cracks and marks with a patching compound compatible with Resilient Flooring.

.5 Mechanically remove all surface contaminants such as paint, oil, grease, varnish, adhesive as well as various other products such as treatment compounds.

.6 Concrete Moisture Testing: Conduct moisture tests on all concrete floors regardless of the age, grade level or the presence of existing flooring. Conduct calcium chloride tests in accordance with ASTM F 1869. Measure the internal relative humidity of the concrete slab in accordance with ASTM F 2170. One test of each type should be conducted for every 1,000 square feet of flooring (minimum of 3). The tests should be conducted around the perimeter of the room, at columns, and anywhere moisture may be evident. Concrete moisture vapor emissions must not exceed 5.0 lbs. per 1,000 square feet in 24 hours when using Forbo T 940 adhesive. Concrete internal relative humidity must not exceed 75% when using Forbo T 940 adhesive. A diagram of the area showing the location and results of each test should be submitted to the Consultant, General Contractor or End User. If the test results exceed these limitations, the installation must not proceed until the problem has been corrected.

.7 Concrete pH Test: Perform pH tests on concrete floors regardless of the age or grade level. If the pH is greater than 10, it must be neutralized prior to beginning the installation.

3.4 INSTALLATION OF RESILIENT TILE FLOORING (RES)

.1 Adhesive Flooring Installation: Begin laying tiles at the starting point, ensuring that the tile is laid exactly along the layout lines. Because the tiles must be installed into wet adhesive, do not spread the adhesive in an area larger that the tile can be installed while the adhesive is still wet. The successful installation of border tiles is best accomplished by following one of two strategies. (1) When laying out tile, determine the edge of a field tile a comfortable distance from each wall and then snap chalk lines around the perimeter of the room. When spreading adhesive, use these lines as a guide to stop spreading adhesive and install the field tile up to the adhesive spread lines. Once the field tiles have been installed, the border tiles and be “dry” fitted (before spreading the adhesive). After the border tiles have been cut, adhesive can be applied in the area of the border tiles and the tiles can be placed immediately into the wet adhesive. (2) Plan the sequence of spreading adhesive so that the border tiles can be cut and placed into the adhesive before the adhesive Working time has been exceeded. Immediately after installation, roll the tile with a 100 pound roller in both directions and repeat as necessary to ensure adequate transfer of adhesive to the backing.

.1 Adhesive Material Installation: Use trowel as recommended by flooring manufacturer for specific adhesive. Spread at a rate of approximately 150 ft^2/gallon, as recommended by flooring manufacturer.

.2 Installation Techniques:

.1 Where demountable partitions and other items are indicated for installation on top of finished flooring, install flooring before these items are installed.

.2 Scribe, cut, fit flooring to butt tightly to vertical surfaces, permanent fixtures and built-in furniture, including pipes, outlets, edgings, thresholds, nosings, and cabinets.

.3 Extend flooring into toe spaces, door reveals, closets, and similar openings.

.4 Install flooring on covers for telephone and electrical ducts, and similar items occurring within finish floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on these covers.

.5 Do not install resilient flooring over expansion joints. Use expansion joint covers manufactured for use with resilient flooring. Refer to other specification sections for expansion joint covers.

.6 Adhere resilient flooring to substrate without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed installation.

.1 Use adhesive applied to substrate in compliance with flooring manufacturer's recommendations, including those for trowel notching, adhesive mixing, and adhesive open and Working times.

.7 Roll resilient flooring as required by resilient flooring manufacturer.

.3 Finish Flooring Patterns: As selected by Consultant.

3.5 APPLICATION of RUBBER BASE

.1 Lay out base to keep number of joints at minimum.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base.

.4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.

.7 Cope internal corners. Use premoulded corner units for right angle external corners. Use formed straight base material for external corners of other angles.

.10 Heat weld base in accordance with manufacturer's printed instructions.

3.6 CLEANING

.1 Cleaning: Remove temporary coverings and protection of adjacent Work areas. Repair or replace damaged installed Products. Clean installed Products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from Project site and legally dispose of debris.

.1 Remove visible adhesive and other surface blemishes using cleaning methods recommended by floor manufacturer.

.2 Sweep and vacuum floor after installation.

.3 Do not wash floor until after time period recommended by flooring manufacturer.

.4 Damp mop flooring to remove black marks and soil.

3.7 PROTECTION

.1 Protection: Protect installed Product and finish surfaces from damage during construction. Remove and legally dispose of protective covering at time of Substantial Completion.

3.8 INITIAL MAINTENANCE PROCEDURES

.1 General: Include in Contract Sum Amount cost for initial maintenance procedures, and execute procedures after flooring installation as recommended by flooring manufacturer.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

.1 Seamless, resinous, waterproof, decorative, epoxy floor system with integral cove base, complete with brightly coloured quartz broadcast aggregate where scheduled.

1.02 REFERENCE DOCUMENTS

.1 ASTM E-1907-97 Standard Practices for Determining Moisture-Related Acceptability of Concrete Floors to Receive Moisture-Sensitive Finishes

.2 ASTM D 4263-83 Indicating Moisture in Concrete by Plastic Sheet Method

.3 ASTM F 1869-98 Measuring Moisture Vapour Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

.4 ASTM D 4414-84 Measurement of Wet Film Thickness by Notch Gages

.5 CSA A23.2-00 A23.2-6B Method of Test to Determine Adhesion by Tensile Load

.6 I.C.R.I Guideline Number 03732 Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings and Polymer Overlays

1.03 SUBMITTALS

.1 Product Data: Submit manufacturer's technical data, installation instructions, and general recommendations for each resinous flooring material required. Include certification indicating compliance of materials with project requirements.

.2 Samples: Submit, for verification purposes, 4-inch square samples of each type of resinous flooring material required, applied to a rigid backing, in color and finish indicated.

1. For initial selection of colors and finishes, submit manufacturer's color charts showing full range of colors and finishes available.

1.04 QUALITY ASSURANCE

.1 Single Source Responsibility: Obtain primary resinous flooring materials including primers, resins, hardening agents, aggregates, finish or sealing coats from a single manufacturer with not less than ten years of successful experience in manufacturing and installing principal materials described in this section. Contractor shall have completed at least five projects of similar size and complexity.

.2 Pre-Installation Conference

1. General contractor shall arrange a for flooring manufacturer/installer representative to attend a regularly scheduled site meeting not less than thirty days prior to starting work to review site conditions and project installation with Owner and Consultant.

.3 ISO 9001: All materials, including primers, resins, curing agents, finish coats, aggregates and sealants are manufactured and tested under an ISO 9001 registered quality system.

1.05 DELIVERY, STORAGE AND HANDLING

.1 Material shall be delivered to job site and checked by flooring contractor for completeness and shipping damage prior to job start.

.2 All materials used shall be factory blended and packaged in single, easy to manage batches to eliminate on site blending errors. Only the on-site weighing of catalyst will be allowed.

.3 Material shall be stored in a dry, enclosed area protected from exposure to moisture.

Temperature of storage area shall be maintained between 60 and 85°F/16 and 30°C.

1.06 PROJECT CONDITIONS

.1 Concrete or masonry substrates shall be properly cured for a minimum of 30 days and shall be tested to ensure relative humidity or water vapour emission rates are in accordance with Manufacturer's recommendations. A vapor barrier or exterior applied waterproofing membrane must be present for concrete slabs below grade.

.2 Utilities, including electric, water, heat (air temperature between 32 and 85°F/0 and 30°C) and finished lighting to be supplied by General Contractor.

.3 Job area to be free of other trades during, and for a period of 4 hours, after flooring system installation.

.4 Protection of finished flooring system from damage by subsequent trades shall be the responsibility of the General Contractor.

1.07 WARRANTY

.1 Manufacturer shall furnish a single, written warranty covering both material and workmanship for a period of two (2) full years from date of installation.

PART 2 -PRODUCTS

2.01 RESINOUS FLOORING SYSTEM (Scheduled as EPO)

.1 5 mm thick, 100% solids, decorative, quartz aggregate broadcast flooring system with integral cove base comprised of an epoxy primer, mortar base, undercoat, broadcast media and epoxy sealer. For use at washroom areas, where scheduled (noted as EPO in Room Finish Schedule).

.2 Physical Properties: Provide flooring system in which minimum physical properties of the complete system, including primers, fillers, aggregates, and sealers, and when tested in accordance with standards or procedures referenced below, are as follows:

Compressive Strength (ASTM C-579)	10,000 psi
Tensile Strength (ASTM D-638)	2,000 psi
Flexural Strength (ASTM C-580)	4,000 psi
Hardness (ASTM D-2240, Shore D)	85-90
Impact Resistance (ASTM D-2794)	>160 in·lbs
Abrasion Resistance (ASTM D-4060, CS-17, 1 kg Load, 1,000 cycles)	0.06 gm max. weight loss
Bond Strength (ASTM D-7234) (100% concrete failure)	>400 psi
Heat Resistance Limitation	140oF/60oC (for continuous exposure) 200oF/93oC (for intermittent spills)
Slip Resistance Index	0.90

(ASTM F-1679, when tested wet)	
Water Absorption (ASTM C-413)	0.1%

.3 Acceptable Manufacturers/Products:

.1 Stonshield HRI as distributed by Stonhard (including Stonhard Standard Primer, Stonshield HRI Base, Stonshield Undercoat, Stonshield Quartz Aggregate and Stonshield Sealer)

.2 Equivalant products per Specification 01 25 00.

.4 Colour/Pattern:

.1 To be selected by Consultant from full manufacturer colour range.

2.02 GROUT (SLOPE TO DRAIN)

.1 A fast setting epoxy-based grout used to build up floor levels and slopes to drain as indicated on drawings/details.

.2 Acceptable product: Stonset TG5 as manufactured by Stonhard, or equivalent products per Specification 01 25 00.

2.03 WATERPROOF MEMBRANE

.1 Acceptable product: Stonproof ME7 or equivalent products per Specification 01 25 00.

2.04 ACCESSORIES

.1 Joint Sealant: Type produced by manufacturer of resinous flooring system for type of service and joint condition indicated. Allowances should be included for Stonflex MP7 joint fill material, and CT5 concrete crack treatment.

.2 Primer: As recommended by manufacturer.

.3 Patching compound: As recommended by manufacturer.

PART 3 - EXECUTION

3.01 PREPARATION

.1 Concrete Substrate: Concrete preparation shall be by mechanical means and may include use of diamond grinder, sander, shotblast method and / or other mechanical means for removal of bond inhibiting materials such as curing compounds, dust, form release agents or laitance. Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.

.2 Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.

.3 Verify that concrete substrates are dry.

.1 Perform in situ probe test, ASTM F 2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 75 percent.

.2 Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of 5 lb of water/1000 sq. ft. of slab in 24 hours.

.3 Perform additional moisture tests recommended by manufacturer. Proceed with application only after substrates pass testing.

.4 Verify that concrete substrates have neutral Ph and that resinous flooring will adhere to them. Perform tests recommended by manufacturer. Proceed with application only after substrates pass

testing.

3.02 APPLICATION

.1 General: Apply each component of resinous flooring system in compliance with manufacturer's directions to produce a uniform monolithic surface of thickness indicated, uninterrupted except at expansion joints or other types of joints (if any), indicated or required.

.2 Primer: Mix and apply primer over properly prepared substrate throughout all areas required by resinous flooring system in strict adherence to manufacturer's installation procedures and coverage rates.

.3 Mortar (Sloped to drain): Spread and compact mortar system with 3” x 12” steel finishing trowel producing slope as indicated on drawings. Achieving positive slope to drain is absolutely critical and must be demonstrated/verified prior to completing flooring installation.

.4 Waterproof Membrane: apply waterproof membrane with a notched squeegee to a uniform dry film thickness of 500-625 microns (20-25 mil), and/or as per manufacturers written instructions.

.5 Cove Base: Mix material according to manufacturer's recommended procedures. Apply cove base material immediately after mixing using preformed cove trowels to a height of 150mm (6”) or as indicated on the room finish schedule/details, before applying flooring. Cove base shall be finished smooth and free of all possible waves, undulations, and other surface defects. Minor imperfections shall be mechanically removed prior to application of topcoat.

.6 Undercoat: Mix material according to manufacturer's recommended procedures. Apply undercoat material immediately after mixing using squeegees or premium nap rollers. Coloured, quartz aggregate shall be broadcast into the wet undercoat until refusal. Excess aggregate shall be removed following appropriate cure time. Strict adherence to manufacturer's coverage rates shall be maintained.

.7 Topcoat: Apply topcoat(s) and sealer in number of coats indicated for flooring system and at spreading rates recommended in writing by manufacturer. Strict adherence to manufacturer's coverage rates shall be maintained.

3.03 TERMINATIONS

.1 Chase edges to “lock” the flooring system into the concrete substrate along lines of termination.

.2 Penetration Treatment: Lap and seal resinous system onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.

.3 Trenches: Continue flooring system into trenches to maintain monolithic protection. Treat cold joints to assure bridging of potential cracks.

.4 Treat floor drains by chasing the flooring system to lock in place at point of termination.

3.04 JOINTS AND CRACKS

.1 Treat control joints to bridge potential cracks and to maintain monolithic protection.

.2 Treat cold joints and construction joints to bridge potential cracks and to maintain monolithic protection on horizontal and vertical surfaces as well as horizontal and vertical interfaces.

.3 Discontinue floor coating system at vertical and horizontal contraction and expansion joints by installing backer rod and compatible sealant after coating installation is completed. Provide sealant type recommended by manufacturer for traffic conditions and chemical exposures to be encountered.

3.05 FIELD QUALITY CONTROL

.1 The right is reserved to invoke the following material testing procedure(s) at any time, and any

number of times during period of flooring application.

.2 The Owner may engage service of an independent testing laboratory to sample materials being used on the job site. Samples of material will be taken, identified and sealed, and certified in presence of Contractor.

.3 Testing laboratory will perform tests for any of characteristics specified, using applicable testing procedures referenced herein, or if none referenced, in manufacturer's product data.

.4 The General Contractor shall engage service of an independent coating inspector to perform core tests to verify installation thickness meets the requirements of the specification. Installer shall repair to the Architect’s satisfaction any damage in the flooring system.

.5 If test results show materials being used do not comply with specified requirements, flooring contractor may be directed by Owner to stop work; remove non-complying materials; pay for testing; reapply flooring materials to properly prepared surfaces which had previously been coated with unacceptable materials.

3.06 CURING, PROTECTION AND CLEANING

.1 Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process. Close area of application for a minimum of 18 hours after application.

.2 Protect flooring system from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application. General Contractor shall be responsible for protection and cleaning of surfaces after final coats.

.3 Cleaning: Remove temporary covering and clean resinous flooring system prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring system manufacturer. General Contractor shall be responsible for cleaning of the surfaces prior to inspection.

END OF SECTION

1 General

1.1 SUMMARY

.1 Section includes surface preparation and the application of paint systems on the following interior and exterior substrates:

.1 Concrete;

.2 Concrete masonry units (CMU)

.3 Steel and iron;

.4 Galvanized metal;

.5 Hollow metal doors and frames;

.6 Gypsum board;

.7 Cotton or canvas insulation covering.

1.2 REFERENCE STANDARDS

.1 Environmental Choice Paints and Surface Coatings, Low VOC Product Listings Program (ECP):

.1 Paints and Surface Coatings, Low VOC Product Listings

.2 The Master Painters Institute (MPI):

.1 New Surfaces: Architectural Painting Specification Manual.

.3 The Society for Protective Coatings (SSPC):

.1 Coating Materials Guidelines

.2 Surface Preparation Guidelines

.3 Application, Inspection and Quality Control Guidelines

1.3 DEFINITIONS

.1 Gloss Levels: Standard coating terms defined by MPI Manual apply to products of this Section as follows:

.1 MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.

.2 MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

.3 MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

.4 MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.

.5 MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.

.6 MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.

.7 MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

.2 Gloss Values: Generally, provide paints and coatings having the following sheens when installed on the following substrates:

.1 Walls: Eggshell (G3) or Satin (G4) as selected by Consultant at a later date.

.2 Trim and Doors: Semi-gloss (G5).

.3 Ceilings: Flat (G1).

1.4 SUBMITTALS

.1 Provide required information in accordance with Division 01.

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

.1 Product Data: Submit list of all painting materials used for the Work to the Consultant for review prior to ordering materials for each paint system indicated, including block fillers and primers.

.1 Material List: An inclusive list of required coating materials indicating each material and cross reference specific coating, finish system, and application; identify each material by manufacturer's catalogue number and general classification.

.2 Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

.2 Samples: Provide stepped samples, defining each separate coat, including block fillers and primers using representative colours required for the project; label each sample for location and application, and as follows:

.1 Drawdown Samples: Provide three (3) drawdown sample charts (cards) for each type, texture and colour of finish specified for verification purposes before ordering paint materials.

.3 Informational Submittals: Provide the following submittals when requested by the Consultant:

.1 Certification: Submit certification reports for paint products indicating that they meet or exceed low VOC and coloured base requirements listed in this Section.

1.5 PROJECT CLOSEOUT SUBMISSIONS

.1 Operation and Maintenance Data: Submit copies of paint manufacturer’s written maintenance information for inclusion in the operations manual in accordance with Division 01, including specific warning of any maintenance practice or materials that may damage or disfigure the finished Work.

.2 Maintenance Materials: Deliver maintenance materials to Owner in quantities indicated and in accordance with Division 01, that match products installed; packaged with protective covering for storage, and identified with labels describing contents and building location and as follows:

.1 Paints and Coatings: Minimum of 4-4L containers of field colours and 4-1 L containers of each accent colour, and all remnants.

1.6 QUALITY ASSURANCE

.1 Conform to the standards contained in the MPI Manual.

.2 Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in service performance, and as follows:

.1 Have a minimum of five (5) years proven satisfactory experience and shall show proof before commencement of work that he will maintain a qualified crew of painters throughout the duration of the work.

.2 When requested provide a list of the last three comparable jobs including, name and location, specifying authority, start and completion dates and cost amount of the painting work.

.3 Apprentices may be employed provided they work under the direct supervision of a qualified journeyman in accordance with trade regulations.

.3 Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats and as follows:

.1 Use only paint manufacturers and products as listed under the Approved Products section of the MPI Manual Architectural Painting Specification Manual.

1.7 MOCKUPS

.1 Mockups: Apply mockups of each paint system indicated and each colour and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

.1 Consultant will select one surface to represent surfaces and conditions for application of each paint system.

.1 Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).

.2 Other Items: Consultant will designate items or areas required.

.2 Final approval of colour selections will be based on mockups.

.1 If preliminary colour selections are not approved, apply additional mockups of additional colours selected by Consultant at no added cost to Owner.

.3 Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Consultant specifically approves such deviations in writing.

.4 Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 7 deg C (45 deg F).

.1 Maintain containers in clean condition, free of foreign materials and residue.

.2 Remove rags and waste from storage areas daily.

1.9 FIELD CONDITIONS

.1 Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 10 and 35 deg C (50 and 95 deg F).

.2 Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 3 deg C (5 deg F) above the dew point; or to damp or wet surfaces.

1.10 WARRANTY

.1 Provide upon completion of the work, a Warranty Certificate, in the name of the Owner, stating that the work of this section was performed in accordance with these specifications and the MPI manual (latest edition), and is warranted against defects in material or installation, for a period of two (2) years from Date of Substantial Performance.

2 Products

2.1 MANUFACTURERS

.1 Subject to compliance with requirements, manufacturers that have attained the prerequisites for ecologically sustainable labelling mark on their products and may be incorporated into the Work include; but are not limited to, the following:

.1 Dulux Paints

.2 Sherwin-Williams LLC

.3 Benjamin Moore and Co. Limited

.4 ICI Paints (Canada) Inc.

2.2 PAINT, GENERAL

.1 MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists".

.2 Material Compatibility:

.1 Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

.2 For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

.3 VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

.1 Flat Paints and Coatings: 50 g/L.

.2 Nonflat Paints and Coatings: 50 g/L.

.3 Dry-Fog Coatings: 150 g/L.

.4 Primers, Sealers, and Undercoaters: 100 g/L.

.5 Rust-Preventive Coatings: 100 g/L.

.6 Zinc-Rich Industrial Maintenance Primers: 100 g/L.

.7 Pretreatment Wash Primers: 420 g/L.

.8 Shellacs, Clear: 730 g/L.

.9 Shellacs, Pigmented: 550 g/L.

.4 Paint Colour and Manufacturer (PT): As selected by the Consultant from the manufacturer's standard product line. Carry five (5) colours and three (3) accent colours in Bid Price.

2.3 PREPARATORY COATS

.1 CMU Block Filler:

.1 Benjamin Moore; Coronado Super Kote 5000 Latex Block Filler (958-11).

.2 PPG; Speedhide Interior/Exterior Masonry Latex Block Filler (6-7).

.3 SW; PrepRite Block Filler Interior/Exterior Latex (B25W25).

3 Execution

3.1 EXAMINATION

.1 Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

.2 Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

.1 Concrete: 12 percent.

.2 Fiber-Cement Board: 12 percent.

.3 Masonry (Clay and Concrete Masonry Units): 12 percent.

.4 Wood: 15 percent.

.5 Portland Cement Plaster: 12 percent.

.6 Gypsum Board: 12 percent.

.3 Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

.4 Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

.5 Proceed with coating application only after unsatisfactory conditions have been corrected.

.1 Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

.1 Comply with manufacturer's written instructions and recommendations in "MPI Painting Specification Manual" applicable to substrates and paint systems indicated.

.2 Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

.1 After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

.3 Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

.1 Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

.4 Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

.1 Use abrasive blast-cleaning methods if recommended by paint manufacturer.

.5 CMU / Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

.6 Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:

.1 SSPC-SP 3.

.7 Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

.8 Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

.9 Gypsum Wallboard: Repair all surfaces in gypsum wallboard with wallboard joint finishing compound or spackling compound, filled out flush and sanded smooth. Clean all surfaces and taped joints of dust, dirt and other contaminants and be sure they are thoroughly dry before applying paint.

.10 Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

.11 Mix and prepare paint materials according to manufacturer's written instructions.

.1 Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

.2 Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

.3 Use only thinners approved by paint manufacturer and only within recommended limits.

3.3 APPLICATION

.1 Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

.1 Use applicators and techniques suited for paint and substrate indicated.

.2 Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.

.3 Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

.4 Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

.5 Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

.2 Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match colour of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

.3 Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

.1 The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.

.1 Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

.2 Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

.3 If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

.2 Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

.4 Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

.1 Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.

.2 Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.

.3 Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

.5 Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and colour breaks.

.6 Apply block fillers to CMU at a rate to ensure complete coverage with pores filled.

.7 Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

.1 Paint the following work where exposed in equipment rooms and where exposed in occupied spaces:

.1 Equipment, including panelboards.

.2 Uninsulated metal piping.

.3 Uninsulated plastic piping.

.4 Pipe hangers and supports.

.5 Metal conduit.

.6 Plastic conduit.

.7 Tanks that do not have factory-applied final finishes.

.8 Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

.8 Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

.1 Colour: Flat (gloss level 1), nonspecular, black.

3.4 FIELD QUALITY CONTROL

.1 Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

.1 Contractor shall touch up and restore painted surfaces damaged by testing.

.2 If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

.1 At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

.2 After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

.3 Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Consultant, and leave in an undamaged condition.

.4 At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

.1 Galvanized Metal (doors, frames, railings, misc. steel, pipes, overhead decking, ducts, gutters, flashing, etcetera):

.1 Latex System - MPI EXT 5.3A.

.1 Semi-gloss (MPI Gloss Level 5).

.2 Wash Primer/2-Component Aliphatic Polyurethane Finish (High Contact Areas) - MPI EXT 5.3D:

.1 Semi-gloss (MPI Gloss Level 5).

3.7 INTERIOR PAINTING SCHEDULE

.1 Concrete Substrates:

.1 Latex System - MPI INT 3.1A:

.1 Primer: Alkali resistant, water based.

.2 Intermediate Coat: Latex, interior, matching topcoat.

.3 Topcoat: Latex, interior (gloss as selected by the Consultant).

.2 CMU Substrates:

.1 Latex System - MPI INT 4.2A:

.1 Primer: CMU block filler.

.2 Intermediate Coat: Latex, interior, matching topcoat.

.3 Topcoat: Latex, interior (gloss as selected by the Consultant).

.3 Structural Steel Substrates:

.1 Water-Based Dry Fall Finish - MPI INT 5.1C

.2 High-Performance Architectural Latex System - MPI INT 5.1R:

.1 Primer: Acrylic.

.2 Intermediate Coat: Latex, interior, high performance architectural; matching topcoat.

.3 Topcoat: Latex, interior, high performance architectural (gloss as selected by the Consultant).

.3 Coordinate with existing structural steel elements scheduled to receive applied fireproofing and/or intumescent fireproofing.

.4 Steel (Factory-Primed) Substrates:

.1 High-Performance Architectural Latex System:

.1 Primer: Acrylic (applied over factory primer).

.2 Intermediate Coat: Latex, interior, high performance architectural; matching topcoat.

.3 Topcoat: Latex, interior, high performance architectural (gloss as selected by the Consultant).

.5 Galvanized-Metal Substrates:

.1 High-Performance Architectural Latex System - MPI INT 5.3M:

.1 Prime Coat: Primer, galvanized, water based.

.2 Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.

.3 Topcoat: Latex, interior, high performance architectural, semi-gloss (MPI Gloss Level 5).

.6 Hollow Metal Doors and Frames.

.1 High-Performance Architectural Latex System - MPI INT 5.3M:

.1 Prime Coat: Primer, galvanized, water based.

.2 Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.

.3 Topcoat: Latex, interior, high performance architectural, semi-gloss (MPI Gloss Level 5).

.7 Wood Substrates:

.8 Gypsum Board Substrates:

.1 Latex System - MPI INT 9.2A:

.1 Primer: Sealer, latex, interior.

.2 Intermediate Coat: Latex, interior, matching topcoat.

.3 Topcoat: Latex, interior (gloss as selected by the Consultant).

.9 Cotton or Canvas Insulation-Covering Substrates: Including pipe and duct coverings.

.1 Latex System - MPI INT 10.1A:

.1 Prime Coat: Primer sealer, latex, interior.

.2 Topcoat: Latex, interior, flat (MPI Gloss Level 1).

END OF SECTION

1.0 GENERAL

1.1 SECTION INCLUDES

.1 Natural linoleum pinboard/bulletin board in aluminum frame.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 – Submittals.

.2 Indicate type dimensions, frame materials, bulletin boar materials, colour and mounting system.

1.3 SAMPLES

.1 Submit samples in accordance with Section 01 33 00 – Submittals.

.2 Submit duplicate 50 x 50 mm samples of colour and finish.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

.2 Handle materials to avoid damage.

2.0 PRODUCTS

2.1 MATERIALS

.1 Natural Cork Bulletin boards (BB) to be ¼" (6mm) thick finest quality Krommenie Linoleum cork with burlap backing. Colour to be selected by consultant from full manufacturer range, allow for 2 colours.

.1 Basis of design product: Bulletin Board by Forbo or equivalent.

.2 Accessories

.1 Aluminum reveal edge trim

.2 Mounting adhesive to manufacturers recommendation

2.2 SCHEDULE

.1 Bulletin Board sizes:

.1 BB-01 - 1219mm W x 2438mm L

.2 BB-02 - 914mm W xx 12194mm L

.3 BB-03 - 610mm W x 1829mm L

.4 BB-04 - 610mm W x 4877mm L

.5 BB-05 - 610mm W x 2845mm L

.6 BB-06 - 1219mm W x 1219mm L

.2 Bulletin Board Locations/Quantities

.1 Supervisor's Office 104 – 1no BB-02

.2 Corridor 101 – 1no BB-0

.3 Servery 102 – 1no BB-03

.4 Toddler Playroom 104 – 1no BB-05

.5 Infant Sleep Room 104b – 1no BB-06

.6 Staff Room 105 – 1no BB-02

.7 Preschool Corridor 108 – 1no BB-03 and 1no BB-04

3.0 EXECUTION

3.1 EXAMINATION

.1 Verify that substrates are properly prepared to receive visual display boards.

.2 Do not begin installation until substrates have been properly prepared.

.3 If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

.1 Clean surfaces thoroughly prior to installation.

.2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

.1 Install in accordance with manufacturer's instructions.

.2 Install bulletin boards level and plumb, keeping perimeter trim aligned in accordance with manufacturer's recommendations.

3.4 ADJUSTING AND CLEANING

.1 Verify that all accessories are installed as required for each unit.

.2 Upon completion of installation, clean surfaces and trim in accordance with manufacturer's recommendations, leaving all materials ready for use.

END OF SECTION

1. GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 The work described in this Section shall include furnishing all equipment, labour, materials and services to supply and install site line painting work as shown on the drawings, and as specified herein.

1.1.2 The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.

1.1.3 Provide pavement line painting including, but are not limited to:

1.1.3.1 Painted line games on asphalt surfaces

1.1.3.2 Painted accessibility symbols and parking space lines

1.2 REFERENCES

1.1.4 Conform to OPSS 1712.

1.3 DELIVERY, STORAGE AND HANDLING

1.3.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

1.3.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

1.3.3 Storage and Handling Requirements:

1.3.3.1 Store materials in dry location, off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

1.3.3.2 Replace defective or damaged materials with new.

1.4 QUALITY ASSURANCE:

1.4.1 All equipment shall be of a type and design that will readily obtain the required uniformity of application of the pavement markings both as to thickness of coating and alignment.

1.5 ACCEPTANCE:

1.5.1 Contractor shall layout and chalk-mark all lines as shown on drawings prior to painting for approval by Consultant. Width of all lines shall be 100mm.

2. PRODUCTS

2.1 MATERIALS:

2.1.1 Paint to be "Ontario Coning Traffic Paint" as distributed by IBIS Products Limited, (Scarborough), Ontario, 416-757-3241, or approved equivalent. Custom colours as shown on the drawings.

3. EXECUTION

3.1 INSPECTION:

3.1.1 Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.2 APPLICATION:

3.2.1 Time of Application: Painting shall be done only during daylight hours and, as far as practical, shall be terminated in time to allow sufficient drying by sunset.

3.2.2 Weather Limitations: No paint shall be applied when any moisture is present on the surface to be painted, when relative humidity is above 85% and the air temperature is below 5 degrees C. Painting shall not be done when winds are sufficient to cause spray dust.

3.2.3 Preparation of Surface to be Painted: The surface to be painted shall be cleaned by compressed air or other effective means immediately before the start of painting. Surface shall be clean and dry when the paint is applied. Any vegetation or loose soil shall be removed from the pavement before striping is begun.

3.2.4 Mixing Paint: The paint shall be thoroughly mixed before it is poured into the painting machine and no thinning of the paint in the machine will be allowed. Before the start of each day's work the paint container, the connections and the spray nozzles on the machine shall be thoroughly cleaned with a suitable cleaner.

3.2.5 Paint Application: Infill colours should be applied first such that the white lines overlap the infill colours to ensure crisp true linework. The line painting shall be of the specified dimensions with clean, true edges and without sharp breaks in the alignment. A uniform coating of paint shall be obtained, and the finished markings shall contain no light spots or paint skips. Any stripes not having a uniform, satisfactory appearance, both day and night, shall be corrected.

3.3 DIMENSION AND ALIGNMENT TOLERANCE:

3.3.1 Dimensions: No marking shall be less than the specified width. No markings shall exceed the specified width by more than 25mm.

3.3.2 Alignment of Strips: Where a stripe deviates from the correct alignment, as indicated by the string line, by more than 250mm in any 6m length, it shall be obliterated, and the stripe corrected as specified in paragraph "Corrective Measures".

3.3.3 Correction Rates: Any corrections of variation in the width of in the alignment of stripes shall not be made abruptly but the stripes shall be returned to the design width at the rate of at least 3m for each 100mm of correction.

3.4 CORRECTIVE MEASURES:

3.4.1 Painted markings failing to meet the specifications, including the permissible tolerances and the appearance requirements, or are marred, damaged by traffic, or from other causes, shall be corrected at the Contractor's expense. Drip and spattered paint shall be removed. Whenever it is necessary to remove paint it shall be done by means that will not damage the underlying surface of the pavement. When necessary to correct a deviation that exceeds the permissible tolerance in alignment, that portion of the stripe affected shall be removed and repainted according to these specifications.

3.4.2 Corrective Devices: Misalignment, defective surfaces, etc., shall be corrected by chemical agents, or by any other type of mechanical device that will effectively remove the paint without damage to the pavement surface, or prevent the reapplication of markings.

3.5 CLEANING

3.5.1 Progress Cleaning: clean in accordance with Section 01 00 05- General Requirements.

3.5.2 Leave Work area clean at end of each day.

3.5.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 00 05- General Requirements.

3.6 PROTECTION:

3.6.1 Protect installed products and components from damage during construction.

3.6.2 Repair damage to adjacent materials caused by traffic signage installation and salvage operations.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

.1 Section Includes

Furnish, deliver and install all Toilet Partitions as indicated on the drawings and as required by actual conditions at the building. The Toilet Partitions shall include the furnishing of all necessary screws, special screws, bolts, special bolts, expansion shields and all other devices necessary for the proper installation and application of the Toilet Partitions.

1.02 REFERENCES

.1 Standard

All Toilet Partitions must be scheduled, supplied and installed in accordance with: Local Building Code, CGSB (Canadian Government Specifications Board), CSA (Canadian Standards Association), ANSI (American National Standards Institute), ADA (Americans with Disabilities Act). In all cases the above references shall be taken to mean the latest edition of that particular standard including all revisions.

1.03 SUBMITTALS

.1 Make all submittals in accordance with Division 01.

.2 Submit detailed shop drawings. Drawings must clearly indicate all methods of attachment at floor/ceiling/walls.

.3 Submit product sheets and/or catalogue cuts, of all products listed in the shop drawings.

.4 Samples

1. Upon request, a returnable sample of the Toilet Partitions shall be submitted to the Consultant/Owner for approval not later than (10) days after requested. All samples must be properly identified including: name of supplier, and name of manufacturer.

.5 Operations and Maintenance Data

1. Provide closeout documents in accordance with Division 1.
2. Include at a minimum documentation relating to proper care of toilet partitions, such as required lubrications, adjustments, cleaning, etc

1.04 QUALITY ASSURANCE

.1 Supplier Qualifications

1. Toilet Partition shop drawings and Toilet Partitions shall be procured from a source of supply approved by the Consultant/Owner/Architect. Supplier is responsible for the complete Toilet Partition subcontract.

1.05 DELIVERY, STORAGE AND HANDLING

.1 Marking and Packaging

1. Toilet Partitions must be delivered to the job site in the manufacturers' original packages and marked to correspond with the approved shop drawings.

.2 Delivery

1. Toilet Partitions must be delivered in an amount of time deemed appropriate by the Consultant/Owner.

1.06 WARRANTY

.1 Written Guarantee

1. The Toilet Partition manufacturer shall guarantee all Toilet Partitions by written certification, for a period of (5) years from date of certified substantial performance of the project, against any defects in design, materials and workmanship. Any defects as described will be made good by the manufacturer at no additional cost to the owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

.1 Approved Manufacturers

1. Hadrian Manufacturing Inc.
2. ASI Global Partitions
3. Bradley Corporation

2.02 MATERIALS

.1 Panels: Shall be constructed of 19mm (3/4") thick solid phenolic core decorative plastic laminate with multiple resin-impregnated kraft and surface sheets fused at high temperature and pressure, edges being finished and polished. Colour to be selected by Consultant from manufacturers standard colour range.

.1 Sizes: 600mm W x Custom Height as detailed

.2 Hardware:

.1 Panel bracket: Continuous heavy duty anodized extruded aluminum (6063-T5 alloy) pre-drilled wall brackets, complete with stainless steel screw-type fasteners.

.5 SS U-bracket pilaster support as detailed.

Stainless Steel Hardware: All door wrap around hinge brackets are cast stainless steel, #4 brushed finish; all 12 x 1-3/4” and 12 x 5/8” TR-27 6-lobe security screws are stainless steel, #4 brushed finish; All inner, barrier free inner, outer, door pulls, stop and keepers, coat hooks and door castings are standard zinc die castings, #4 brushed finish.

PART 3 - EXECUTION

3.01 EXAMINATION

.1 Site Preparation

1. The contractor must examine all site conditions that would prevent the proper application and installation of Toilet Partitions. Any defect must be immediately identified and corrected, prior to the installation of the Toilet Partitions.

3.02 INSTALLATION

.1 Mounting Locations

1. All Toilet Partitions must be mounted according Manufacturers standard locations and those specified on the drawings.

3.03 FIELD QUALITY CONTROL

.1 Inspection

1. After installation has been completed, provide for a site inspection of all Toilet Partitions to determine that all items have been supplied and installed as per the enclosed details. Also, check the operation and adjustment of all Toilet Partitions. Any discrepancies, or malfunctioning product, must be reported to the Architect immediately.

3.04 ADJUSTMENT AND CLEANING

.1 Final Preparation

1. At final completion, Toilet Partitions shall be left clean and free from disfigurement. Make all final adjustments. Where Toilet Partitions are found defective, repair or replace or otherwise correct as directed.

3.05 PROTECTION

.1 Site Protection

1. The Contractor must provide for the proper protection of all Toilet Partitions until the owner accepts the project as complete.

3.06 TOILET PARTITION SCHEDULE

.1 Schedule

1. Provide Toilet Partitions as specified in all above sections and as per the detailed Architectural Drawings.

END OF SECTION

1 General

1.1 SUMMARY

.1 Furnish labour, materials and other services to complete the fabrication and installation of the following:

.1 Washroom and Custodial Room accessories and attachment hardware.

.2 Include all materials and fitments required for the operation of any unit furnished, in the manner, direction and performance shown on the shop drawings and specified herein.

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM):

.1 ASTM A153/A153M-09, Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware

.2 ASTM A653/A653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.3 ASTM A666-10, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar

.4 ASTM A1008/A1008M-12a, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

1.3 SUBMITTALS

.1 Provide required information in accordance with Division 01.

.2 Shop Drawings:

.1 Show and describe in detail, materials, finishes, dimensions, details of connections and fastenings, elevations, plans, sections, metal gauges, hardware and any other pertinent information.

.3 Coordinate the work of this Section with the placement of internal wall reinforcement.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location.

.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.

.3 Store materials in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

.4 Unsatisfactory materials shall be removed from the site.

.5 Adequately protect the structure and work of other Sections during delivery, storage, handling and execution of the work of the Section.

.6 Provide tools, plant and other equipment required for the proper execution of the work of this Section.

2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design Products: Products named in this Section were used as the basis-of-design for the project; additional manufacturers offering similar products may be

incorporated into the work of this Section provided they meet the performance requirements established by the named products and provided they submit requests for substitution in accordance with Division 01.

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

.1 ASI Watrous - Global Partitions

.2 Bobrick

.3 Frost

.4 Or approved equivalent.

2.2 MATERIALS

.1 Provide one of the products indicated for each designation in the Washroom and Custodial Accessory Schedule below, subject to compliance with specified requirements.

.2 Stainless Steel: In accordance with ASTM A666, Type 304, with No. 4 finish (satin); minimum nominal thickness as established by product type.

.3 Sheet Steel: Steel: In accordance with ASTM A1008/A1008M, cold rolled, commercial quality; minimum nominal thickness as established by product type; surface preparation and metal pretreatment as required for applied finish.

.4 Galvanized Steel Sheet: In accordance with ASTM A653/A653M, minimum Z180 coating designation.

.5 Galvanized Steel Mounting Devices: In accordance with ASTM A153/A153M, hot dip galvanized after fabrication.

.6 Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.3 FABRICATION

.1 Washroom and Custodial Accessories:

.1 Surface Mounted:

.1 Fabricate units with tight seams and joints, and exposed edges rolled.

.2 Hang doors and access panels with continuous stainless steel hinge.

.3 Provide concealed anchorage where possible.

.2 Recessed Mounted:

.1 Fabricate units of all welded construction, without mitred corners.

.2 Hang doors and access panels with full length, stainless steel hinge.

.3 Provide anchorage that is fully concealed when unit is closed.

.2 Workmanship shall be best grade of modern shop practice known to recognized manufacturers specializing in this work. Joints and intersecting members shall be accurately fitted, made in true planes with adequate fastening. Wherever possible fastenings shall be concealed.

.3 Isolate where necessary to prevent electrolysis between dissimilar metal to metal or metal to masonry or concrete contact.

.4 Fabricate and erect work square, plumb, straight, true and accurately fitted. Provide adequate reinforcing and anchorage.

.5 Drilling shall be reamed and exposed edges left clean and smooth.

.6 Include anchors and fastenings necessary to anchor work of this Section.

.7 Coordinate with Section 06 10 00 for wood blocking for attachment of washroom accessories.

.1 Installed grab bars shall be capable of supporting a downward pull of 500 lbs. per lineal foot.

.2 Install blocking, plywood sheathing, and adjust stud spacing or gauge, in locations identified on the Drawings, scheduled to receive a future adult change table (NIC).

.1 Once installed, adult change tables shall be capable of supporting a weight of 400 pounds (1.78 kN).

.2 Provide Engineered Shop Drawings indicating blocking support, fire-retardant plywood sheathing and steel stud design, including large scale detail of members and materials, connection and interfacing with work of other Sections, jointing details, and anchorage devices. Provide dimension, gauges, thicknesses, description of materials, metal finishing, as well as other pertinent data and information.

.3 Shop Drawings are required to identify the load rating of the wall assembly scheduled to accept the adult change table, and shall be stamped by an Engineer located in the Province of the Work.

.8 Keys: Provide universal keys for internal access to accessories for servicing and re-supplying. Provide minimum of six (6) keys to Owner's representative.

3 Execution

3.1 EXAMINATION

.1 Inspect surfaces over which the work of this Section is dependent for any irregularities detrimental to the application and performance of the work.

.2 Notify Consultant in writing of all conditions which are at variance with those in the Contract Documents and/or detrimental to the proper and timely installation of the work of this Section. The decision regarding corrective measures shall be obtained from the Consultant prior to proceeding with the affected work.

.3 Commencement of work of this Section implies acceptance of surfaces and conditions.

3.2 INSTALLATION

.1 Make thorough examination of drawings and details, determine the intent, extent, materials, conditions of interfacing with other work and be fully cognizant of requirements.

.2 Work of this Section shall include complete installation of items specified herein. Installation shall be in strict accordance with manufacturer's printed instructions.

.3 Securely fasten accessories, level and plumb in the locations shown on the drawings and specified herein. All fastenings shall be concealed.

.4 Co-ordinate the work of this Section with the work of other Sections to provide the necessary recesses, edge conditions wood blocking for the accessories as required.

.5 Do all drilling of steel, masonry and concrete necessary for the anchorage of the work.

3.3 ADJUSTING

.1 Check mechanisms, hinges, locks and latches, adjust and lubricate to ensure that accessories are in perfect working order.

3.4 CLEANING

.1 Upon completion of the work of this Section or when directed by Consultant, remove all protective coatings, and coverings. Clean and polish exposed surfaces.

3.5 WASHROOM AND CUSTODIAL ACCESSORY SCHEDULE

No.	Description / Model
W1a	Grab Bar: Side "L"-shape grab bar, 760mm (30") long x 760mm (30") high x 32mm (1-1/4") dia., stainless steel, slip resistant grip, concealed mounting, cap secured with vandal resistant set screws, provide 1 per Universal Washroom: ASI Type 04 Or Approved Equivalent
W1b	Grab Bar: 1.214mm (0.048") thickness; 765mm (30") long x 32mm (1-1/4") Ø, straight, stainless steel, slip resistant grip, concealed mounting, cap secured with vandal resistant set screws, provide 1 per Universal Washroom: ASI 3801-30P Bobrick B-6806.99x30 Or Approved Equivalent
W2a	Mirror (Tilted): Stainless steel frame, 36” high x 24 wide, fixed installation, mounting height as per drawings, provide 1 per Universal Washroom Bobrick B-293 2436 Or Approved Equivalent
W2b	Mirror (Flat): Stainless steel frame, 18” high x 14” wide, fixed installation, mounting height as per drawings provide 1 for each child-height sink per washroom: Bobrick B-290 Or Approved Equivalent
W3	Automatic hand dryer: provide 1 per Universal Washroom Dyson Airblade V, stainless steel Or Approved Equivalent
W4	Wall-Mounted Soap Dispenser: Heavy-duty all-purpose valve, wall-mounted stainless steel soap dispenser, 850 ml capacity with visible viewing window, quantity as shown on drawings: Bobrick B-2012 Or Approved Equivalent
W5	Paper Towel Dispenser, quantity as shown on drawings: Tork Disp H-Towel Interfold Mini White 552120 Or Approved Equivalent
W6a	Toilet Tissue Dispenser (child WCs): Double roll, surface mounted, complete with 5.9 x 3.1” shelf, concealed fastening, provide 1 per toilet in children’s washroom: Kruger NOIR Twin Bathroom Tissue Dispenser 09652 Or Approved Equivalent
W6b	Toilet Tissue Dispenser (Universal WC): Twin roll, surface mounted, type 304 satin finish stainless steel cabinet and mechanism, provide 1 for each Universal WC: ASI 20030 Or Approved Equivalent

W7	Shelf: stainless steel, provide 1 per Universal washroom: Frost 950-18 Or Approved Equivalent
W8	Coat Hook: Wardrobe hook, stainless steel, surface mounted, provide 1 per Universal washroom, located as directed by Consultant: Frost 1146 Or Approved Equivalent
W9	Pre-fabricated change table with stairs: walkup changing table, quantity as shown on drawings, provide left/right stairs model as per drawings, colour: maple: Tot mate SKU: TM8534A.0577 Or Approved Equivalent
W10	Fold-down baby change table: stainless steel veneer, surface mounted, quantity as shown on drawing: Bobrick KB300-SS Horizontal Or Approved Equivalent
W11	Custodial Shelf with Mop and Broom Holders and Hooks: 34”L x 13”H, three anti-slip mop holders, four hooks, satin-finish stainless steel, provide 1 for Service Room 122, located as directed by Consultant: Bobrick B-239 x 34 Or Approved Equivalent
W12	Sanitary Napkin Disposal: stainless steel finish, surface mounted, provide 1 per Universal WC Frost 620 Or Approved Equivalent

END OF SECTION

1.0 GENERAL

1.1 REFERENCES

.1 CAN/CGSB-44.40-[92], Steel Clothing Locker.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 – Submittals.

.2 Indicate type and class of locker, thicknesses of metal, fabricating and assembly methods, assembled banks of lockers, tops, rods, hooks, shelves, bases, trim, numbering, filler panels, end/back panels, doors, handles, locking method, ventilation method, finishes.

1.3 SAMPLES

.1 Submit samples in accordance with Section 01 33 00 – Submittals.

.2 Submit duplicate 50 x 50 mm samples of colour and finish on actual base metal.

2.0 PRODUCTS

2.1 MANUFACTURED UNITS

.1 Approved Manufacturers:

.1 Emperor Lockers by Hadrian Manufacturing

.2 ASI Storage Solutions

.3 Deluxe Series Lockers by Shannahan’s

.2 Size:

.1 Locker type 1 (double tier): 12” wide x 18” deep x 72” high.

.3 Assembly: knock down construction

.1 Sides and backs shall be no less than 22-gauge and should not contain extra unnecessary holes unless otherwise specifically used for the assembly of the lockers and accessories on the project.

.2 Edges shall be formed to provide a strong and rigid assembly when bolted or riveted together Locker backs are flanged at right angles providing a triple thickness of metal at the back corner connections.

.4 Doors: double pan design consisting of 20ga outer panel welded to 24ga inner panel with 1” cell honeycomb core, continuous 14ga piano hinge, door swing Right Hand Reverse. Provide magnet at latch to keep door in closed position.

.5 Accessories: 20ga hat shelf, 3 single prong coat hooks, 4” tall pedestal base, flat top, 11ga hasp for trouble free use with standard padlock

.6 Finish: high grade epoxy polyester powder finish, colour to be determined by consultant from manufacturer’s standard colour range.

2.2 SCHEDULE

.1 Provide lockers as scheduled in the following quantities:

.1 Basement Lobby B100: 9no locker type 1.

3.0 EXECUTION

3.1 INSTALLATION

.1 Assemble and install lockers in accordance with manufacturer's written instructions.

.2 Safely and securely anchor all lockers properly to walls and/or floors as required. Use fasteners appropriate to load and the substrate.

.3 Provide continuous sealant between wall and locker – see specification 07 90 00 for sealant.

.4 Install finished end panels to exposed ends of locker banks.

END OF SECTION

1.0 GENERAL

1.1 SECTION INCLUDES

.1 Manually operated, roll-up fabric interior window shades including mounting and operating hardware.

1.2 REFERENCES

.1 All window coverings offered must meet the HAZARDOUS PRODUCTS ACT, Regulation SOR/2009-112, Sep 8, 2009 - Corded Window Covering Products Regulations.

.2 All window coverings offered must meet the CSA Z600-08 - Safety of Corded Window Covering Products standard including but not limited to meeting the product safety requirements of section 4 and the labeling and information requirements of section 5.

1.3 SUBMITTALS

.1 Submit under provisions of Section 01 33 00 – Submittals.

.2 Product Data: Manufacturer's data sheets on each product specified, including:

.1 Preparation instructions and recommendations

.2 Installation and maintenance instructions.

.3 Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.

.4 Storage and handling requirements and recommendations.

.5 Mounting details and installation methods.

.3 Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings, field verified window dimensions, quantities, type of shade, controls, fabric, and color, and include opening sizes and key to typical mounting details.

.4 Verification Samples: For each finish product specified, two complete sets of shade components, unassembled, demonstrating compliance with specified requirements. Shade fabric sample and aluminum finish sample as selected, representing actual product, color, and patterns. Mark face of material to indicate interior faces.

.5 Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

.6 Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Do not deliver window shades until building is enclosed and construction within spaces where shades will be installed is substantially complete.

.2 Deliver products in manufacturer's unopened packaging until ready for installation.

.3 Label containers and shades according to Window Shade Schedule.

.4 Store products in manufacturer's unopened packaging until ready for installation.

1.5 SEQUENCING

.1 Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

.2 Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.6 PROJECT CONDITIONS

.1 Install roller shades after finish work and ambient temperature, humidity and ventilation conditions are maintained at levels recommended for project upon completion.

2.0 PRODUCTS

2.1 MANUFACTURERS

.1 SOLARFECTIVE/LEGRAND

.2 HUNTER DOUGLAS CANADA

.3 Equivalent products as per 01 25 13.

2.2 MANUALLY OPERATED WINDOW SHADES

.1 Roller Shade Components

.1 ROLLER TUBE: Circular-shaped aluminum tube extruded from alloy and temper 6063 T-6. 2" outside diameter extruded tube to have a .063" wall thickness (2.5" outside diameter to have a .079" wall thickness). Heavily reinforced with minimum six internal ribs providing additional tensile strength and allows for secure placement of clutch & end plug.

.2 HEAVY DUTY TUBE BEARING PLUG: Die cast metal and reinforced idler assembly containing spring loaded end plug with positive locking wheel allows for up to 7/8" adjustment and provides for a secure installation and removal of shade. Locking tube bearing plug contains minimum 6 ribs and inserted a minimum of 2-3/8" into roller tube.

.3 BOTTOM BAR: Extruded aluminum weight in a Sealed Pocket Hem Bar, or RB Bottom Bar for fabrics that are not seamable. Bottom bar is for tracking adjustments and provides uniform look.

.4 MOUNTING HARDWARE: Manufacturer's standard heavy duty dual-brackets system constructed of hardened 1/8" thick steel to support full weight of shade with bracket & screw hole covers to provide uniform look. Double roller bracket to be able to install two shades in the same bracket. Integrated leveling device for enhanced level adjustment of overall shade. Locking mechanism on bracket adapter provides for a secure installation and removal of the shade.

.5 DOUBLE ROLLER SHADE FASCIA: L shape removable aluminum extrusion valance that attaches to brackets and conceals roller shade. Finish: clear anodized. To be provided where exposed.

2.3 FABRICS

.1 Light Filtering Fabrics (allow for a maximum of two fabrics per roller shade)

.1 Shade cloth shall be woven of .018 opaque, vinyl coated polyester yarn consisting of approximately 79% vinyl and 21% 500 dernier polyester core yarn. The fabric shall be tensioned in the finishing range prior to heat setting to keep the warp ends straight and minimize or eliminate weave distortion to keep the fabric flat. The fabric shall be dimensionally stable. Colour to be as selected from standard range.

.2 Average 0-3% open.

.2 Performance – As a "shade cloth" the 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 +1/8" in either direction due to warp distortion, or weave design.

.3 Flame Retardance - Fabric shall be certified by an Independent Laboratory to pass the Small Scale Vertical Burn Requirements test CAN and ULC-S109-M87 and NFPA 701.

.4 The fabric supplied shall be GREENGUARD certified or approved equivalent.

2.4 SCHEDULE

.1 Provide roller shades at the following locations:

.1 All new/existing exterior windows and glazed doors.

.2 All interior glazed screens, sidelights and vision panels within interior doors.

.3 Any additional locations indicated on drawings.

3.0 EXECUTION

3.1 EXAMINATION

.1 Do not begin installation until substrates have been properly prepared.

.2 If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

.1 Coordinate requirements for blocking and structural supports to ensure adequate means for installation of window shades.

3.3 INSTALLATION

.1 Install in accordance with manufacturer's instructions.

.2 Install roller shades level, plumb, square, and true. Allow proper clearances for window operation hardware.

.3 Install the following items to conceal roller and operating mechanism. Do not use exposed fasteners.

.1 Fascias

.2 Closure panels

.3 Endcaps

3.4 TESTING AND DEMONSTRATION

.1 Test window shades to verify that operating mechanism, fabric retainer, and other operating components are functional. Correct deficiencies.

.2 During daylight hours, lower shades and turn off interior lights. Verify that there are no light leaks at perimeter or within shade assembly. Correct deficiencies.

3.5 PROTECTION

.1 Protect installed products until completion of project.

.2 Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

1.0 GENERAL

1.1 Work included

.1 Supply and install the following vertical transportation equipment:

.1 A single limited-use limited-application elevator.

1.2 Maintenance: 2 years

.1 Provide maintenance of the equipment in accordance with the City of Toronto Elevator Maintenance documents (RFP 6718-18-0180 dated July 25, 2018) for a period of 2 years after Substantial Performance.

1.3 Codes, by-laws, and regulations

.1 Provide equipment and perform work in accordance with all local, provincial and federal codes, by-laws, and regulations.

.2 Provide equipment and perform work in accordance with the latest edition of the B44 Safety Code for Elevators and any other code which may govern the installation.

.3 At the time of bid submission and during the contract provide written notification of any proposed changes in codes, by-laws, or regulations which may affect the work.

1.4 Permits and certificates of inspection

.1 Arrange and pay for all necessary permits, certificates, approvals, variances, and inspections.

.2 Prior to Substantial Performance, arrange and pay for a safety inspection of the equipment by the regulatory authority.

1.5 Warranty: 2 years

.1 Warrant the work performed, materials, performance, and workmanship for a period of 2 years from the date of Substantial Performance of the project.

.2 Correct defects which develop within the above mentioned time period.

.3 For duration of the warranty, the Contractor shall supply monthly and annual reports summarizing performance and operations of the unit including the following KPIs: call backs including a breakdown emergency,

entrapments, equipment failures, uptime (or unit availability), et cetera.

1.6 Shop drawings and samples

.1 Supply for approval shop drawings and samples of exposed finishes.

.2 Supply at a minimum drawings showing the general arrangement layout, machine room layout, fixtures, entrances, and cab finishes.

1.7 Wiring diagrams and manuals

.1 Prior to substantial performance, supply to the Owner, three sets of manuals describing in detail the operation of the equipment and special features.

.1 Detail the operation for special features such as independent service, emergency power operation, Firefighter's Emergency Operation, intercommunication, and security operation.

.2 Supply, as part of the manual, as-built drawings.

.3 Full copy of the TSSA submission and copies of any variances.

.4 Copy of any TSSA directives.

.5 Copy of MCP and log book.

.6 Maintenance details included into the warranty.

.7 Recommended spare parts list.

.8 All as-built drawings for machine rooms must be laminated.

.2 Provide electronic copies of the submission on USB drive (not disc).

.3 Prior to substantial performance, supply to the Owner, a manual detailing proper maintenance procedures for the equipment.

1.8 Training

.1 At completion of the job, provide a training seminar for the Owner's staff. Provide a review of the documentation and operation of the equipment and features along with. required training for MCP and maintenance log.

1.9 Trademarks

.1 Arrange that none of the car or hall equipment has any trademark, company name, or logo.

1.10 Barrier-free access

.1 Arrange the controls and fixtures to meet barrier-free access requirements Appendix E of the B44 Safety Code for Elevators (latest edition), applicable AODA requirements, and any other code which may govern the installation.

1.11 Fixtures

.1 Unless indicated otherwise in the Specifications or Drawings, provide a choice of fixtures from a third party supplier and your standard products.

.2 Provide vandal-resistant buttons with LED illumination and stainless steel targets.

1.12 Operating conditions

.1 Provide equipment that will operate normally when the machine room and hoistway temperature is between 5 and 35 degrees Celsius (40 and 95 degrees Fahrenheit).

.2 Provide equipment that will operate normally when the power supply is within 10 percent of its rated voltage.

1.13 Inspection and acceptance

.1 Provide a meter and test weights (full load) along with an adjuster and helper to assist the engineer with a final acceptance inspection.

1.14 Non-proprietary equipment

.1 Provide completely generic equipment that can be maintained, adjusted, and diagnosed without the use of proprietary tools and/or information. Provide any and all required tools and information required to maintain the equipment.

.2 Provide controllers from one of the following companies:

.1 GAL Manufacturing Corporation.

.2 Automatisation JRT Inc.

.3 Motion Control Engineering.

.3 Arrange the equipment such that there are no time, date, trip, or other counters that would shut down the equipment or change its operation.

1.15 Test data form

.1 Prior to final acceptance of the elevators, submit a test data form certifying that the elevators are complete and ready for inspection.

.2 This form is to show the operating times, door times, dwell times, and ride quality (lateral and vertical acceleration rates).

.3 Submit with the form accelerometer recordings showing the lateral and vertical acceleration rates.

.4 Arrange that this form is signed by the adjustor responsible for the work.

1.16 Elevator clean-down

.1 In addition to the hoistway and machine room equipment clean-down performed at TSSA inspection, perform an additional clean-down once building construction is complete.

2.0 PRODUCTS

2.1 Description

.1 Provide a single Limited-Use/Limited-Application elevator as follows:

.1 Roped-hydraulic equipment.

.2 Contract speed of 0.15 m/s (30 fpm) plus or minus 5.0 percent.

.3 Capacity of 635 kg (1400 lb).

.4 Two speed side opening entrances with a width of 915 mm (3'0") and a height of 2030 mm (6'8").

.5 Floors served - front openings at levels B and 1 / rear opening at level B.

.6 Clear inside cab dimensions of 1220 mm (4'0") wide and 1370 mm (4'6") deep.

.7 Overall cab height of 2135 mm (7'0").

.8 Hoistway, pit, overhead dimensions as per the Drawings.

2.2 Power unit

.1 Provide a power unit comprised of an oil tank, hydraulic pump, electric motor, control valves, oil level gauge, and oil pressure gauge.

.2 Provide a pump and motor designed for oil hydraulic use and smooth, quiet operation.

.3 Provide a control valve assembly containing a relief valve, a check valve, a levelling valve, and a manual lowering valve.

.4 Provide a tank shut off valve and a gate valve between the power unit and the jack.

.5 Unless the power unit is submerged in the oil tank, enclose it with steel panels and sound-deadening material.

.6 Provide a hydraulic muffler in the oil line.

2.3 Oil lines

.1 Provide oil lines of a minimum 25 mm (1") diameter.

.2 Run the oil lines above ground, suspended from the ceiling with isolation hangers.

.3 Identify oil lines that are accessible outside of the elevator machine room or hoistway with the markings “Elevator Hydraulic Line” in letters that are at least 19 mm (0.75") high in a contrasting color. Ensure that the markings are visible after installation and applied at intervals not greater than 3000 mm (9'10").

2.4 Jack: roped-hydraulic

.1 Provide a hydraulic jack of sufficient size to lift the gross load the height specified.

.2 Factory test the jack unit to ensure adequate strength and freedom from leakage. Do not use brittle material such as grey cast iron in the jack construction.

.3 Provide a jack unit consisting of a plunger of heavy seamless steel tubing

accurately turned and polished, a stop ring electrically welded to the plunger to prevent the plunger leaving the cylinder, an internal guide bearing, packing or seal of suitable design and quality, a drip ring around the casing top, and a cylinder made of steel pipe and provided with a pipe connection and air bleeder.

.4 Weld brackets to the jack casing for supporting the elevator on pit channels.

.5 Provide a second (safety) bulkhead in the lower end of the cylinder.

.6 Provide jack units contained within the hoistway with sheaves attached to the piston.

2.5 Elevator wire rope

.1 Provide steel hoist ropes of sufficient size and number to lift the load and ensure proper wearing qualities, consisting of at least six strands wound around a hemp core centre.

.2 Ensure that all the ropes for a particular elevator are from the same manufacturing run.

.3 Provide wedge type cable clamps.

2.6 Automatic reset governor

.1 Provide an automatic reset governor located in the hoistway that can be maintained from the car top. When the governor has tripped, arrange that it will be reset when the car is moved in the up direction.

2.7 Controller

.1 Provide a microprocessor based controller consisting of relays, contactors, switches, capacitors, resistors, fuses, circuit breakers, overload relays, power supplies, circuit boards, static drive units, wiring terminal strips, and related components all enclosed in a cabinet with hinged door panels.

.2 Store basic systems operating software in non-volatile EPROMs and store field adjustable parameters in EEPROMs.

.3 Install wiring in a neat workmanlike manner with all field wiring terminated at labelled and identified stud blocks. Do not connect more than 2 wires to any single terminal.

.4 Label each electrical component in the controller with alpha-numeric identification that matches that shown on the as-built wiring diagrams.

.5 Ensure that the elevator control system will restart after a loss of normal power.

.6 Provide a maintenance diagnostic tool together with the controller. The diagnostic tool shall be the property of the City.

2.8 Entrances

.1 Provide T-style entrances consisting of doors, frames, sills, sight guards, door hangers, tracks, interlocks, door closers, gibs, and all other equipment required for a complete installation.

.2 Provide entrances and associated hardware having a 1.5 hour fire rating.

.3 Provide plastic insert door hanger rollers.

.4 Design all equipment for a minimum of noise.

.5 Provide entrance doors and frames finished in prime coat suitable for painting.

2.9 Beams, sheaves, and anchorage

.1 Provide all required sheaves and supporting beams or channels along with other miscellaneous and structural steel.

.2 Provide anchorage as required to mount to the building structure.

2.10 Pit buffer equipment

.1 Provide, if required to suit the pit depth, buffer extensions, platforms, and ladders.

2.11 Guide rails

.1 Provide standard tongue and groove steel guide rails.

.2 Install guide rails using brackets fastened to the building structure.

.3 Clamp the guide rails to the bracket with clips arranged to prevent any horizontal movement of the rail.

.4 Join the rail sections using steel backing plates.

2.12 Painting

.1 Paint the pit and machine room floors.

2.13 Hoistway floor identification

.1 Provide identification of each floor level on the hoistway side of the hall doors using numerals or letters at least 150 mm (6") in height.

2.14 Slipper guides

.1 Provide spring mounted slipper guides located at the top and the bottom of the car frame.

.2 Provide guides that are self-aligning and self lubricating with replaceable nylon liners in order to ensure smooth and quiet operation.

2.15 Floor designations

.1 Provide floor designations a minimum 50 mm (2") high and raised at least 0.8 mm (0.03") with Braille on both sides of the hall door entrance jambs located with a centerline of 1525 mm (60") above the floor to identify the floor level.

.2 Provide, on the main floor entrance frame, the elevator designation a minimum of 75 mm (3") in height.

2.16 Fascias

.1 Provide fascias from each hall sill to the entrance header below. Include express zones. Extend the fascias into the pit and the overhead.

.2 Provide fascia the entire width of the door opening.

.3 Construct the fascia of a minimum 1.6 mm (16 gauge) sheet steel.

.4 Alternatively, provide an electrical-mechanical car door interlock to negate the requirement for fascia.

2.17 Car frame, platform, and cab

.1 Provide a car frame constructed of steel channels and a platform constructed of steel channels with a wood or metal sub-floor.

.2 Isolate the frame and platform from one another so that there is no metal

to metal contact in order to prevent the transmission of noise and vibration.

.3 Mount the elevator cab shell on the platform in alignment with the hoistway entrances.

.4 Isolate the cab from the car frame and platform.

2.18 Cab finishes

.1 Provide standard cab finishes as follows:

.1 Brushed stainless steel car doors, return panels, and transoms.

.2 Raised plastic laminate vertical hang-on panels (colour and pattern to be selected by the consultant with edges matching face) with brushed stainless steel reveals and kickplates on the side walls.

.3 Bushed stainless steel cylindrical handrails 38 mm (1.5") in diameter on the side walls at a height of 915 mm (36") from the finished floor to the top of the handrail.

.4 Brushed stainless steel four panel suspended ceiling with an LED down light in each panel.

.5 Resilient sheet or tile flooring by another trade.

.2 Submit for approval drawings of the cab design and lists of options for fixtures, interior materials, finishes and colours.

2.19 Car doors

.1 Provide car doors, jambs, headers, hangers, tracks, door closers, gibs, electrical contacts, and all other equipment required for a complete installation.

.2 Provide plastic insert door hanger rollers.

.3 Design all equipment for a minimum of noise.

2.20 Car station

.1 Provide one car station.

.2 Incorporate in each car station floor push buttons, door open and close buttons, and other fixtures required for normal operation.

.3 Provide for each floor button a call registered light and momentary audible tone.

.4 Provide below the car station a locked service cabinet containing devices other than those used for normal operation including a light switch, a fan switch, a keyed emergency stop switch, an emergency light test switch, and a 110 volt receptacle.

.5 Locate the car station controls at a height between 890 mm (35") and 1220 mm (48") from the cab floor with the emergency controls and door operating buttons grouped together at the bottom.

.6 Provide buttons of at least 19 mm (0.75") in their smallest direction and raised at least 1.5 mm (0.06"). Provide raised arabic numerals at least 16 mm (0.63") high and raised at least 0.8 mm (0.03") along with braille immediately to the left of the button.

.7 Engrave the car station with the elevator capacity, identification number, government installation number, and other markings required by code.

2.21 Car position indicator

.1 Provide a digital (dot matrix or segmented) car position indicator located above each car station with a minimum 50 mm (2") high display.

.2 Provide continuous indication of the elevator location.

2.22 Certificates and licences

.1 Do not install any certificates or licences in the cab. Arrange and pay for a variance from the TSSA for this if required.

2.23 Voice synthesizer

.1 Provide a voice synthesizer for each elevator.

.2 Provide a microprocessor based control unit in the machine room along with a speaker in the elevator cab.

.3 Provide an automatic verbal announcement of each floor at which the elevator stops.

.4 Provide a system that will handle a variety of other messages and indications as may be required by the Owner at a later date.

.5 Set the volume at 10 decibels above ambient.

.6 Arrange that the volume is adjustable over a range of 40 to 80 decibels.

.7 Measure the noise levels using a sound level meter set to the "A" scale for a fast response.

.8 Copies of custom voice recordings shall be provided to the customer.

2.24 Door protective device: 3D

.1 Provide an infra-red multiple beam three-dimensional door protective (re-opening) device.

.2 Arrange that if the door protective device detects an object while the doors are closing (either in the door closing path or approaching objects from the landing side), it will re-open the doors.

.3 Protect the full width and up to 1830 mm (6') from the floor of the door opening.

.4 Where mounted to the car door, locate the device 25 mm (1") behind from the leading edge of the door.

.5 If the beams or detection means are interrupted continuously for more than 30 seconds, close the doors slowly under reduced speed and force, and actuate an audible signal as a warning.

.6 Arrange that the system is self-monitoring. After the door has fully opened and before closing has commenced, verify that the detection means is operational.

2.25 Battery operated emergency cab lighting

.1 Provide battery operated emergency cab lighting.

.2 Arrange the lighting to go on immediately in the event of a loss of normal elevator cab lighting.

.3 Provide a charging unit that will re-charge the battery when normal power returns and keep the battery fully charged at all times.

.4 Mount the light fixture out of view above the cab ceiling.

.5 Provide an emergency lighting test switch in the car station service cabinet.

2.26 Door operator: closed loop

.1 Provide a heavy duty closed loop door operator with direct current motor to open and close the car and hoistway doors simultaneously.

.2 Provide solid state control of the door operator including feedback for position, acceleration, velocity, and force. Constantly adjust the motor torque to maintain the correct door speed based on it's position and force.

.3 Adjust the door closing speed to an average of 300 mm (12") per second and the door opening speed to an average of 600 mm (24") per second.

.4 Design the equipment for a minimum of noise.

2.27 Hands-free communication system: audio & video

.1 Provide a two-way voice and visual communication system as per article 2.27.1 of the B44-19 Safety Code for Elevators and Escalators.

.2 Integrate the communication system into the car station to meet barrier-free access requirements.

.3 Provide a MAD MosaicONE Video & Messaging System or approved equal.

.1 Provide a car position indicator which can display digital messages from authorized personnel. Provide a MAD Matisse, CE Electronics Elite PI, or approved equal car position indicator.

.2 Provide a means for passengers to respond to messages using the Door Open and Door Close buttons in the car station (ie. indicate in the message that one button is for YES and the other is for NO or engrave “YES” and “NO” directly beneath these buttons). Do not provide separate YES and NO buttons.

.3 Provide a camera, to display video of passengers at any location on the car floor, to authorized personnel.

.4 Provide information such that authorized personnel can access online messaging and video display.

.4 Provide 110 volt power at the car station and car top for the communication equipment.

.5 Provide and pull all wiring to interconnect the equipment including but not

limited to wiring between the elevator cab and the machine room.

.6 Provide a junction box with terminal blocks for the communication equipment mounted on the side of a controller in the elevator machine room.

.7 Provide equipment such that all elevators can share one telephone line and network connection.

.8 Provide to the Owner or Owner's monitoring company, software to access the online messaging and video along with training.

.9 The telephone functionality must be available for remote reprogramming.

2.28 Alarm

.1 Provide an alarm bell on top of the elevator cab.

.2 Arrange that the alarm bell is initiated by momentary actuation of the "PHONE" button in the car station.

.3 Provide back-up battery power for the alarm bell operation. It can be from the same source as the emergency cab lighting.

2.29 Car top inspection station

.1 Provide an inspection station on the car top consisting of an emergency stop button, up, down and common inspection running buttons, a light with switch and guard, a duplex receptacle, and other devices necessary for car top operation.

2.30 Cab fan

.1 Provide a two speed exhaust fan mounted in the cab top.

.2 Arrange that when the fan is operating there is no noticeable vibration in the cab.

2.31 Cab lighting & fan: timer

.1 Provide a timer for the cab lights and fan such that the lights and fan turn off when the elevator has been idle for more than 5 minutes and then turn on when demand for the elevator returns.

2.32 Cab protective pads

.1 Provide one set of cab protective pads that cover all walls and the cab return panels along with pad hooks.

2.33 Hoistway access switch

.1 Where required, provide hoistway access switches located in the entrance frame or in the hall door sight guard.

2.34 Hoistway door unlocking devices

.1 Provide hoistway door unlocking devices (by lunar key) on the hall doors at all floors.

2.35 Hall push button stations

.1 Provide a single riser of hall stations.

.2 Provide in each hall station illuminating up and down push buttons (at terminal floors, provide only one button).

.3 Provide buttons at least 19 mm (0.75") in their smallest direction, raised at least 1.5 mm (0.06"), and located with their centerline 1070 mm ± 25 mm (42" ± 1") above the floor.

.4 Provide brushed stainless steel faceplates that install flush to the face of the wall with a maximum projection into the hall of 6.35 mm (1/4").

2.36 In car lanterns

.1 Provide in car lanterns in each jamb of the elevator cab entrance.

.2 Arrange the lanterns such that as the car doors start to open, the lanterns illuminate (do not provide any audible signals).

2.37 Hall position indicator: main floor

.1 Provide a digital (dot matrix or segmented) hall position indicator located above the entrance frame at the main floor with a minimum 50 mm (2") high display.

.2 Provide continuous indication of the elevator location.

.3 Provide brushed stainless steel faceplates that install flush to the face of the wall with a maximum projection into the hall of 6.35 mm (1/4").

2.38 Electric wiring

.1 Provide copper wiring to connect the equipment.

.2 Run the wire in metal conduit, duct or electrical metallic tubing.

.3 Provide travelling cable between car stations and the controller in the machine room.

.4 Provide at least six pair shielded wires and a coaxial conductor in the travelling cable.

.5 Provide at least ten percent spare wires in each travelling cable.

.6 Provide on one controller a separate junction box for non-elevator devices such as telephones, cameras, and security systems.

.7 If required by code, provide a stop switch at the controller.

3.0 EXECUTION

3.1 Microprocessor based control and dispatching

.1 Provide microprocessor based group dispatching of the elevator that operates in real time, continuously analysing the elevators' position, condition, and load.

.2 Provide full automatic control of the elevator by means of push buttons in the car numbered to correspond with floors served and by push buttons at each hall landing.

.3 Constantly scan the system for hall calls. When hall calls are registered, instantly calculate the estimated time of arrival, number of floors to travel from the current position, the time it takes to travel one floor at top speed, calls assigned to a car, and car reversal time to respond to a call in the opposite direction of travel. When a car's status changes or additional hall calls are registered, re-calculate the estimated time of arrival and re-assign calls if necessary.

.4 Provide flexibility to meet well defined patterns of traffic including up peak, down peak, and heavy inter-floor demands, and adjust for indeterminate variations in these patterns which occur in buildings.

.5 When car call buttons are actuated, dispatch the elevator to the designated floors in the order in which the landings are reached by the

elevator, irrespective of the sequence in which the buttons are pressed. Cancel the car call when the elevator arrives at the floor.

.6 Respond to calls only in the direction that the elevator is travelling.

.7 Cancel car calls when the elevator changes direction.

3.2 Independent service

.1 Provide independent service as follows:

.1 Remove the elevator from the group dispatching system such that it does not answer hall calls, the hall lanterns are disabled, and the door protective devices are disabled;

.2 Arrange the elevator to park with its doors open;

.3 Accept a car call and close the doors only when the door close button or any call button is actuated using constant pressure until the doors are fully closed and the interlock is closed. Re-open the doors if the button is released before the elevator starts to move.

3.3 Nudging

.1 If the door protective device is operated continuously for more than 30 seconds, close the doors slowly under reduced speed and force, and actuate an audible signal as a warning.

3.4 Door dwell times

.1 When an elevator stops in response to a car call, keep the doors open for 2.0 seconds.

.2 When an elevator stops in response to a hall call, keep the doors open for 4.0 seconds. Reduce this time to 1.0 second after the door detector beams are broken.

.3 Arrange that these times are separately adjustable over a range of 0.5 to 12 seconds.

.4 Close the doors immediately if a car call or door close button is actuated.

3.5 Sound levels

.1 Arrange the fan so that the sound level as measured in the cab with the elevator stopped is less than 57 decibels with the fan running.

.2 Arrange the elevator equipment so that the sound level as measured in the cab with the elevator running is less than 60 decibels.

.3 Arrange the door equipment so that the sound level as measured in the cab is less than 62 decibels during a full door open and door close operation.

.4 Arrange the machine room equipment so that the sound level as measured in the machine room with the elevator running is less than 80 decibels.

.5 Measure the sound levels using a sound level meter set to the "A" scale for a fast response.

3.6 Operating performance

.1 Levelling - Arrange that the car stops within 6 mm (¼") of the floor level.

.2 Acceleration - Arrange that the average acceleration is not less than 0.6 m/s/s (2.0 f/s/s) and the acceleration peaks do not exceed 1.5 m/s/s (5.0 f/s/s).

.3 Ride quality - Arrange that the lateral acceleration (front to rear and side to side) measured during express runs is less than 150 mm per second per second (0.5 f/s/s) peak to peak.

.4 Ensure that the number of callbacks does not exceed 4.9 per elevator per year.

.5 Ensure that the elevator uptime is at least 99.25%. This is the amount of time the elevator is available for use divided by (the amount of time in period less scheduled maintenance and repair time in period).

3.7 Firefighters' Emergency Operation: Phase 1

.1 Provide Phase 1 Firefighters' Emergency Operation.

.2 Initiate Firefighters' Emergency Operation either manually by turning the three position (RESET/OFF/ON) key switch labelled 'FIRE RECALL' to the 'ON' position or automatically through the fire alarm system.

.1 When Phase I has been initiated, return the elevators non-stop to the designated level and open the doors.

.2 Provide visual and audible indication inside the elevator.

.3 Disable door protective devices that are sensitive to smoke or flame.

.4 Disable emergency stop switches.

.5 Where the designated level is not sprinklered and Phase I is initiated by a device located at the designated level, return the elevators non-stop to the alternate level (unless a 'FIRE RECALL' switch is already in the 'On' position).

.3 Arrange that upon restoration of power following a power interruption, elevators re-establish their absolute car position and are not removed from Firefighters' Emergency Operation.

.4 Terminate Firefighters' Emergency Operation once all cars are at the designated level, the fire alarm system is in its normal status, and all key switches are in the 'OFF' position (with the 'FIRE RECALL' switch having first been turned to the 'RESET' position).

3.8 Instructions: Firefighters' Emergency Operation

.1 Engrave the 'FIRE RECALL' switch at the designed level with the following wording:

FIREFIGHTERS' OPERATION

To recall elevators
Insert fire key and turn to "ON"

3.9 Battery lowering

.1 Provide battery operated emergency lowering.

.2 Provide enough battery power to close the elevator doors, lower the elevator to the lowest floor without stopping, and open the doors in the event of a loss of normal power.

.3 Provide a charging unit that will re-charge the battery when normal power returns and keep the battery fully charged at all times.

4.0 SEPARATE PRICES (not included in base bid)

4.1 Liftnet elevator monitoring

.1 Provide a Liftnet elevator monitoring system to remotely monitor the elevator.

.2 Provide all necessary hardware and wiring.

.3 Provide web based access to Liftnet monitoring and reporting.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Coordinate with Mechanical Drawings and requirements and obtain clarification if conflicts are noted between this Section and Drawings.

.2 Provide all labour, material, equipment, supervision, and services necessary to adjust existing catch basin, maintenance hole, and observation well frame and grate/ cover elevation as required to provide adequate drainage of the overburden surfaces.

.3 Provide all labour, materials, equipment, supervision, and services necessary to supply and install new below-grade drainage systems (i.e. weeping tile) below the new slab-on-grade and at the exterior foundation wall perimeter, as indicated on the Drawings. Work to include tie-ins of new weeping tile piping to the existing/ new site drainage systems and sump pits.

.4 Visit the Place of the Work to ascertain existing conditions and allow for all conditions that will affect the new installation.

1.2 Performance Requirements

.1 The new below-grade piping supplied and installed under this Contract, and connections to existing/ new systems, shall satisfy the following:

.1 Be fully operational and not unduly damage or deteriorate under normal use or hinder the flow of water.

.2 All connections and hardware shall remain securely fastened without leaks.

2.0 PRODUCTS

2.1 Materials

.1 All below-grade piping to be minimum 100mm (4 in.) diameter PVC pipe.

.2 Weeping Tile Pipe: 100mm (4 in.) diameter, flexible, HDPE perforated pipe with exterior polyester fibre sock.

.3 Provide all traps and clean-outs in new drain lines as necessary to conform to plumbing and drainage act regulations.

.4 Risers and all penetrations through floor slabs to be 100 mm System XFR 15-50 Thermoplastic Piping by Ipex.

3.0 EXECUTION

3.1 Weeping Tile Installation and Catch Basin Adjustment

.1 Install new weeping tile piping in accordance with this specification and relevant building code and plumbing code requirements.

.2 Connect weeping tile piping to existing/ new systems as indicated on the Drawings. Maintain adequate slopes. All pipes to maintain a minimum positive slope of 2%.

.3 Provide cleanouts at maximum intervals of 9.0 m.

.4 Adjust the elevation of catch basin, maintenance hole, and observation well frames and grates as required to promote adequate drainage of the overburden surfaces.

3.2 Handling and Storage

.1 Take care during handling to prevent damaging the pipe.

.2 Store pipe on level surface. If placed on the ground, support the pipe by timbers spaced no more than 900 mm apart.

.3 When storing pipe on a flat smooth surface, place smaller diameter pipe on top of larger pipe.

.4 Do not store pipe close to sources of heat such as boilers, steam lines, engine exhaust outlets, etc.

3.3 Field Quality Control

.1 Confirm acceptability of drainage system installations prior to casting concrete.

.2 If requested, flood test drainage system to confirm water-tightness and that system is free draining. Consultant shall be present.

3.4 Cleaning of Drainage System

.1 Power flush (high-pressure jetting or approved equivalent) all drainage systems within Work areas to verify that all new and existing drains, drain lines, and related piping are totally cleaned, operational, and free running.

.2 Sumps shall be vacuumed clean of all silt and debris upon completion of the drainage system cleaning.

.3 Test drainage system to confirm unobstructed operation.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide temporary power to the site for use during construction and pay all costs for disconnection of existing power, supply and connection of temporary power, and connection of permanent power service after completion of interior and exterior renovations, including meters and other equipment specified and required by Toronto Hydro and/ or other Authorities Having Jurisdiction. Pay fees and costs associated with temporary power usage during construction.

.2 This Section outlines repair and inspection procedures to be undertaken when electrical conduits, cables, fixtures, systems, etc. that have been installed as part of finished work or were existing and to remain are damaged due to the construction activity.

.3 Damaged electrical conduits, cables, fixtures, systems, etc. must be repaired in a timely fashion. If repair cannot be made in a timely fashion, a temporary system must be installed.

.4 Visit site to ascertain and note existing conditions that will affect the Work.

1.2 Regulatory Requirements

.1 Comply with Safety Codes Act and rules and regulations made pursuant thereto, including Canadian Electrical Code.

.2 Unless otherwise indicated, all references in the Contract Documents to "Canadian Electrical Code" or "CEC" shall mean the edition of the Canadian Electrical Code, Part I, CSA C22.1 and the variations made thereto by Ontario regulation, which are in force on the date of bid closing for the Contract.

.3 All electrical products shall be tested, certified, and labelled in accordance with a certification program accredited by the Standards Council of Canada.

.4 Submit drawings and specifications to authority having jurisdiction and local utility company for examination and approval before commencement of electrical work. Pay any associated fees required to obtain a permit for the Work.

.5 Submit a copy of electrical permit obtained from the Authority Having Jurisdiction to the Consultant.

1.3 Examination of Site

.1 Visit and examine the site and all applicable Drawings before Bid. The Bid shall include all costs for required electrical work necessary for performance of the Work. No extras will be paid due to failure to visit the site or adequately review all required interfacing details.

.2 Disconnect existing site power supply and provide temporary power required for completion of the work. Maintain temporary power until occupancy. Coordinate switchover from temporary to permanent system with the Owner.

1.4 Delivery, Storage, and Handling

.1 Submit copies of Safety Data Sheets (SDS) for all products prior to arrival on site.

.2 Deliver, store, and maintain packaged material with manufacturer's seals and labels intact.

.3 Store material in regulation containers in accordance with the Occupational Health and Safety Act and manufacturer instructions.

.4 Toxic or hazardous chemicals shall be secured in a locked storage area with appropriate protection measures in accordance with the Occupational Health and Safety Act.

.5 All containers to be labelled with material expiration dates. Material that is older than the expiry date shall be rejected. Shelf life shall be strictly adhered to and material shipped without dates will be rejected. Immediately remove rejected materials from site.

2.0 PRODUCTS

2.1 Materials

.1 Use new products unless otherwise specified.

.2 Provide electronic copies of maintenance instructions for finished surfaces and maintenance material before Substantial Performance of the Work.

3.0 EXECUTION

3.1 Exposed Conduits, Cables, Fixtures, Etc.

.1 All exposed conduits, cables, fixtures, etc. that are to remain are to be properly protected and operational at all times during the Work.

.2 Repair or replacement of damaged exposed conduits, cables, fixtures, etc. that are to remain is Contractor’s responsibility when damage was caused by Contractor’s operations. Required repair or replacement work to exposed conduits, cables, fixtures, etc. may be performed by Contractor's own electrician.

3.2 Existing Embedded Electrical Services

.1 Identify potential areas of buried or hidden conduit, and locate or switch off high voltage systems in the area of Work to prevent possible damage and injury. Coordinate requirements with Owner.

.2 Take utmost precaution during demolition operations to prevent damage to buried or hidden conduit, cables, systems, etc. Immediately report damage to hidden conduits, cables, systems, etc. to Owner and Consultant.

.3 Damaged or deteriorated conduits, cables, systems, etc. are not to be covered up without specific approval from Owner.

.4 Allow reasonable time in scheduling of the Work for implementation of any required repairs to buried or hidden conduit, cables, systems, etc.

.5 Take all precautions to ensure buried or hidden conduits uncovered by the work are not live before performing demolition work around them. Anticipate uncovering lighting conduits, 600V main power lines, alarm lines, telephone lines, etc.

.6 Repair or abandon and replace damaged conduit, cabling, systems, etc. uncovered by the Work that are to remain. Cover all associated costs.

3.3 Temporary Systems

.1 If damage to surface-mounted or buried/ hidden conduit, cabling, systems, etc. cannot be repaired in a timely fashion, Owner may, at their discretion, request that Contractor provide a temporary system or connection to maintain operation.

.2 Costs for requested temporary systems will be allocated to Owner for damage to buried or hidden conduit, cabling, systems, etc. and to Contractor for damage to surface mounted conduit, cabling, systems, etc.

3.4 Inspection of Work

.1 All electrical system repair work is to be inspected as required by the authority having jurisdiction.

.2 Arrange for required inspections of repairs within 48 hours of repairing damage. Schedule all required inspections, regardless of whether Owner's or Contractor's electrician performed the repair.

.3 Cost of inspections shall be responsibility of Contractor.

.4 Copies of inspection certificates for required inspections shall be distributed to Owner and Consultant upon completing the Project.

END OF SECTION

1. GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 The work described in this Section shall include furnishing all equipment, labour, materials and services to supply and install fine grading and growing media (soil), as shown on the drawings as specified herein and in conformance with the standard noted herein.

1.1.2 The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.

1.1.3 All depths of materials indicated on the drawings and in these specifications refer to minimum required depth of materials, after compacting, rolling or settling.

1.2 REFERENCES

1.2.1 Canadian Landscape Standard – Growing Medium.

1.2.2 Agriculture and Agri-Food Canada, The Canadian System of Soil Classification.

1.2.3 Canadian Council of Ministers of the Environment, PN1340, Guidelines for Compost Quality.

1.2.4 ANSI A300 Standard – Tree Care Industry Association.

1.3 SOURCE QUALITY CONTROL

1.3.1 The Contractor, at his own discretion, may use either imported or amended on-site topsoil, providing that all requirements of this specification are met.

1.3.2 Inform Consultant of proposed source of growing media (soil) to be supplied arrange for inspection and testing. Acceptance of growing media (soil) subject to inspection and/or soil analysis test results. Do not commence Work until growing media (soil) is accepted by the Consultant.

1.3.3 Test growing media (soil) from the source prior to stripping and stockpiling, for nitrogen, phosphorous, potassium, and magnesium levels, soluble salt content, pH value, growth inhibitors and soil sterilants. Test results shall include percentage content of dry weight of total growing medium (soil) for gravel, sand, clay, silt and organic content and clear recommendations for any required amendments or fertilizers.

1.3.4 Inspection and testing of growing media (soil) will be carried out by testing laboratory approved by Owner and paid for by the Contractor.

1.3.5 The Contractor shall provide delivery slips on which the following shall be recorded: supplier, serial number of slip, date, truck number, Contractor, project, growing media (soil) composition and volume of growing media (soil) delivered to site.

2. PRODUCTS

2.1 GROWING MEDIA

2.1.1 Imported Growing Media (Soil):

2.1.1.1 The texture classification for these growing media (soil) by Canadian system of soil classification is "loamy sand" to "sandy loam". The growing media (soil) accommodate a wide selection of plants: they create a balance between good drainage and water retention and are suited to moderate, normal maintenance practices.

2.1.1.2 Based on Canadian Landscape Standard, the properties of growing media (soil) shall be as follows:

GROWING MEDIUM TYPE APPLICATION:	**TURF** (Sod or Seed)	**PLANTING BEDS**	**ON SLAB**
Texture:	Percent of Dry Weight of Total Growing Medium (Soil)		
Coarse Gravel: • Larger than 19mm • Smaller than 40mm	0 – 1%	0 – 1%	0 – 1%
All Gravel: • Larger than 2mm • Smaller than 40mm	0 – 5%	0 – 5%	0 – 5%
	Percent of Dry Weight of Total Growing Medium (Soil)		
Sand: • Larger than 0.5mm • Smaller than 2mm	55 – 70%	40 – 70%	40 – 90%
Silt: • Larger than 0.002mm • Smaller than 0.05mm	0 – 25%	0 – 30%	0 – 20%
Clay: • Smaller than 0.002mm	0 – 15%	0 – 15%	0 – 10%
Clay and Silt Combined	Maximum 35%	Maximum 40%	Maximum 25%
Organic Content: (by weight)	10 – 20%	15 – 25%	15 – 25%
Acidity (pH):	6.0 – 7.5	6.0 – 7.5	6.0 – 7.5
Drainage:	Percolation shall be such that no standing water is visible 60 minutes after at least 10 minutes of moderate to heavy rain or irrigation.		

2.1.2 Amended, On-Site Growing Media (Soil):

2.1.2.1 Mixture of particulates, micro-organisms and organic matter which provides a well-structured topsoil consisting of neither heavy clay nor very light sand, suitable for supporting intended plant growth.

2.1.2.2 Growing media (soil) shall be free of subsoil, roots, debris, toxic materials, stones over 25 mm in diameter, and coarse vegetative material, 5mm diameter and 75mm length, occupying more than 10% of soil volume. Growing media (soil) containing seeds or roots of noxious weeds is unacceptable.

2.1.2.3 Consistency: Friable when moist.

2.1.2.4 Consultant shall arrange and pay for sampling and testing of on-site and imported growing media (soil), as required and as indicated above.

2.1.2.5 On-site Growing media (soil) shall be amended in accordance with the recommendations of the consultant and the testing agency to meet the same requirements as growing media (soil).

2.2 SOIL AMENDMENTS

2.2.1 Fertilizer:

2.2.1.1 Fertility: major soil nutrients present in following amounts:

2.2.1.2 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.

2.2.1.3 Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.

2.2.1.4 Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.

2.2.1.5 Calcium, magnesium, sulphur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.

2.2.1.6 Ph value: less than 7.5

2.2.2 Peatmoss:

2.2.2.1 Derived from partially decomposed species of Sphagnum Mosses.

2.2.2.2 Elastic and homogeneous, brown in colour.

2.2.2.3 Free of wood and deleterious material which could prohibit growth.

2.2.2.4 Shredded particle minimum size: 5 mm.

2.2.3 Sand: washed coarse silica sand, medium to course textured.

2.2.4 Organic matter: compost Category A, B in accordance with CCME PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.

2.2.5 Use composts meeting Category B requirements for land fill reclamation and large scale industrial applications.

2.2.6 Limestone:

2.2.6.1 Ground agricultural limestone.

2.2.6.2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

2.2.7 Fertilizer: industry accepted standard medium containing nitrogen, phosphorous, potassium and other micro-nutrients suitable to specific plant species or application or defined by soil test.

3. EXECUTION

3.1 PREPARATION

3.1.1 Grade native or sub-grade soils, eliminating uneven areas and low spots, ensuring positive drainage. Dispose of removed materials as directed by the Consultant.

3.1.2 After rough grading, scarify and cultivate entire area that is to receive growing media (soil) to a depth of 50mm. Repeat cultivation in those areas where equipment used for hauling and spreading has compacted soil.

3.1.3 Remove surface debris, roots, vegetation branches and stones in excess of 50 mm in diameter.

3.1.4 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.

3.2 GROWING MEDIA (SOIL) SPREADING

3.2.1 Spread growing media (soil) after Consultant has approved sub-grade and growing media (soil) mix.

3.2.2 Spread growing media (soil) with adequate moisture in uniform layers over approved, unfrozen sub-grade, where seeding or sodding are indicated. Refer to Section 329000 – Planting, for soil requirements in other planting areas.

3.2.3 Spread growing media (soil) as indicated to following minimum depths after settlement

3.2.3.1 150mm for seeded areas

3.2.3.2 135mm for sodded areas

3.2.3.3 500mm for perennial and shrub beds

3.2.4 Manually spread growing media (soil) around trees, shrubs and obstacles.

3.3 WEED CONTROL

3.3.1 Allow weed seeds in spread soil to germinate.

3.3.2 Eradicate first growth of weeds by hand or through mechanical methods only.

3.4 FINISH GRADING

3.4.1 Fine grade and loosen growing media. Eliminate rough spots and low areas to ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.

3.4.2 Roll to consolidate growing media for areas to be seeded or sodded leaving surface smooth, uniform, firm against deep foot printing, and with fine loose texture to approval of Consultant.

3.5 SURPLUS MATERIAL

3.5.1 Dispose of all surplus materials legally off-site.

END OF SECTION

1. GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 The work described in this Section shall include furnishing all equipment, labour, materials and services to perform excavation, backfilling and site grading, as shown on the drawings and specified herein.

1.1.2 The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.

1.1.3 All depths of materials indicated on the drawings and in these specifications refer to minimum required depth of materials, after compacting.

1.1.4 Excavation, backfilling and site grading for this Work includes, but is not necessarily limited to;

1.1.4.1 Stripping and disposal off-site of native topsoil that is surplus or has been indicated by the Consultant to be undesirable.

1.1.4.2 All required excavation.

1.1.4.3 Stockpiling and reuse of on-site fill material approved by the Consultant.

1.1.4.4 Disposal off-site of cut material that is surplus or has been indicated by the Consultant to be undesirable.

1.1.4.5 Supplying imported topsoil and granular materials as well as trucking them to the site.

1.1.4.6 Filling, backfilling and compacting granular materials, amended native topsoil or imported topsoil to attain indicated final grades.

1.2 REFERENCES

1.2.1 ASTM D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).

1.2.2 OPSS, Ontario Provincial Standard Specification.

1.3 INSPECTION AND TESTING

1.3.1 Contractor shall carry out inspection and testing of the Work of this Section, and provide documentation of such testing to the Consultant in accordance with Section 01 00 05.

1.3.2 Contractor shall provide washed sieve gradation analysis for all aggregates and granular materials to be used in accordance with MTO Laboratory Testing Manual Section LS-602 and related standards.

1.3.3 Contractor shall carry out field inspections and compaction testing of all compacted sub-grade and base materials in accordance with MTO Laboratory Testing Manual Section LS-623 and related standards.

1.3.4 Contractor shall maintain a record showing the location and result of inspections and testing conducted. These records shall be submitted to the Consultant when requested, or prior to proceeding with work that depends upon the work of this Section.

1.4 SOURCE QUALITY CONTROL

1.4.1 Consultant must approve the soils and granular materials for use. If testing is required, it is to be paid for by the Contractor.

1.5 SOURCE QUALITY CONTROL

1.5.1 Examine soil report if available.

1.5.2 Buried services:

1.5.2.1 Before commencing work verify / establish location of buried services on and adjacent to site.

1.5.2.2 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.

1.5.2.3 Prior to beginning excavation Work, notify applicable authorities having jurisdiction and establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during Work.

1.5.2.4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.

1.5.2.5 Where utility lines or structures exist in area of excavation, obtain direction of Consultant before re-routing or removing.

1.5.2.6 Record location of maintained, re-routed and abandoned underground lines.

1.5.3 Existing buildings and surface features:

1.5.3.1 Conduct, with Consultant, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.

1.5.3.2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Consultant

1.5.4 Where required for excavation, cut roots or branches as directed by Consultant.

2. PRODUCTS

2.1 MATERIALS

2.1.1 Granular 'A' and 'B': All structural backfill material shall be manufactured granular crushed from limestone rock, described as Granular 'A' and Granular 'B', conforming to the requirements of Ontario Provincial Standard Specification OPSS 1010, "Material Specifications for Aggregates - Granular A, B, M and Select Subgrade Material". Reclaimed concrete material (RCM) is not acceptable.

2.1.2 Crushed stone: 19 mm (or 20 mm) crushed stone ("crusher run") shall be clean, durable, angular crushed gravel or stone conforming to the following limits:

Sieve Designation	% Passing
19.0mm	100%
4.75mm	40-80%
2.36mm	27-65%
600µm	12-35%

2.1.3 Clear Stone: 19 mm (or 20 mm) clear stone shall be clean, durable, angular crushed gravel or stone conforming to the following limits:

Sieve Designation	% Passing
19.0mm	100%
4.75mm	2%

2.1.4 Fill Material: Selected material from excavation or other sources, approved by the Consultant for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse, contaminants or other deleterious materials.

2.1.5 All other materials not specifically described but required for a complete and proper installation, shall be selected by the Contractor, subject to the review of the Consultant.

2.1.6 Geotextile: 'Terrafix 270 R' by Terrafix Geosynthetics Inc. or approved alternative.

3. EXECUTION

3.1 REMOVAL OF TOPSOIL

3.1.1 Remove all topsoil from areas to be excavated or regraded. Strip topsoil when it is dry enough to prevent contamination with sub-grade material.

3.1.2 Do not handle topsoil in wet or frozen condition.

3.1.3 Stockpile any available topsoil on-site where directed. Piles shall not exceed 2000 mm in height.

3.2 EXCAVATION

3.2.1 Provide, install and maintain adequate fences and barricades.

3.2.2 Excavate to lines, grades, elevations and dimensions indicated on the Drawings.

3.2.3 Have excavations in excess of 1200 mm in depth conform to requirements of Occupational Health and Safety Act, and Regulations for Construction Projects.

3.2.4 Remove concrete, masonry, rubble and other obstructions encountered during excavation and dispose of legally off-site.

3.2.5 Excavation required within proximity of underground utility lines or within the dripline of trees designated to remain are to be made by hand.

3.2.6 Excavation must not interfere with normal 45 plane of bearing from the bottom of any footing.

3.2.7 Do not disturb soil within branch spread of trees or shrubs that are to remain.

3.2.7.1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw in accordance with applicable Municipal regulations.

3.2.8 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic material.

3.3 DEWATERING

3.3.1 Keep excavations free of water while Work is in progress.

3.3.2 Avoid excavation below groundwater table if quick condition or heave is likely to occur. Prevent piping or bottom heave of excavations by groundwater lowering, or other means.

3.3.3 Protect open excavations against flooding and damage due to surface run-off.

3.3.4 Dispose of accumulated water in a manner not detrimental to public and private property, or any portion of Work completed or under construction.

3.3.5 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers.

3.4 OVER-EXCAVATION

3.4.1 Where excavations are made below the indicated intended elevations, backfill with lean concrete, unshrinkable fill, crushed stone or granular material as directed by the Consultant. Compact to provide a firm, unyielding sub-grade at no additional cost to the Owner.

3.5 BACKFILL

3.5.1 Do not place, spread or compact any backfill materials during unfavourable weather. Unfavourable weather includes temperatures below 0 C and/or precipitation.

3.5.2 Do not commence any backfill operation without adequate compaction equipment.

3.5.3 Protect the site of the backfilling and storage of backfill materials from freezing.

3.5.4 Prior to placing backfill, scarify the sub-grade surface to a depth of 50 mm.

3.5.5 During backfilling, take care to avoid displacing or damaging Utilities Work and Services.

3.6 COMPACTION

3.6.1 All layers of backfill material shall be compacted to not less than the minimum density specified. The Contractor is not to proceed until approval of compaction has been granted.

3.6.1.1 Granular 'B' backfill and native material shall be compacted to 100% standard proctor dry density in layers not exceeding 300 mm thickness.

3.6.1.2 Granular 'A' backfill shall be compacted to 100% standard proctor dry density in layers not exceeding 100 mm thickness.

3.6.2 For all backfill material, bring to the moisture content that will permit proper compaction.

3.6.3 For all granular material, bring to the moisture content of plus or minus 2% of optimum moisture content.

3.6.4 Optimum moisture content shall be determined for each type of material to be compacted in accordance with ASTM D1557.

3.6.5 Type of compaction equipment selected by the Contractor is subject to the review of the Consultant.

3.7 STORAGE AND STOCKPILING OF MATERIALS

3.7.1 Stockpiled and imported materials to be stored away from existing trees, drainage areas and access points.

3.8 SITE GRADING

3.8.1 Perform all rough and finish grading and backfilling required to achieve the finished elevations indicated on the Drawings.

3.8.2 Ensure that the finished ground slopes are as indicated on the Drawings.

3.8.3 Regrade all areas that retain or pond water.

3.8.4 All areas shall be rough graded within a tolerance of plus or minus 50 mm.

3.9 DISPOSAL OF EXCAVATED MATERIALS

3.9.1 All excavated sub-grade material generated by construction, may be used as fill on-site unless otherwise rejected by the Consultant, in which case it is to be disposed of legally off-site at a location determined and paid for by the Contractor.

3.9.2 All surplus sub-grade material generated by construction and not required to attain indicated final grades is to be disposed of legally off-site at a location determined and paid for by the Contractor.

3.9.3 Any required testing of excavated material to be disposed of off-site shall be arranged and paid for by the Contractor.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to prepare existing subgrade material and install new engineered granular backfill materials as indicated on the Drawings and described herein.

.2 This Section is associated with the granular backfill work described/ indicated on the Structural Drawings. Refer to and conform with Landscaping Specification Sections for landscaping granular backfill requirements.

1.2 References

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	ASTM C117	Standard Test Method for Materials Finer than 75-μm (No. 200) Sieve in Mineral Aggregates by Washing
.4	ASTM C136/136M	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
.5	CAN/CGSB-8.1-88	Sieves, Testing, Woven Wire, Inch Series (Withdrawn)
.6	CAN/CGSB-8.2-M88	Sieves, Testing, Woven Wire, Metric Series (Withdrawn)
.7	OPSS 501	Compacting
.8	OPSS 1010	Aggregates - Base, Subbase, Select Subgrade, and Backfill Material

1.3 Submittals

.1 Obtain certificates from suppliers that attest that supplied materials comply with Specifications and submit to Consultant.

.2 Obtain copies of waybills for supplied granular backfill material and submit to Consultant at end of each workday.

.3 Unit weight of supplied materials will be determined by average of three compaction tests conducted in the field or by using minimum specified weights and volume based on measured areas.

2.0 PRODUCTS

2.1 Materials

.1 Gradations to be within specified limits when tested to ASTM C117 and ASTM C136/136M. Sieve sizes to CAN/CGSB-8.1 and/or CAN/CGSB-8.2.

.2 Granular base to be Granular “A” to OPSS 1010. Inclusion of reclaimed asphalt pavement (RAP) and/or reclaimed concrete materials (RCM) will be at Consultant’s discretion.

.3 Granular subbase to be Granular “B” to OPSS 1010. Inclusion of reclaimed asphalt pavement (RAP) and/or reclaimed concrete materials (RCM) will be at Consultant’s discretion.

.4 Crushed stone or gravel shall consist of hard, durable, angular particles that are free from clay lumps, cementation, organic material, frozen material, and other deleterious materials.

.5 Geotextile filter fabric/ cloth to be Terrafix 200R manufactured by Terrafix Geosynthetics Inc.

3.0 EXECUTION

3.1 Surface Preparation Prior to Installation of New Material

.1 Verify grade of items set in work area for conformance with required elevations before placing granular backfill materials. Prepare and compact subgrade prior to placing granular backfill materials.

.2 Allow for Consultant review of subgrade before placing granular backfill materials.

.3 Place granular backfill materials only on clean unfrozen subgrade and backfill material that is free from snow and ice.

.4 Place granular backfill materials to compacted thicknesses indicated in Contract Documents. Do not place frozen material.

.5 Place granular backfill materials in layers not exceeding 150 mm compacted thickness. Compact to density not less than 98% of maximum dry density (MDD) determined using standard proctor test.

.6 Finished base surface to be within 10 mm of specified grade but not uniformly high or low. Where grades are not specified on Drawings, confirm requirements with Consultant and ensure slopes to drains and catch basins, and away from building walls.

.7 Replace all damaged, deteriorated, and unsuitable sections of existing subgrade material prior to placement of granular backfill material.

3.2 Compacting

.1 Compact subgrade and granular backfill materials in accordance with the Ontario Provincial Standard Specifications, using proper equipment to achieve specified density, and complying with OPSS 501.

.2 Compact subgrade and granular backfill materials to a minimum of 98% of MDD as determined by the standard proctor test method.

.3 Density is to be measured using a nuclear density gauge.

.4 Finished surfaces to be to finished grades where indicated, or as directed by the Consultant, with slope to drains and catch basins, and away from building walls.

.5 Finished surfaces to be uniform, smooth, even, dense, and free from shallow areas, protrusions, and surplus backfill. Correct any irregularities that vary more than 6 mm in 3,050 mm (1/4” in 10’-0”).

3.3 Inspection and Testing

.1 Testing to be conducted by a testing agency designated by the Owner. Unless otherwise noted, the Owner will pay costs of inspection and testing described in this Section.

.2 Inform Consultant and testing agency 72 hours in advance of work to be performed under this Section.

.3 Testing may include site sampling and laboratory testing and/or in-situ compaction testing.

END OF SECTION

1. GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.

1.1.2 All depths of materials indicated on the drawings and in these specifications refer to minimum required depth of materials, after compacting.

1.2 REFERENCE STANDARDS

1.2.1 ASTM International

1.2.1.1 ASTM C443M, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).

1.2.1.2 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3(600 kN-m/m3)).

1.2.1.3 ASTM D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.

1.2.1.4 ASTM D2680, Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.

1.2.1.5 ASTM D3034, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

1.2.1.6 ASTM F405, Standard Specification for Corrugated Polyethylene (PE) Tubing and Fittings.

1.2.1.7 ASTM F667, Standard Specification for Large Diameter Corrugated Polyethylene Tubing and Fittings.

1.2.1.8 ASTM F794, Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

1.2.2 CSA Group (CSA)

1.2.2.1 CAN/CSA-B1800, Thermoplastic Non-pressure Pipe Compendium - B1800 Series.

1.3 DELIVERY, STORAGE AND HANDLING

1.3.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.

1.3.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

1.3.2.1 Storage and Handling Requirements:

1.3.2.2 Store materials in accordance with manufacturer's recommendations.

1.3.2.3 Store and protect pipes from damage.

1.3.2.4 Replace defective or damaged materials with new.

2. PRODUCTS

2.1 MATERIALS

2.1.1 Flexible drainage pipe: Big "O" 404 perforated flexible pipe with filter wrap, and appropriate fittings and joining materials. Diameter of pipe shall be as indicated on the drawings.

2.1.2 Rigid non-perforated shall be in accordance with OPSS 405. Diameter of pipe shall be as indicated on the drawings.

2.1.3 Drainage course aggregate and trench backfill materials shall be in accordance with Specification Section 312300 - Excavation, Backfill and Site Grading and as indicated on the drawings.

2.1.4 All other materials not specifically described but required for a complete and proper installation, shall be selected by the Contractor, subject to the review of the Consultant.

3. EXECUTION

3.1 PREPARATION

3.1.1 Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of Consultant.

3.2 TRENCHING

3.2.1 Do trenching Work in accordance with Section 31 23 00 - Excavation, Backfill and Site Grading.

3.2.2 Protect trench from contents of sewer.

3.2.3 Trench alignment and depth to approval of Consultant prior to placing bedding material and pipe.

3.2.4 Water jetting of backfill under haunches of corrugated steel pipe may be permitted if recommended by manufacturer and approved by Consultant.

3.3 CONCRETE BEDDING AND ENCASEMENT

3.3.1 Do concrete Work in accordance with Section 321600 - Concrete Works. Place concrete to details as indicated directed by Consultant.

3.3.2 Position pipe on concrete blocks to facilitate placing of concrete.

3.3.3 When necessary, rigidly anchor or weight pipe to prevent flotation when concrete is placed.

3.3.4 Backfill over concrete as directed by Consultant.

3.4 GRANULAR BEDDING

3.4.1 Place bedding in unfrozen condition.

3.4.2 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth as indicated in drawings.

3.4.3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.

3.4.4 Do not use blocks when bedding pipes.

3.4.5 Shape transverse depressions as required to suit joints.

3.4.6 Compact each layer full width of bed to at least 95% maximum density to ASTM D698.

3.4.7 Fill excavation below bottom of specified bedding adjacent to manholes or catch basins with compacted common backfill.

3.4.8 INSTALLATION

3.4.9 Lay and join pipe in accordance with manufacturer's recommendations and to approval of Consultant.

3.4.10 Handle pipe using methods approved by Consultant.

3.4.10.1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.

3.4.11 Lay pipes on prepared bed, true to line and grade with pipe inverts smooth and free of sags or high points.

3.4.11.1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.

3.4.12 Begin laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.

3.4.13 Do not place pipe in direct contact with rigid materials such as rock, brick, or wood. Do not use grade stakes, stones, masonry or concrete fragments or any type of shim under pipe.

3.4.14 Join pipe sections by means of couplings. Provide end plugs on open ends of pipe runs at high points.

3.4.15 Aggregate materials shall be damp when placed. If necessary, spray with water using fog nozzle to assist hydraulic consolidation.

3.4.16 Place aggregate materials by hand around and above pipe in successive 150mm lifts. Consolidate each lift by tamping moderately; prevent damage to pipes.

3.4.17 **PIPE SURROUND**

3.4.18 Place surround material in unfrozen condition.

3.4.19 Upon completion of pipe laying, and after Consultant has inspected pipe joints, surround and cover pipes as indicated.

3.4.20 Leave joints and fittings exposed until field testing is completed.

3.4.21 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.

3.4.22 Do not dump material.

3.4.23 Place layers uniformly and simultaneously on each side of pipe.

3.4.24 Compact each layer from pipe invert to mid height of pipe to at least 95 % maximum density to ASTM D698.

3.4.25 Compact each layer from mid height of pipe to underside of backfill to at least 90% maximum density to ASTM D698.

3.4.26 When field test results are acceptable to Consultant, place surround material at pipe joints.

3.4.27 **BACKFILL**

3.4.28 Place backfill material in unfrozen condition.

3.4.29 Place backfill material, above pipe surround, in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.

3.4.30 Under paving and walks, compact backfill to at least 95 % maximum density to ASTM D698. In other areas, compact backfill to at least 90% maximum density to ASTM D698.

3.4.31 Place unshrinkable backfill in accordance with Section 31 23 00 - Excavation, Backfill and Site Grading.

3.5 UNDERCROSSING

3.5.1 Excavate working pit to dimensions indicated, outside right-of-way to be crossed.

3.5.2 Excavate working pit to minimum of 0.5 m below lowest invert of encasing pipe.

3.5.3 Dewater excavation.

3.5.4 Dewater area of undercrossing.

3.6 LAYOUT:

3.6.1 Establish grades and inverts from appropriate benchmarks. Lay out lines as indicated on the drawings.

3.6.2 Slope drainage pipes at least 0.5%.

3.6.3 Lay pipe in straight lines; turn corners using 45-degree bends.

3.7 PAVING DRAINAGE:

3.7.1 Provide sub-drainage below paved areas to the extent indicated on the drawings.

3.7.2 Connect drainage pipes to catch basins, unless otherwise indicated on the drawings.

3.8 FIELD TESTS AND INSPECTIONS

3.8.1 Repair or replace pipe, pipe joint or bedding found defective.

3.8.2 Draw tapered wooden plug with diameter of 50 mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstruction directed by Consultant.

3.8.3 Remove foreign material from sewers and related appurtenances by flushing with water.

3.9 CLEANING

3.9.1 Progress Cleaning: clean in accordance with Section 010005 - General Requirements.

3.9.2 Leave Work area clean at end of each day.

3.9.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 010005 - General Requirements.

END OF SECTION

1. GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 The work described in this Section shall include furnishing all equipment, labour, materials and services to supply and install site asphalt paving, as shown on the drawings and specified herein.

1.1.2 The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.

1.1.3 All depths of materials indicated on the drawings and in these specifications refer to minimum required depth of materials, after compacting.

1.1.4 Provide asphalt paving including, but are not limited to;

1.1.4.1 Asphalt pavement, walks and curbs.

1.1.4.2 Walls and footings as required and/or as indicated on Drawings.

1.1.4.3 Ornamental finishing enhancements, such as patterning/stamping of concrete work.

1.2 REFERENCES

1.2.1 Asphalt Institute (AI):

1.2.1.1 AI MS-2-Sixth Edition 1994, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.

1.2.1.2 ASTM International

1.2.1.3 ASTM C88- 05, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.

1.2.1.4 ASTM C117-04, Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.

1.2.1.5 ASTM C123-04, Standard Test Method for Lightweight Particles in Aggregate.

1.2.1.6 ASTM C127-07, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.

1.2.1.7 ASTM C128-07a, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.

1.2.1.8 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

1.2.1.9 ASTM C136-06, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

1.2.1.10 ASTM C207-2006, Standard Specification for Hydrated Lime for Masonry Purposes.

1.2.1.11 ASTM D995-95b (2002), Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.

1.2.1.12 ASTM D2419-09, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

1.2.1.13 ASTM D3203-94(2005), Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.

1.2.1.14 ASTM D4791-05e1, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.2.2 OPSS Ontario Provincial Standard Specification.

1.3 DESIGN REQUIREMENTS

1.3.1 Design concrete so that material will not segregate and excessive bleeding will not occur.

1.3.2 Comply to the MTC Manual of Uniform Traffic Control Devices for signs and flagging when working within existing road ways. Any requirements to restrict local traffic due to the contractors works, must be reviewed and approved by the Consultant.

1.3.3 Design falsework / formwork in accordance with CAN/CSA S269.3-M.

1.4 SUBMITTALS

1.4.1 Product Data:

1.4.2 Submit manufacturer's instructions, printed product literature and data sheets for asphalt mixes and aggregate and include product characteristics, performance criteria, physical size, finish and limitations.

1.4.3 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C 4 weeks prior to beginning Work.

1.4.4 Submits to be in accordance with Section 01 00 05.

1.5 QUALITY ASSURANCE

1.5.1 Subcontractor Qualifications: Subcontractor performing this Work shall have adequate equipment for project, and skilled trades people so that Work is performed expeditiously; and is known to have been responsible for satisfactory installations similar to that specified during a period of at least the previous 2 years.

1.5.2 Allowable Tolerances:

1.5.2.1 Grade base courses with surfaces within 13 mm of established elevations and within a tolerance of 13 mm under a 3000 mm long straight edge.

1.6 INSPECTION AND TESTING

1.6.1 Contractor shall carry out inspection and testing of the Work of this Section, and provide documentation of such testing to the Consultant in accordance with Section 01 00 05 – General Requirements.

1.6.2 The Contractor shall coordinate their work, providing a schedule and notifications at the appropriate times, to allow an independent testing agency to carry out inspection and testing of the Work of this Section, in accordance with Section 01005-General Requirements.

1.6.3 The Contractor shall provide washed sieve gradation analysis for all aggregates and granular materials to be used in accordance with MTO Laboratory Testing Manual Section LS-602 and related standards.

1.6.4 The Contractor shall provide asphalt mix designs in accordance with OPSS 1003 and OPSS 1150 and related standards.

1.6.5 The Contractor shall coordinate their work, providing a schedule and notifications at the appropriate times, to allow an independent testing agency to carry out field inspections and compaction testing of all compacted sub-grade and base materials in accordance with MTO Laboratory Testing Manual Section LS-623 and related standards.

1.6.6 The Contractor shall coordinate their work, providing a schedule and notifications at the appropriate times, to allow an independent testing agency to carry out field inspections and Marshall compaction testing of all compacted asphalt materials in accordance with MTO Laboratory Testing Manual Section LS-287 and related standards.

1.6.7 The Contractor shall not proceed with work that depends upon the work of this Section until it has been deemed in conformance with these specifications. The independent testing agency shall maintain and distribute in a timely manner a record showing the location and result of inspections and testing conducted.

1.6.8 The Contractor shall maintain a record showing the location and result of inspections and testing conducted. These records shall be submitted to the Consultant when requested, or prior to proceeding with work that depends upon the work of this Section.

1.7 DELIVERY, STORAGE AND HANDLING

1.7.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.

1.7.2 Deliver and stockpile aggregates in accordance with Section 01 00 05. Stockpile minimum 50 % of total amount of aggregate required before beginning asphalt mixing operation.

1.7.2.1 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.

1.7.2.2 Stockpile fine aggregate separately from coarse aggregate, although separate stockpiles for more than two mix components are permitted.

1.7.2.3 Provide approved storage, heating tanks and pumping facilities for asphalt cement.

2. PRODUCTS

2.1 MATERIALS

2.1.1 Performance graded asphalt cement: to AASHTO M320, grade PG 28-58 when tested to AASHTO R29.

2.1.2 GRANULAR BASE MATERIAL:

2.1.2.1 Granular 'A': All granular base material (unless otherwise noted) shall be manufactured granular, crushed from limestone rock, described as Granular 'A', conforming to the requirements of Ontario Provincial Standard Specification OPSS 1001, "Aggregates - General", OPSS 1003, "Aggregates - Hot Mix Asphalt", and OPSS 1010, "Aggregates – Base, Subbase, Select Subgrade, and backfill Material." **All granular materials are to be crushed natural stone. Crushed recycled concrete is not an acceptable substitution.**

2.1.3 CONCRETE BASE MATERIAL FOR COMPOSITE PAVEMENTS:

2.1.3.1 Concrete shall be in conformance with specification section 32 16 00

2.1.4 ASPHALTIC MATERIAL:

2.1.4.1 Asphaltic Material HL3A as conforming to the requirements of Ontario Provincial Standard Specification OPSS 1150.

2.1.5 PAVEMENT COMPOSITION:

2.1.5.1 For **medium-duty** pavement, the pavement composition shall be as follows:

Specifications	**Materials**	**Thickness**
Asphaltic Material (OPSS 1150)	HL3	40mm
Asphaltic Material (OPSS 1150)	HL8	50mm
Granular Base Material (OPSS 1001, OPSS 1010)	Granular 'A'	200mm minimum

* In tree protection areas, granular base shall be installed only to depths required for leveling course—no excavation is permitted.

2.1.6 Tactile walking surface indicators: Cast iron, stainless steel or reinforced fiberglass with truncated domes to CSA B651.

2.2 EQUIPMENT

2.2.1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.

2.2.2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.

2.2.3 Vibratory rollers:

2.2.3.1 Drum diameter: 1200 mm minimum.

2.2.3.2 Amplitude of vibration (machine setting): 0.5 mm maximum for lifts less than 40 mm thick.

2.2.4 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:

2.2.4.1 Boxes with tight metal bottoms.

2.2.4.2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.

2.2.4.3 In cool weather or for long hauls, insulate entire contact area of each truck box.

2.2.4.4 Use only trucks which can be weighed in single operation on scales supplied.

2.2.5 Hand tools:

2.2.5.1 Lutes or rakes with covered teeth for spreading and finishing operations.

2.2.5.2 Tamping irons having mass 12 kg minimum and bearing area not exceeding 310 cm2 for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by, may be used instead of tamping irons.

2.2.5.3 Straight edges, 4.5 m in length, to test finished surface.

3. EXECUTION

3.1 PROTECTIONS

3.1.1 Prevent damage to adjacent buildings, wall surfaces, and pavements scheduled to remain.

3.1.2 Keep all traffic off this Work until materials have cured and reached design strength. Because of the public nature of this Work, a 24-hour guard following critical pours may be required.

3.1.3 Protect concrete surfaces exposed to view from grease, oil and other soil that will affect appearance of concrete.

3.1.4 Barriers and Lights: Contractor shall erect and maintain such barriers and lights as will effectively prevent any accident on the site. The Contractor shall be liable for all damages occasioned in any way by their acts or neglect or that of his agents, employees or workers.

3.2 EXAMINATION

3.2.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for asphalt paving in accordance with manufacturer's written instructions.

3.2.2 Visually inspect substrate in presence of Consultant.

3.2.3 Inform Consultant of unacceptable conditions immediately upon discovery.

3.2.4 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.3 PREPARATION

3.3.1 Reshape asphalt pavement or granular roadbed in accordance with Drawings and Specification here in.

3.3.2 When paving over existing asphalt surface, clean pavement surface in accordance with Drawings and Specification here in.

3.3.3 When levelling course is not required, patch and correct depressions and other irregularities to approval of Consultant before beginning paving operations.

3.3.4 Prior to laying mix, clean surfaces of loose and foreign material.

3.4 PLACING

3.4.1 Obtain Consultant's approval of base prior to placing asphalt.

3.4.2 Place asphalt concrete to thicknesses, grades and lines as indicated in Drawings.

3.4.3 Placing conditions:

3.4.3.1 Place asphalt mixtures only when air temperature is 5 degrees C minimum.

3.4.3.2 When temperature of surface on which material is to be placed falls below 10 degrees C, provide extra rollers as necessary to obtain required compaction before cooling.

3.4.3.3 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.

3.4.4 Place asphalt concrete in compacted lifts of thickness as indicated.

3.4.5 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300 mm

3.4.6 On parking lots commence spreading at high side of pavement or at crown and span crowned centerlines with initial strip.

3.4.7 All asphalt edges not contained by hard edges shall have uniform lines with a hand tamped 45° angle. All pathway edges shall have a "smooth", curvilinear appearance. The Consultant reserves the right to request that sections of pathway be reworked to achieve the desired appearance.

3.4.8 Exercise care to prevent contamination of materials.

3.4.9 Spread and strike off mixture with self propelled mechanical finisher:

3.4.9.1 Construct longitudinal joints and edges true to line markings.

1. Consultant to establish lines for paver to follow parallel to centerline of proposed pavement. Position and operate paver to follow established line closely.

3.4.9.2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver.

1. Work pavers as close together as possible and in no case permit them to be more than 30m apart.

3.4.9.3 Maintain constant head of mix in auger chamber of paver during placing.

3.4.9.4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.

3.4.9.5 Correct irregularities in alignment left by paver by trimming directly behind machine.

3.4.9.6 Correct irregularities in surface of pavement course directly behind paver.

1. Remove excess material forming high spots using shovel or lute.
    1. Fill and smooth indented areas with hot mix.
    2. Do not broadcast material over such areas.

3.4.9.7 Do not throw surplus material on freshly screeded surfaces.

3.4.10 **When hand spreading is used:**

3.4.10.1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section.

1. Use measuring blocks and intermediate strips to aid in obtaining required cross-section.

3.4.10.2 Distribute material uniformly without broad casting material.

3.4.10.3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes.

1. Reject material that has formed into lumps and does not break down readily.

3.4.10.4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.

3.4.10.5 Provide heating equipment to keep hand tools free from asphalt.

1. Control temperature to avoid burning material.
2. Do not use tools at higher temperature than temperature of mix being placed.

3.5 JOINTS

3.5.1 General:

3.5.1.1 Remove surplus material from surface of previously laid strip.

1. Do not deposit on surface of freshly laid strip.

3.5.1.2 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated.

3.5.1.3 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.

3.5.2 Transverse joints:

3.5.2.1 Offset transverse joint in succeeding lifts by at least 600 mm.

3.5.2.2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.

3.5.2.3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.

3.5.3 Longitudinal joints:

3.5.3.1 Offset longitudinal joints in succeeding lifts by at least 150 mm.

3.5.3.2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100 degrees C prior to paving of adjacent lane.

1. For airfield runway paving, avoid cold joint construction in mid 30 m of runway.
2. If cold joint can not be avoided, cut back by saw cutting previously laid lane, by at least 150 mm, to full depth vertical face, and tack face with thin coat of hot asphalt of adjacent lane.

3.5.3.3 Overlap previously laid strip with spreader by 25 to 50 mm.

3.5.3.4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.

3.5.3.5 Roll longitudinal joints directly behind paving operation.

3.5.3.6 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.

3.5.4 Construct butt joints as indicated.

3.6 FINISH TOLERANCES

3.6.1 Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low.

3.6.2 Finished asphalt surface not to have irregularities exceeding 5 mm when checked with 4.5 m straight edge placed in any direction.

3.7 DEFECTIVE WORK

3.7.1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required.

3.7.1.1 If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true and even surface and compact immediately to specified density.

3.7.2 Repair areas showing checking, rippling, or segregation.

3.7.3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

3.8 CLEANING

3.8.1 Progress Cleaning: clean in accordance with Section 01 00 05.

3.8.1.1 Leave Work area clean at end of each day.

3.8.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 00 05.

3.8.2.1 Remove containers and bins from site and dispose of materials at appropriate facility.

3.9 REPAIRING & CLEANUP

3.9.1 The Contractor shall be held responsible for any damage or defacing done to the finished Work by other parties until the finished Work is accepted by the Consultant and shall repair or replace any damaged or defaced portion of the Work as required by the Consultant. The Contractor is required to provide adequate protection to ensure that fresh asphalt is not vandalized.

3.10 MAINTENANCE

3.10.1 Maintain all asphalt up until the date of acceptance by the Owner.

3.10.2 Maintenance shall include all repair work necessary to keep asphalt paving at required grades and to keep surface clean and intact until final acceptance.

3.10.3 The Contractor shall keep all pathways clean and clear of any mud tracks or other debris both on and off the site.

END OF SECTION

1. GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 The work described in this Section shall include furnishing all equipment, labour, materials and services to supply and install site concrete work, as shown on the drawings and specified herein.

1.1.2 The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.

1.1.3 All depths of materials indicated on the drawings and in these specifications refer to minimum required depth of materials, after compacting.

1.1.4 Provide concrete work including, but are not limited to;

1.1.4.1 Concrete pavement, walks and curbs.

1.1.4.2 Walls and footings as required and/or as indicated on Drawings.

1.1.4.3 Ornamental finishing enhancements, such as patterning/stamping of concrete work.

1.2 REFERENCES

1.2.1 ASTM A1064/A1064-M, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

1.2.2 ASTM C94, Standard Specification for Ready-Mixed Concrete.

1.2.3 ASTM C309, Specification For Membrane-Forming Compounds for Curing Concrete.

1.2.4 CAN/CSA A23.1/A23.2-M, Concrete Materials and Methods of Concrete Construction/Methods of Tests For Concrete.

1.2.5 CAN/CSA A23.3, Design of Concrete Structures.

1.2.6 CAN/CSA A3000, Cementitious Materials Compendium.

1.2.7 CSA O121, Douglas Fir Plywood.

1.2.8 CAN/CSA S269.3-M, Concrete Formwork.

1.2.9 OPSS Ontario Provincial Standard Specification.

1.3 DESIGN REQUIREMENTS

1.3.1 Design concrete so that material will not segregate and excessive bleeding will not occur.

1.3.2 Comply to the MTC Manual of Uniform Traffic Control Devices for signs and flagging when working within existing road ways. Any requirements to restrict local traffic due to the contractors works, must be reviewed and approved by the Consultant.

1.3.3 Design falsework / formwork in accordance with CAN/CSA S269.3-M.

1.4 SUBMITTALS

1.4.1 Concrete Mix Designs: Submit concrete mix designs for review.

1.4.2 Shop Drawings: The Contractor shall submit shop drawings of all concrete reinforcing.

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

1.4.4 Concrete Pour Records: Record time, date, delivery slip serial number and location of each concrete pour and identify related test cylinders. Keep these records on-site until project is completed.

1.4.5 Submits to be in accordance with Section 010005 – General Requirements.

1.4.6 Submit full size paver samples for Consultant's approval of shape and colour two weeks prior to installation.

1.5 QUALITY ASSURANCE

1.5.1 Subcontractor Qualifications: Subcontractor performing this Work shall have adequate equipment for project, and skilled trades people so that Work is performed expeditiously; and is known to have been responsible for satisfactory installations similar to that specified during a period of at least the previous 2 years.

1.5.2 Contractor is to retain an independent testing agency to provide quality assurance testing of concrete materials and to verify that the concrete has been installed in conformance with the specifications. The testing agency must be approved by the Consultant prior to being retained. Laboratory facilities and field technicians are to be certified by the Canadian Standards Association (CSA).

1.5.3 Allowable Tolerances:

1.5.3.1 Grade base courses with surfaces within 13 mm of established elevations and within a tolerance of 13 mm under a 3000 mm long straight edge.

1.5.3.2 Install all concrete features to within +/- 5 mm of indicated finished elevations or as approved by the Consultant.

1.6 INSPECTION AND TESTING

1.6.1 Contractor shall carry out inspection and testing of the Work of this Section, and provide documentation of such testing to the Consultant in accordance with Section 01 00 05.

1.6.2 Concrete inspection and testing:

1.6.2.1 Materials: CAN/CSA A23.1/A23.2-M; Inspect and test for conformance to requirements of this Standard and to Specifications.

1.6.2.2 Tests will be made in accordance with CAN/CSA A23.2-M.

1.6.2.3 Remove defective materials and completed Work which do not conform to the Contract Documents.

1.6.3 Contractor shall provide washed sieve gradation analysis for all aggregates and granular materials to be used in accordance with MTO Laboratory Testing Manual Section LS-602 and related standards.

1.6.4 Contractor shall carry out field inspections and compaction testing of all compacted sub-grade and base materials in accordance with MTO Laboratory Testing Manual Section LS-623 and related standards.

1.6.5 Inspection Reports: Submit written reports of any inspection and/or tests.

1.6.5.1 Distribute reports as follows: One (1) copy to the Consultant, One (1) copy to the Owner.

1.6.5.2 Concrete cylinder test reports shall include:

1. Specific location of concrete represented by sample
2. Design strength

3. Unit weight of sample
4. Exposure class
5. Aggregate size and admixtures incorporated
6. Date, hour and temperature at time sample was taken
7. Percentage air content
8. Test strength of cylinder
9. Type of failure if test fails to meet specification

1.6.6 Testing and Replacement of Deficient Concrete in Place:

1.6.6.1 Contractor shall pay for additional testing and related expenses if concrete has proved to be deficient.

1.6.6.2 Contractor shall 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.

1.6.7 The Contractor shall maintain a record showing the location and result of inspections and testing conducted. These records shall be submitted to the Consultant when requested, or prior to proceeding with work that depends upon the work of this Section.

1.7 DELIVERY, STORAGE AND HANDLING

1.7.1 Delivery and Acceptance Requirements:

1.7.2 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.

1.7.2.1 Modifying maximum time limit without receipt of prior written agreement from Client and Designer and concrete producer as described in CSA A23.1/A23.2. is prohibited.

1.7.2.2 Deviations submitted for review by Consultant.

1.7.2.3 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

1.8 SITE CONDITIONS

1.8.1 Environmental Requirements: Commence placing and perform compaction of granular base courses when sub-grade temperature is at least 2º Celsius and rising.

1.8.2 Provide protection to maintain concrete continuously moist during curing period.

1.8.3 Provide same specified protection for storage of each concrete compression specimen as for concrete from which it was taken, until it is sent to testing laboratory.

1.8.4 Placing concrete during rain or weather events that could damage concrete is prohibited.

1.8.5 Protect newly placed concrete from rain or weather events in accordance with CSA A23.1/A23.2.

1.8.6 Cold weather protection:

1.8.6.1 Maintain protection equipment, in readiness on Site.

1.8.6.2 Use such equipment when ambient temperature below 5°C, or when temperature may fall below 5°C before concrete cured.

1.8.6.3 Placing concrete upon or against surface at temperature below 5°C is prohibited.

1.8.7 Hot weather protection:

1.8.7.1 Protect concrete from direct sunlight when ambient temperature above 27°C.

1.8.7.2 Prevent forms of getting too hot before concrete placed. Apply accepted methods of cooling not to affect concrete adversely.

1.8.8 Concrete shall be placed in the dry and protect from drying.

2. PRODUCTS

2.1 MATERIALS

2.1.1 Cementing Materials: Portland Cement to CAN/CSA A3000, Type 10.

2.1.2 Granular Sub-Base Course: Compacted granular materials as indicated on the Drawings and in accordance with the requirements of Section 31 23 00.

2.1.3 Formwork:

2.1.3.1 Formwork materials brought on-site shall be new.

2.1.3.2 Generally: Douglas Fir, minimum thickness of 17 mm, to CSA O121, finished one side, fabricated specially for use as concrete form panels, with sealed edges, free of warp and of sufficient strength to resist displacement during the placing and consolidation of the concrete. Curved forms shall be of 25 mm nominal thickness.

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

2.1.3.4 Chamfers: cut from smooth, single pieces of wood, with no open defects and of sufficient dimension to construct specified chamfers.

2.1.3.5 Mechanical curb machine is subject to the approval of the Consultant.

2.1.3.6 All form work shall be clean and treated with a non-staining mineral oil before concrete is placed, and so constructed as to prevent honeycombing.

2.1.4 Reinforcing steel:

2.1.4.1 Reinforcing steel shall be epoxy-coated Grade 400 and supplied and placed in accordance with OPSS 905, and as indicated on the Drawings. Reinforcing steel shall not be welded.

2.1.4.2 Welded steel wire fabric, as required: ASTM A1064/A1064-M; resistance welded in size and spacing shown for smooth wire fabric and deformed wire fabric, in flat sheets only.

2.1.5 Expansion Joints:

2.1.5.1 Rigid Expansion Joint Filler shall be non-bituminous pre-moulded joint filler (polyethylene) in 13mm thickness, to OPSS 1308, Type A, except as otherwise shown. Joint filler shall be cut to full cross-section shape as detailed.

2.1.5.2 Expansion Joint Sealant shall be a fast-setting, 2-part polyeurethane material intended for sealing expansion joints in new exterior concrete applications. Colour to match adjacent concrete surfaces.

2.1.6 Curing Compound: White-pigmented, chlorinated, rubber-based curing compound, ASTM C309 Type 2, suitable for exterior use, shall not be used on any exposed concrete surfaces, unless specifically indicated on the Drawings or herein, or approved by the Consultant.

2.1.7 Structural Grout: Non-shrink, non-metallic, chloride free grout, capable of providing continuous support. 'Sika M-Bed Standard' by Sika Canada or approved alternative. The minimum compressive strength of the grout at 28 days shall be 40 MPa. Colour of structural grout shall match adjacent surfaces as nearly as possible.

2.1.8 Tactile walking surface indicators: Cast iron, stainless steel or reinforced fiberglass with truncated domes to CSA B651

2.2 REINFORCING STEEL FABRICATION

2.2.1 Fabricate reinforcing steel only in a permanent fabricating shop unless otherwise approved by Consultant.

2.2.2 Fabricate reinforcing steel in accordance with Drawings, where applicable. Tag reinforcing bars to indicate placement as designated on shop drawings.

2.2.3 Splices: Provide splices where required. Laps to be Class B Tension Lap Splices in accordance with CAN/CSA A23.3 unless otherwise shown.

2.3 CONCRETE MIXES

2.3.1 Concrete for all concrete works shall be ready mixed.

2.3.2 Design concrete mix in conformance with CAN/CSA A23.1/A23.2-M, Class F-1 exposure. Submit evidence and material samples if requested, acceptable to testing laboratory to verify that proposed concrete mix design will produce specified quality of concrete. Design mixes shall be compatible with the selected finishing products for each area.

2.3.3 32 MPa minimum, and 40 MPa maximum compressive strength at 28 days unless indicated otherwise on Drawings. Minimum aggregate size to be 20 mm.

2.3.4 Concrete Weight: Air dry unit weight shall be: minimum 2320 kg/m3 adjusted proportionally for maximum air content as per CAN/CSA A23.1/A23.2-M, Clause 15, Table 8.

2.3.5 Air content: Provide air content in accordance with Clause 15, Table 8 of CAN/CSA A23.1/A23.2-M.

2.3.6 Air entrainment for the Portland cement concrete shall meet the requirements of ASTM C94, or CAN/CSA A23.1/A23.2-M. The cement factor shall not be less than 335 kg per cubic metre and the water cement volume ratio shall not exceed 0.45.

2.3.7 Concrete to have a uniform consistency and slump. The slump shall be between 25 mm and 75 mm for hand vibrated concrete, between 50 mm and 100 mm for hand tamped or spaded concrete.

2.3.8 Admixtures:

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

2.3.8.2 Air-Entraining Agent: Incorporate air-entraining agent in addition to chemical admixture in concrete in accordance with CAN/CSA A23.1/A23.2-M, Clause 15, Table 10.

2.3.8.3 The use of admixtures to prevent freezing or to accelerate setting of the concrete is prohibited.

2.3.8.4 Calcium Chloride: Do not use calcium chloride or admixtures containing chloride in concrete. Conform to Reference Standards for chemical and air-entraining admixtures.

3. EXECUTION

3.1 PROTECTION

3.1.1 Prevent damage to adjacent buildings, wall surfaces, and pavements scheduled to remain.

3.1.2 Keep all traffic off this Work until materials have cured and reached design strength. Because of the public nature of this Work, a 24-hour guard following critical pours may be required.

3.1.3 Protect concrete surfaces exposed to view from grease, oil and other soil that will affect appearance of concrete.

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

3.1.5 Protect concrete from cold temperatures. Provide insulation and/or heat as required.

3.1.6 Barriers and Lights: Contractor shall erect and maintain such barriers and lights as will effectively prevent any accident on the site. The Contractor shall be liable for all damages occasioned in any way by their acts or neglect or that of his agents, employees or workers.

3.2 EXCAVATION

3.2.1 Sand Excavation shall be in accordance with Section 31 23 00, or as required during the course of the Work by the Consultant. Disturbed material in the bottom of the excavation shall be thoroughly consolidated to the satisfaction of the Consultant by rolling or tamping, or both.

3.2.2 Sub-grade shall be excavated or filled with suitable material to the required grades and lines. Filled sections shall be compacted and extend a minimum of 300 mm outside the form lines. Water shall be used as an aid to compaction where required.

3.3 GRANULAR BASE

3.3.1 Contractor shall not proceed with placement of the granular base until the finished sub-grade has been verified by the Consultant.

3.3.2 On the sub-grade brought to the correct line and elevation as above described shall be placed a layer of Granular Base Course "Type A". After being placed and compacted, the granular base course shall have a minimum uniform thickness of base depth.

3.3.3 Compaction requirements for granular base shall be as indicated on the Drawings and in accordance with Specification Section 31 23 00.

3.3.4 Prior to the placing of the concrete, a vapour barrier of sub-grade paper or polyethylene film shall be placed on the prepared base. The polyethylene film shall be a minimum of 4 mm thick.

3.4 FORMWORK

3.4.1 Forms shall be of wood or metal and of sufficient strength to resist springing, tipping or other displacement due to the placing of concrete and such other loads as may be superimposed during construction. Forms shall be free from warps, splits, holes and bulges and all bolts, rivets and fittings shall be countersunk.

3.4.2 Forms shall be erected without the use of internal ties and shall be sufficiently tight to prevent leakage.

3.4.3 Faces of forms against which concrete is to be placed shall, before the placing of concrete, be thoroughly cleaned and coated with an approved non staining oil or other approved material.

3.4.4 Flexible or rigid forms of proper curvature may be used for curves having a radius of 30m or less. Division plates shall be metal.

3.4.5 Forms when tested with a 3-metre straight edge or curved template shall not deviate on the top surface more than 3mm nor on the inside faces more than 6 mm from the testing edge of the template.

3.4.6 Build formwork with joints sufficiently tight to prevent leakage of grout or cement paste. Install chamfers at external corners exposed to view where shown on the Drawings. Do not embed wood in concrete.

3.5 SUBGRADE AND SUBBASE PREPARATION

3.5.1 Soft, yielding materials or other portions of subgrade that will not compact to specification shall be removed and replaced with suitable material. Subgrade to be brought to a firm unyielding condition with a uniform density. It shall be compacted at or above optimum moisture content to [95] % Standard Proctor density.

3.5.2 When concrete is placed directly on subgrade, it will be checked for conformity with the cross-section tolerance. Finished surface shall not deviate more that 3 mm above and 10 mm below specified grade and cross-section, and the surface shall not deviate more than 10 mm at any place on a 3 mm template.

3.5.3 Subbase to consist of specified material and have a compacted thickness of not less than specified.

3.5.4 For slip-form paving, subbase travelled by tracks in paving machine shall be firm and have a smooth surface.

3.5.5 Subbase shall be compacted to specified density.

3.5.6 Prepared subbase shall be checked for conformity with the cross-section and grad tolerances. Finished surface of subbase shall not deviate more than 3 mm above and 10 mm below specified grade and cross-section, and surface shall not deviate more than 10 mm at any place on a 3 mm template.

3.5.7 Repair damage to subbase resulting from hauling or equipment operations.

3.5.8 Prior to placing concrete, subbase shall be thoroughly wetted. Wetting shall be carried out, such that standing water is not present on grade.

3.6 REINFORCEMENT AND DOWELS

3.6.1 Place reinforcement in accordance with requirements of CAN/CSA A23.3, typical details and as indicated on the Drawings. Support reinforcing steel with spacers, chairs or hangers in spaced as closely as possible to prevent displacement of reinforcement from intended position. Bottom steel for slabs resting on granular materials may be supported on concrete chairs.

3.6.2 Dowel bars shall be plain round bars of grade 300 or better conforming to CSA G40.20/G40.21 and be epoxy-coated to requirements of ASTM A775/A775M, also coated with bond breaker material.

3.6.3 Steel for tie bars or tie bolts to comply to CSA G30.18 and be epoxy-coated to ASTM A775/A775M.

3.6.4 Place sufficient number of joint dowel assemblies in advance of paver to avoid delay in concrete placement.

3.6.5 Remove oil, grease, dirt and deleterious material from reinforcing bars before placing concrete.

3.6.6 Steel placement to be approved by Consultant before placing concrete.

3.6.7 Bar hooks shall have standard hook dimensions using minimum bend diameters

3.6.8 Do not cut reinforcement to incorporate other Work.

3.6.9 Relocate or re-bend bars only on written instructions of the Consultant.

3.6.10 Tie, do not weld, reinforcement in place.

3.7 EXAMINATION

3.7.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for concrete paving installation in accordance with manufacturer's written instructions.

3.7.2 Visually inspect substrate in presence of Consultant.

3.7.3 Inform Consultant of unacceptable conditions immediately upon discovery.

3.7.4 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.8 ADJUSTING AND CLEANING

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

3.8.2 Remove contaminants which lessen bond between concrete and reinforcement.

3.9 PLACING CONCRETE

3.9.1 Notify Consultant and obtain permission at least 24 hours prior to proceeding with concrete operation.

3.9.2 No concrete shall be placed until the forms and the base course on which the concrete is to be placed have been inspected by the Consultant.

3.9.3 Coat formwork with form release agent before reinforcement and other built-in items are installed. Do not coat plywood forms pre-treated with release agent.

3.9.4 The freshly mixed concrete shall be deposited on the sub-grade as close as possible to its final position, by methods which will prevent the separation or loss of the materials. The fresh concrete shall be thoroughly spaded along the sides of the forms and at all joints. Concrete shall be thoroughly consolidated in an approved manner to the full depth as soon as it has been placed.

3.9.5 Use hand placing where machine spreading is not feasible.

3.9.6 Spread uniformly with approved equipment to thickness sufficient to allow for proper consolidation and finishing. Do not apply external tractive force to paver.

3.9.7 Operate with continuous forward momentum. Schedule concrete supply to minimize interruptions.

3.9.8 Insert tie bars as indicated.

3.9.9 When completing concrete placement for day, carry placement through to scheduled contraction joint location.

3.9.10 Where concrete placement is stopped for more than 30 min due to breakdowns, weather or other reasons, construct extra bulkhead and construction joint as directed by Consultant.

3.9.11 Equipment for chuting, pumping and pneumatically conveying concrete shall be of such size and design as to insure a practically continuous flow of concrete at the delivery end without separation of the materials. Maximum vertical drop from chutes shall be 1.5 metres.

3.9.12 When placed in the forms, the concrete shall be tamped and struck off with a template riding on the side forms. The concrete should be placed a little high and the template must be sufficiently heavy to compress the concrete and bring it to the required elevation and slope.

3.9.13 Concrete shall not be placed when the prepared sub-grade is frozen or when the sub-grade under the adjacent pavement is frozen. Concrete shall not be placed when the air temperature in the shade is 4.5 deg. C. or less and falling.

3.9.14 No concrete shall be placed during rain.

3.9.15 When rain appears imminent paving operation should cease. Protect freshly laid concrete from rain damage and adverse weather condition and in accordance with CSA A23.1/A23.2. Extend protective coverings over edges of concrete and arrange so as not to bear on unprotected edges.

3.9.16 Concrete placed when the ambient temperature is at or above 27 degrees C to be cured by continuous water curing from soaker hoses providing complete coverage of the pavement to minimize the temperature rise of the concrete.

3.10 CONSOLIDATION

3.10.1 When internal vibrators are used:

3.10.2 For slab depths up to 50 mm, mount vibrators parallel to base at mid depth. For slab depths greater than 50 mm, mount vibrators with tips minimum 50 mm above base and tops minimum 50 mm beneath pavement surface.

3.10.3 Operate at manufacturer's recommended number of vibrations and specifications.

3.10.4 When surface vibrators are used:

3.10.5 Synchronize units on each individual screed or pan.

3.10.6 Operate at minimum of 3,500 vibrations per minute and minimum amplitude of 0.4 mm.

3.11 EXPANSION JOINTS

3.11.1 Joints shall be formed with 13 mm thick full depth joint filler material types 'A' or 'C'.

3.11.2 Granulated cork fillers will not be accepted.

3.11.3 Panels shall be pre cut from a single piece to the shape of the cross section as shown the standard Drawings but so as to provide a 6mm recess on the exposed surfaces.

3.11.4 Maximum spacing of expansion joints to be 4800 mm.

3.11.5 Joints shall be formed with the materials as specified above. Joint filler panels shall be set in a vertical position.

3.11.6 Work in close co-operation with other surface setting trades where this Work becomes integral with other materials. Adhere strictly to expansion and control joint patterns, where indicated.

3.12 ISOLATION JOINTS

3.12.1 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.

3.12.2 Install joint filler in isolation joints as indicated.

3.12.3 Seal isolation joints with sealant approved by Consultant.

3.13 CONTROL / CONSTRUCTION JOINTS

3.13.1 Transverse weakened planed contraction joints shall be hand-formed. The joints may be hand-formed either by (1) using a narrow or triangular jointing tool or a thin metal blade to impress a place of weakness into the plastic concrete, or (2) inserting 3mm thick steel strips into the plastic concrete temporarily. Steel strips shall be withdrawn before final finishing of the concrete.

3.13.2 **For sidewalks:**

3.13.2.1 contraction joints are to be placed so as to divide transversely into lengths of not more than 2000 mm. All edges shall be finished with a tool which produces a rounded edge and a smooth surface of not more than 50 mm in width and a 3 mm thick groove equal to at least one-quarter the depth of 50 mm at 2000 mm intervals. Width of cut shall be 3 mm.

3.13.3 **For sawn joints:**

3.13.3.1 Ensure joints are sawn straight. Install end stakes to ensure straight joint alignment across paved area. Mark joint alignment with chalk line or other suitable guide to approval of Consultant.

3.13.3.2 Saw joints using approved equipment and methods to produce joint dimensions indicated.

3.13.3.3 Restrict speed of saw cutting to ensure proper joint alignment and to avoid damage to concrete.

3.13.3.4 Supply sufficient workers and equipment including standby equipment, to maintain satisfactory sawing schedule.

3.13.3.5 Schedule sawing operations on 24 hours basis and consistent with concrete placing.

3.13.3.6 Make initial saw cuts in progressive manner and as soon as concrete surface has hardened sufficiently to resist ravelling as cut is made and before shrinkage cracks occurs.

3.13.3.7 If cracking occurs ahead of saw cut, stop sawing immediately. Move ahead several joints and cut one or more joints before returning to saw intermediate joints. Where cracking persists, make 1 m saw cut from one edge and complete sawing from opposite edge. Adjust sawing schedule accordingly.

3.13.3.8 If uncontrolled cracking or other surface damage results from inadequate or improper sawing techniques suspend further concrete operations until situation is corrected and immediately remove and replace damaged slabs.

3.13.3.9 Immediately on completion of sawing, flush joints with water to remove laitance.

3.14 FINISHING

3.14.1 The concrete on the upper surface shall be floated with a wood or magnesium float only, to a smooth uniform finish to the required cross-section, free of open texturing, plucked aggregate and local projections.

3.14.2 Care shall be taken to avoid over finishing or working more mortar to the surface than is actually required.

3.14.3 Unless otherwise provided, back edges shall be rounded by use of a 6mm radius edging.

3.14.4 Treat formed surfaces in accordance with CAN/CSA A23.1/A23.2-M, Clause 24 and as additionally specified herein.

3.14.5 Unless otherwise indicated on the Drawings or herein, finish exposed surfaces of concrete paving with a light-broomed finish having lines running parallel to a single axis.

3.14.6 Provide light broom finish to all concrete surfaces that will remain exposed after completion of the Work.

3.15 CURING, SEALING AND PROTECTION

3.15.1 Cure concrete in accordance with CAN/CSA A23.1/A23.2-M, Clause 21 and as specified herein.

3.15.2 White-pigmented curing compound shall not be used on any exposed concrete surfaces, unless specifically indicated on the Drawings or herein.

3.15.3 Structural concrete is to be cured using wet burlap placed in two layers. Strips shall overlap by 150 mm. The burlap is to be kept continuously wet throughout the curing period. The burlap is to be pre-soaked for 24 hours prior to placing by immersing it in water.

3.15.4 **For concrete paving:**

3.15.4.1 As soon as concrete surface has been finished and can bear weight without marking, carefully cover with burlap or cotton mats.

3.15.4.2 Place mats to overlap each other by 300 mm or more and to overlap concrete slab by 300 mm or more at each side secured by a continuous bank of sand and gravel.

3.15.4.3 Cover sides and ends of slab with mats as soon as forms are removed.

3.15.4.4 Thoroughly wet mats before placing them on concrete and keep saturated during curing period with water spray sufficiently fine to avoid damaging concrete surface, avoiding wet/dry cycles.

3.15.4.5 Apply curing compound evenly to form a continuous film. Follow manufacturer's instructions.

3.15.4.6 The Contractor shall always have materials available to protect the surface of the plastic concrete against rain. These materials shall consist of waterproof paper or plastic sheeting. For slipform construction, materials such as wood planks or forms to protect the edges shall also be required.

3.15.4.7 When concrete is being placed in cold weather and the temperature may be expected to drop below 2 deg. C. suitable protection shall be provided to keep the concrete from freezing until it is at least 10 days old. Concrete injured by frost action shall be removed and replaced at the Contractor's expense.

3.16 STRIPPING OF FORMWORK

3.16.1 Be responsible for safety of structure, both before and after removal of forms, until concrete has reached 70% of its specified 28-day strength.

3.16.2 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.

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

3.17 BACKFILLING

3.17.1 Allow concrete to cure 7 days prior to backfilling.

3.17.2 The Contractor shall place earth shouldering at the edge of concrete works with an approved backfill material to grades approved by the Consultant.

3.18 PROTECTION OF THE PAVEMENT FROM TRAFFIC

3.18.1 The Contractor shall by barricades, watchmen, or by other means, protect all concrete surfaces from harm by traffic until the Consultant authorizes the facility to be opened to public use.

3.18.2 The Contractor shall at all times prior to the opening to traffic provide suitable bridging as other means of access to adjacent properties, but will only be required to do so at existing traffic points.

3.19 DEFECTIVE WORK, ADJUSTMENT AND CLEANING

3.19.1 Replacement of Defective Work:

3.19.1.1 Replace defective concrete Work to match balance of Work. Honeycombing, rough surfaces and other deficiencies will be replaced or repaired with mortar at the discretion of the Consultant. Plastering or rubbing down with a rich cement paste is not acceptable.

3.19.2 Cleaning:

3.19.2.1 Clean finish surfaces to remove stains, mortar, sealant and other foreign materials without damaging surfaces.

3.19.3 Variations in excess of specified tolerances and marked or disfigured surfaces that cannot be repaired by approved methods will be considered defective Work performed by this section.

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

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

3.19.6 Shrinkage cracking caused by lack of shrinkage control, such as saw-cutting delay or lack of chemical control, will be replaced at the Contractor's expense.

3.20 REPAIRING & CLEANUP

3.20.1 The Contractor shall be held responsible for any damage or defacing done to the finished Work by other parties until the finished Work is accepted by the Consultant and shall repair or replace any damaged or defaced portion of the Work as required by the Consultant. The Contractor is required to provide adequate protection to ensure that fresh concrete is not vandalized.

END OF SECTION

1. GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 The work described in this Section shall include furnishing all equipment, labour, materials and services to supply and install miscellaneous metal items, as shown on the drawings and specified herein.

1.1.2 The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.

1.1.3 Site furnishing items including, but are not limited to;

1.1.3.1 The Imported Natural Hardwood Logs and associated work, as shown on the Drawings, Manufacturer Specifications and as specified herein.

1.2 SUBMITTALS

1.2.1 Submit product photos by email.

1.3 DELIVERY, STORAGE AND HANDLING

1.3.1 Deliver, store and handle furnishings materials and product to the job site pre-packed for damage prevention in good condition and properly protected against damage to finished surfaces, and in accordance with manufacturer's instructions.

1.3.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

1.3.3 Storage and Handling Requirements:

1.3.3.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area. Stacking shall be done in a way that will prevent bending.

1.3.3.2 Store and protect furnishings from nicks, scratches, and blemishes.

1.3.3.3 Replace defective or damaged materials with new.

1.3.3.4 Keep handling on site to a minimum. Exercise particular care to avoid damaging finishes of material.

2. PRODUCTS

2.1 NATURAL HARDWOOD LOGS:

2.1.1 Hardwood Logs – Size as specified on drawings. Oak or black locust is preferred.

De-bark logs. Soaked and peeled logs are preferred. If machined peeled, contractor is responsible for grinding and sanding all areas of log damaged by machine such that the finished wood is smooth and completely free of splinters until the end of the warranty period.

Available from Fred Christensen at tensensawing@hotmail.com or approved equal.

Contractor shall submit supplier / manufacturer's data sheet prior to delivery to the site.

3. EXECUTION

3.1.1 As per manufacturer and drawings.

3.2 EXAMINATION

3.2.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for exterior site furnishing installation in accordance with manufacturer's written instructions.

3.3 INSTALLATION

3.3.1 Assemble furnishings in accordance with manufacturer's written recommendations.

3.3.2 Install furnishing firmly supported, anchored, true and plumb, as indicated by Consultant.

3.3.3 Touch up and repair any damaged materials or finishes in accordance with manufacturers printed instructions or to approval of Consultant.

3.4 CLEANING

3.4.1 Leave work area clean at end of each day.

3.4.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 00 05 General Requirements.

3.5 PROTECTION

3.5.1 Protect installed products and components from damage during construction.

3.5.2 Touch up and repair any damaged materials or finishes in accordance with manufacturers printed instructions or to the Owner's satisfaction.

END OF SECTION

1. GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 The work described in this Section shall include furnishing all equipment, labour, materials and services to supply, install and care for trees, as shown on the drawings as specified herein and in compliance with ANSI A300 standards.

1.1.2 The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.

1.1.3 All depths of materials indicated on the drawings and in these specifications refer to minimum required depth of materials, after compacting.

1.2 REFERENCES

1.2.1 Agriculture and Agri-Food Canada (AAFC), Plant Hardiness Zones in Canada.

1.2.2 Canadian Nursery Landscape Association (CNLA), Canadian Standards for Nursery Stock.

1.2.3 ANSI A300 standards – Tree care industry association

1.3 DELIVERY, STORAGE AND HANDLING

1.3.1 Co-ordinate shipping of plants and excavation of planting pits to ensure minimum time lapse between digging and planting.

1.3.2 Wrap branches of trees securely and protect plant material against abrasion, exposure and extreme temperatures during transit. Avoid binding of planting stock with rope or wire that would damage bark, break branches or destroy the natural shape of plant. Give full support to rootball of large trees during lifting. No plant will be accepted when the ball of earth surrounding its roots has been severely cracked or broken prior to or during planting.

1.3.3 Plant root systems must be kept moist at all times prior to planting. If storage longer than 48 hours is necessary, the plant material shall be heeled in using good loam soil. Contractor shall be responsible for all necessary watering and maintenance to preserve the stock in good condition.

1.3.4 Cover plant foliage with tarpaulin and protect bare roots by means of dampened peat moss, or other acceptable material, to prevent loss of moisture during transit and storage.

1.3.5 Remove broken and damaged roots with sharp pruning secateurs. Make clean cuts.

1.3.6 Keep roots moist and protected from sun and wind. Heel-in trees that cannot be planted immediately in shaded areas and water well.

1.4 WARRANTY

1.4.1 Contractor shall agree to guarantee to replace and replant any plant material found dead or in poor condition within two years of the date of Substantial Performance of the Contract, without cost to the Owner. "Poor condition" shall be interpreted as meaning plant material on which the branches are dead or dying, or which have not shown satisfactory growth of leaves in the judgement of the Consultant.

1.4.2 Contractor shall not be held responsible for plant material destroyed by vandalism after acceptance by the Owner.

1.4.3 All required replacements shall be made at the next planting season and replacements of all unsatisfactory trees are to continue, with all costs borne by the Contractor, until the specified numbers planted are satisfactory and complete.

2. PRODUCTS

2.1 PLANTING MATERIALS

2.1.1 Water: Potable and free of minerals which may be detrimental to plant growth.

2.1.2 Mulch: Shredded Cedar mulch or approved equal.

2.2 PLANTING SOIL

2.2.1 Inform Consultant of proposed source of planting soil to be supplied arrange for inspection and testing. Acceptance of topsoil is subject to inspection and/or soil analysis test results. Do not commence Work until planting soil is accepted by the Consultant.

2.2.2 Test planting soil from the source prior to stripping and stockpiling, for nitrogen, phosphorous, potassium, and magnesium levels, soluble salt content, pH value, growth inhibitors and soil sterilants. Test results shall include clear recommendations for any required amendments or fertilizers.

2.2.3 Inspection and testing of planting soil will be carried out by testing laboratory approved by Owner and paid for by the Contractor.

2.2.4 The Contractor shall provide delivery slips on which the following shall be recorded: supplier, serial number of slip, date, truck number, Contractor, project, topsoil composition and volume of planting soil delivered to site.

2.2.5 Planting Soil Components:

2.2.5.1 Imported Planting Soil: Sandy loam with a friable texture consisting of neither heavy clay nor very light sand. Sandy loam to consist of approximately 55% sand, 30% silt, 8% clay, 7% organic material, with a pH value between 6 and 7.5. Sandy loam to be free of subsoil, roots, debris, toxic materials and stones over 50 mm in diameter. Sandy loam containing seeds or roots of noxious weeds is unacceptable.

2.2.5.2 Amended, On-Site Topsoil may be used as an alternative to imported planting soil:

1. The Contractor shall arrange and pay for sampling and testing of topsoil.
2. The on-site topsoil shall be amended in accordance with the recommendations of the testing agency to meet the same requirements as imported topsoil.

2.2.5.3 Manure: Cattle (cow or sheep), composted / aged minimum three years and free of weeds or other living vegetation.

2.2.5.4 Compost: To consist of equal amounts carbon-rich and nitrogen-rich organic material. Compost to be free of subsoil, roots, debris, toxic materials and stones over 50 mm in diameter. Compost containing seeds or roots of noxious weeds is unacceptable.

2.2.6 Soil For Tree Planting In Sod Areas:

2.2.6.1 Backfill with native soil or sandy loam, if required for improved drainage or to replace soil contaminated with toxic material.

2.3 PLANT MATERIAL

2.3.1 Quality and Source: Comply with Canadian Standards for Nursery Stock and Guide Specification for Nursery Stock, Recent Edition of Canadian Nursery Trades Association referring to size and development of plant material and root ball. Measure plants when branches are in their natural position. Height and spread dimensions refer to main body of plant and not from branch tip to branch tip. Use trees of No.1 grade.

2.3.2 All plants shall have been grown in Canada or in the north eastern United States and be hardy within the AAFC Canadian Plant Hardiness Zone 5a. Plant materials obtained from areas with milder climatic conditions from those of the site are not acceptable.

2.3.3 Plant trees with a strong structurally sound fibrous root system free of disease, insects, defects or injuries. Use trees with straight trunks, well and characteristically branched for species. Trees of each species are to be of a consistent form. Plants shall have been root pruned regularly, but no later than one growing season prior to arrival on-site.

2.3.4 Large trees shall have been half root pruned during each of two successive growing seasons, the latter at least one growing season prior to arrival on-site.

2.3.5 Container-grown stock: Trees must have been grown in a container for a minimum of one growing season but not longer than two seasons. Root system must be able to "hold" soil when removed from container. Plants that have become root-bound are not acceptable. Container stock shall have been fertilized with slow release fertiliser.

2.3.6 Measurement: For standard shade trees, the relationship between calliper, overall height, branching height, minimum number of branches in the head, and minimum root spread are indicated in Table 1. For each calliper size specified, the allowed variation in height is indicated in Table 1 beside the calliper size. Calliper takes precedence over height. Calliper is measured not less than 150mm above the ground or bud union (graft) for trees up to 100mm and 300 mm above ground level for trees larger than 100mm calliper. Trees shall meet or exceed the minimum size indicated on the Plant List.

TABLE NO.1
MINIMUM SIZES FOR STANDARD SHADE TREES

Specified Calliper (mm)	Overall Min. Height (m)	No. Min. Branches in Head	Min. Ball Branching Height (m)	*Min. Ball Diameter (cm)	Depth (cm)
40	3.00-3.50	8	1.75	60	45
45	3.25-3.75	9	1.75	65	45
50	3.50-4.00	10	1.75	70	50
60	3.75-4.25	11	2.00	75	50
70	4.00-4.50	13	2.00	80	50
80	4.25-5.00	14	2.00	90	55
90	4.50-5.00	15	2.00	95	55
100	5.00-6.00	15	2.00	100	60

* Root ball sizes must be increased if necessary in order that at least 75% of the fibrous root system can be contained within the root ball.

2.4 PROTECTION SCREENS

2.4.1 STAKES: Use heavy-duty t-bar stakes of minimum 2,400mm (8-foot) length

2.4.2 SCREENS: Use 6-guage galvanized steel mesh with 50 X 50mm openings, from a 1200mm (4-foot) roll, cut mesh-ends to form end-ties

2.4.3 TIES: Use 6-guage galvanized steel wire-ties to attach screen to stakes only. Close mesh screens using cut-ends rather than ties.

3. EXECUTION

3.1 GENERAL

3.1.1 Co-ordinate operations. Keep site clean and planting pits drained. Immediately remove soil or debris spilled into planting pits.

3.2 PLANTING TIME

3.2.1 All stock shall be dug while dormant. Plants noted on the Plant List for spring planting only must be moved while dormant.

3.2.2 Plant deciduous bare root plant material during dormant periods (typically April to mid-May, mid-September to late November).

3.2.3 Plant material noted for spring planting only must be planted between April 1 and May 15.

3.3 EXCAVATION

3.3.1 Contractor is responsible for verifying the locations of all utilities and for taking adequate precautions against any damage to them. In the event of damaging any utilities, the Contractor shall make or pay for any required repairs to the satisfaction of the utility company, at no extra cost to the Owner.

3.3.2 Trees: Excavate planting pits as indicated on the Drawings.

3.3.3 Provide drainage for planting pits in heavy soil if natural drainage does not exist. Have method approved by Consultant.

3.4 PREPARATION OF PLANTING AREAS

3.4.1 Grade native or sub-grade soils, eliminating uneven areas and low spots, ensuring positive drainage. Remove soil contaminated with toxic materials. Dispose of removed materials as directed by Consultant.

3.4.2 After rough grading, scarify and cultivate area for tree planting as indicated on the Drawings. Repeat cultivation in those areas where equipment used for hauling and spreading has compacted soil.

3.4.3 Remove surface debris, roots, vegetation, branches and stones in excess of 50mm in diameter.

3.5 PLANTING OF TREES

3.5.1 Plant only under conditions that are conducive to the good health and physical condition of the plants.

3.5.2 After planting pit is dug break up the smooth finish on the sides of the hole with a pick or shovel. Provide vertical fissures approximately 50 mm deep, spaced 200 to 300 mm around entire circumference of planting pit.

3.5.3 Loosen bottom of planting pit to depth of 150 to 200 mm.

3.5.4 Plant trees vertically with roots placed straight out in planting pit. Flush cut broken or frayed root ends with pruning secateurs. Orient plant material to give best appearance in relation to roads, walks and views by site users.

3.5.5 Balled and burlapped root balls: Loosen burlap and cut away at a minimum the top one half without disturbing root ball. Do not remove burlap from under the root ball.

3.5.6 Container stock: Remove entire container without disturbing root ball. All wrapping must be removed.

3.5.7 Frozen ball material is not acceptable.

3.5.8 Tamp native soil or sandy loam around root system in layers of 150mm to eliminate air voids. Frozen or saturated planting soil is unacceptable. When two thirds of planting soil has been placed, fill hole with water. After water has completely penetrated into soil, complete backfilling.

3.5.9 Apply mulch as specified.

3.5.10 Shrub material indicated on the Drawings to be planted in lawn areas may be planted in accordance with these requirements.

3.6 WEED CONTROL

3.6.1 Allow weed seeds in spread soil to germinate.

3.6.2 Eradicate first growth of weeds by hand or through mechanical methods only.

3.7 TREE SUPPORT

3.7.1 Staking: Stake only if and as directed by the Consultant.

3.8 PRUNING

3.8.1 Postpone pruning, of those trees where heavy bleeding may occur, until in full leaf. Employ clean sharp tools and make cuts flush with main branch, smooth and sloping as to prevent accumulation of water. Remove projecting stumps on trunks or main branches. Remove dead and injured branches and branches that rub causing damage to bark. Trim out crown of trees without changing their natural shape. Do not damage lead branches or remove smaller twigs along main branches.

3.9 MULCHING

3.9.1 Provide a uniform layer of specified mulch 100mm deep around all new tree. Refer to section 329113 – Landscape Surfaces.

3.10 SURPLUS MATERIAL

3.10.1 Legally dispose of surplus materials off-site, as directed by Consultant.

3.11 MAINTENANCE

3.11.1 The Contractor is responsible for maintaining all plant material in a healthy, viable condition from the time each plant is planted up to the time final written acceptance is issued.

3.11.2 Maintenance of trees in a healthy, viable condition consists of:

3.11.2.1 Regular inspections.

3.11.2.2 Water used for the work shall be free from any organic or chemical contaminants detrimental to humans, animals or healthy plant growth.

3.11.2.3 Water at the rate of approximately 45 litres per tree every 7 days during the growing season. All trees to be watered with a sub-surface 'Ross' root feeder or approved equal. If the growing season is uncommonly dry, additional watering may be required. Watering shall take place in early morning hours.

3.11.2.4 Additional deep watering to take place at least four times before the onset of the winter season.

3.11.2.5 Keep tree saucer areas free of garbage, weeds and any debris that may adversely affect plant growth.

3.11.2.6 Tighten, repair or replace stakes and guy wires as necessary. Remove all staking material and tree wrap at the end of the maintenance period.

3.11.2.7 Any pruning necessary.

3.11.2.8 Shrubs in lawn areas shall be maintained in accordance with these requirements.

END OF SECTION

1. GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 The work described in this Section shall include furnishing all equipment, labour, materials and services to supply and install landscape surfaces, as shown on the drawings and specified herein.

1.1.2 Landscape surfaces include:

1.1.2.1 Washed concrete sand for sandbox;

1.1.2.2 Rubberized Play Surfacing.

1.1.2.3 Shredded Cedar Mulch

1.1.3 The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.

1.1.4 All depths of materials indicated on the drawings and in these specifications refer to minimum required depth of materials, after compacting.

1.2 REFERENCES

1.2.1 ASTM 1292 – Standard Specification for Impact Attenuation of Surfacing Materials Within the Use Zone of Playground Equipment.

1.2.2 ASTM F2373 – Standard Consumer Safety Performance Specification for Public Use Play Equipment for Children 6 Months through 23 Months.

1.2.3 CSA Z614-14 – Children's Playspaces and Equipment.

1.3 SUBMITTALS

1.3.1 Submit colour samples of rubberized play surfacing for review and approval by Consultant.

1.4 DELIVERY, STORAGE AND HANDLING

1.4.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

1.4.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

1.4.3 Storage and Handling Requirements:

1.4.4 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

1.4.4.1 Store and protect landscape surfaces materials from cross contamination, humidity, extreme temperatures in accordance with manufacturer's written instructions.

1.4.4.2 Replace defective or damaged materials with new.

1.5 PAYMENT

1.5.1 Payment for the items specified herein will be lump sum at the bid price, unless otherwise noted. Payment will be full compensation for all labour, material and equipment to complete the work, including the supply and installation of concrete works, for mounting of site furnishings.

2. PRODUCTS

2.1 MATERIALS

2.1.1 **SAND FOR SANDBOX:**

2.1.1.1 This item includes the supply, delivery, and installation of CSA Compliant Washed Concrete Playground Sand.

2.1.1.2 Sand for sand play areas shall be a washed, graded, concrete sand product with a designated mixture of coarse sand, medium sand and fine sand intended for use as a sand play area sand, and not as a safety fall surface.

2.1.1.3 Granular materials shall be supplied as per Specification Section 024113 - Excavation, Backfill and Site Grading.

2.1.2 **RUBBERIZED PLAYGROUND SAFETY SURFACING:**

2.1.2.1 CSA Compliant Playground Safety Surfacing shall be "In Situ" poured-in-place recycled rubber playground surfacing; colours shall be as noted in the drawings as manufactured and installed by Everplay International Inc, contact Henry Helps, Tel. 647-212-0707 or email to henry@everplay.com, or from approved equal.

2.1.2.2 This item includes the supply, delivery, and installation of CSA Compliant Playground Safety Surfacing, Terrafix 270R Filter Cloth and 19mm clear stone drainage layer.

2.1.3 **SHREDDED CEDAR MULCH:**

2.1.3.1 Shredded Cedar Mulch shall be "Fibre Weave" as supplied by Go-Bark (Ontario) Ltd., 816 Mayfield Rd Caledon, ON L7C 0Y6

phone (905) 846-1515 fax (905) 846-6735 email: neil@gro-bark.com

2.1.3.2 Contractor shall submit samples of proposed mulch surfacing product to consultant for verification prior to delivery to the site.

2.1.3.3 No sub-drainage, gravel base, or filter cloth is required

3. EXECUTION

3.1 INSTALLATION

3.1.1 **SAND FOR SAND PLAY AREAS:**

3.1.1.1 Excavate area to specified settled depth of surfacing, with a minimum 1% downward grade to ensure proper drainage. All roots, stones, and vegetation must be removed.

3.1.1.2 The area should be well compacted and accurately graded, especially in areas where additional fill has been brought in.

3.1.1.3 Hand rake for a perfectly smooth, finished surface.

3.1.2 **RUBBERIZED PLAYGROUND SAFETY SURFACING:**

3.1.2.1 Install rubberized surfacing directly on clear stone base, existing asphalt or new asphalt as per drawings and as per manufactures requirements.

3.1.3 **SHREDDED MULCH - INSTALLATION:**

3.1.3.1 The Contractor shall strip any sod or invasive weeds in the area to receive the mulch surfacing and dispose of it off-site.

3.1.3.2 The Contractor shall install any edging or other furnishings to be installed within the mulch surfacing area prior to delivering the surfacing materials.

3.1.3.3 The surfacing materials shall be spread evenly. Care shall be taken that equipment is not driven over the installed surfacing materials.

3.2 CLEANING

3.2.1 Progress Cleaning: clean in accordance with Section 01 00 05 – General Requirements.

3.2.1.1 Leave Work area clean at end of each day.

3.2.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 00 05 - General Requirements.

3.3 TOUCH-UP

3.3.1 Touch up and repair any damaged materials or finishes in accordance with manufacturers printed instructions or to the Owner's satisfaction.

END OF SECTION

1. GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 The work described in this Section shall include furnishing all equipment, labour, materials and services to supply, install and care for sodding, as shown on the drawings as specified herein and in compliance with ANSI A300 standards.

1.1.2 The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.

1.1.3 Conform to the City of Toronto Specifications for Sodding TS 5.00.

1.1.4 Comply with Canada Fertilizers Act R.S.c. F-9 s.1 and Canada Fertilizers Regulations.

1.1.5 Comply with the City of Toronto Pesticide By-law (Chapter 612).

1.1.6 All depths of materials indicated on the drawings and in these specifications refer to minimum required depth of materials, after compacting.

1.2 REFERENCES

1.2.1 Agriculture and Agri-Food Canada (AAFC), Plant Hardiness Zones in Canada.

1.2.2 Canadian Nursery Landscape Association (CNLA), Canadian Standards for Nursery Stock.

1.2.3 ANSI standards – ANSI Z60.1-2014 - Nursery Stock; ANSI Z133.1-2012 - Tree Care Operations-Pruning, Trimming, Repairing, Maintaining, and Removing Trees and Cutting Brush- Safety Requirements

1.3 SCOPE OF WORK:

1.3.1 Supply, lay and maintain turf grass nursery sod as indicated on drawings.

1.4 DELIVERY, STORAGE AND HANDLING

1.4.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.

1.4.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

1.4.3 Schedule deliveries in order to keep storage at Site to minimum without causing delays.

1.4.4 Deliver, unload and store sod on pallets.

1.4.5 Deliver sod to Site within 24 hours of being lifted and lay sod within 36 hours of being lifted.

1.4.6 Storage and Handling Requirements:

1.4.6.1 Store materials in accordance with supplier's recommendations.

1.4.7 Prevent sod from drying out during hot or dry weather.

1.4.7.1 Replace defective or damaged materials with new.

1.4.8 Prevent sod from drying out during hot or dry weather.

1.5 SITE CONDITIONS

1.5.1 Install warning signs and others means of protecting sodded areas as required and directed by consultant to protect sod from damage by traffic.

1.5.2 Do not perform work under adverse field conditions such as frozen soil, excessively wet or dry soil or soil covered with snow, ice or standing water.

1.6 SCHEDULING:

1.6.1 Schedule placing of topsoil, finish grading and sodding to suit Site conditions and requirements of this Section.

1.7 WARRANTY

1.7.1 Contractor shall agree to guarantee to replace and replant any sodding material found dead or in poor condition within one years of the date of Substantial Performance of the Contract, without cost to the Owner. "Poor condition" shall be interpreted as meaning sodding material in which the turf is dead or dying, or which has not shown satisfactory growth or establishment as per the judgement of the Consultant.

1.7.2 Contractor shall not be held responsible for sodding material destroyed by vandalism after acceptance by the Owner.

1.7.3 All required replacements shall be made at the next planting season and replacements of all unsatisfactory turf is to continue, with all costs borne by the Contractor, until the specified turf area is satisfactory and complete.

2. PRODUCTS

2.1 PLANTING MATERIALS

2.1.1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.

2.1.2 Turf Grass Nursery Sod types:

2.1.2.1 Number One Kentucky Bluegrass Sod: Nursery Sod grown solely from seed of cultivars of Kentucky Bluegrass, containing not less than 50% Kentucky Bluegrass cultivars licensed for sale in Canada by the Canadian Department of Agriculture.

2.1.2.2 Number One Kentucky Bluegrass Sod - Fescue Sod: Nursery Sod grown solely from seed mixture of cultivars of Kentucky Bluegrass and Chewing Fescue or Creeping Red Fescue, containing not less than 40% Kentucky Bluegrass cultivars and 30% Chewing Fescue or Creeping Red Fescue cultivars.

2.1.2.3 Number One Named Cultivars: Nursery Sod grown from certified seed.

2.1.3 Turf Grass Nursery Sod quality:

2.1.3.1 Not more than 1 broadleaf weed and up to 1% native grasses per 40 square metres.

2.1.3.2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.

2.1.3.3 Mowing height limit: 35 to 65 mm.

2.1.3.4 Soil portion of sod: 6 to 15 mm in thickness.

2.1.4 Commercial Grade Turf Grass Nursery:

2.1.4.1 Mow sod at height directed by Consultant within 36 hours prior to lifting, and remove clippings.

2.1.4.2 Not more than 5 broadleaf weeds and up to 20% native grasses per 40 square metres.

2.1.5 Sod establishment support:

2.1.6 Geotextile fabric: biodegradable.

2.1.7 Wooden pegs: 17 x 8 x 200 mm.

2.1.8 Biodegradable starch pegs: 17 x 8 x 200 mm.

2.1.9 Water: Potable and free of minerals which may be detrimental to plant growth.

2.1.10 Fertilizer:

2.1.10.1 To Canada "Fertilizers Act" and Fertilizers Regulations.

2.1.10.2 Complete, synthetic, slow release with 65 % of nitrogen content in water-insoluble form.

2.1.11 Growing Media:

2.1.11.1 Refer to Section 31 22 16 - Fine Grading and Growing Media.

3. EXECUTION

3.1 EXAMINATION

3.1.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sod installation in accordance with manufacturer's written instructions.

3.1.1.1 Visually inspect substrate in presence of Consultant.

3.1.2 Inform Consultant of unacceptable conditions immediately upon discovery.

3.1.3 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Consultant.

3.2 PREPARATION

3.2.1 Verify that grades are correct and prepared in accordance with Section 31 22 16 - Fine Grading and Topsoil. If discrepancies occur, notify Consultant and commence work when instructed by Consultant.

3.2.2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.

3.2.3 Fine grade surface free of humps and hollows to smooth, even grade, elevations indicated, to tolerance of plus or minus 8 mm, for Turf Grass Nursery Sod plus or minus 15 mm for Commercial Grade Turf Grass Nursery, surface to drain naturally.

3.2.4 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site, in accordance with Section 01 00 05 – General requirements.

3.3 SOD PLACEMENT

3.3.1 Ensure sod placement is done under supervision of certified Landscape Planting Supervisor.

3.3.2 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.

3.3.3 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

3.3.4 Roll sod as directed by Consultant. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.4 SOD PLACEMENT ON SLOPES AND PEGGING

3.4.1 Install and secure geotextile fabric in areas indicated, in accordance with manufacturer's instructions.

3.4.2 Obtain review of finish grading and sod product by Consultant prior to laying sod.

3.4.3 Lay sod during growing season.

3.4.4 Start laying sod at bottom of slopes.

3.4.5 Lay sod in rows, perpendicular to slope, smooth and even with adjoining areas, and with joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp knife.

3.4.6 Peg sod on slopes steeper than 3 horizontals to 1 vertical, within 1 m of catch basins and within 1 m of drainage channels and ditches to following pattern:

3.4.6.1 100 mm below top edge at 200 mm on centre for first sod sections along contours of slopes.

3.4.6.2 Not less than 3-6 pegs per square metre.

3.4.6.3 Not less than 6-9 pegs per square metre in drainage structures. Adjust pattern as directed by Consultant.

3.4.6.4 Drive pegs to 20 mm above soil surface of sod sections.

3.4.7 Provide close contact between sod and soil with 50kg roller of minimum 900mm width. Ensure finished surface is even and without bumps or low spots. Heavy rolling to correct irregularities in grade is not permitted.

3.4.8 Use spade to provide sharp clean edge at depth of 100mm between sodded areas and planting beds and/or individual trees.

3.4.8.1 Water thoroughly immediately after sodding. Moisture penetration through sod shall be uniform, to a minimum depth of 100mm throughout.

3.4.8.2 Provide adequate protection of sodded areas against erosion and mechanical damage. Remove protection after lawn areas have been accepted.

3.5 CLEANING

3.5.1 Progress Cleaning: clean in accordance with Section 01 00 05 – General requirements.

3.5.2 Leave Work area clean at end of each day.

3.5.3 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.

3.5.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 00 05 – General requirements.

3.5.5 Clean and reinstate areas affected by Work.

3.6 PROTECTION BARRIERS

3.6.1 Protect newly sodded areas from deterioration with snow fence on rigid frame as directed by Consultant.

3.6.2 Remove protection 2 weeks after installation as directed by Consultant.

3.7 MAINTENANCE DURING ESTABLISHMENT PERIOD

3.7.1 Perform following operations from time of installation until acceptance.

3.7.1.1 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.

3.7.1.2 Cut grass to 50 mm when or prior to it reaching height of 75 mm.

3.7.1.3 Maintain sodded areas weed free 95%.

3.7.1.4 Fertilize areas in accordance with manufacturer recommendations. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.

3.7.1.5 Water used for the work shall be free from any organic or chemical contaminants detrimental to humans, animals or healthy plant growth.

3.7.1.6 Temporary barriers or signage to be maintained where required to protect newly established sod.

3.8 ACCEPTANCE

3.8.1 Turf Grass Nursery Sod areas will be accepted by Consultant provided that:

3.8.1.1 Sodded areas are properly established.

3.8.1.2 Sod is free of bare and dead spots.

3.8.1.3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 50 mm.

3.8.1.4 Sodded areas have been cut minimum 2 times prior to acceptance.

3.8.2 Sodded Commercial Grade Turf Grass Nursery Sod areas will be accepted by Consultant provided that:

3.8.2.1 Sodded areas are properly established.

3.8.2.2 Extent of surface soil visible when grass has been cut to height of 60 mm is acceptable.

3.8.2.3 Sod is free of bare or dead spots and extent of weeds apparent in grass is acceptable.

3.8.2.4 Sodded areas have been cut minimum 2 times prior to acceptance.

3.8.2.5 Fertilizing in accordance with fertilizer program has been carried out at least once.

3.8.3 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

3.8.4 When environmental conditions allow, all sodded areas showing shrinkage cracks shall be top-dressed and seeded with a seed mix matching the original.

3.8.5 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

3.9 MAINTENANCE DURING WARRANTY PERIOD

3.9.1 Perform following operations from time of acceptance until end of warranty period:

3.9.1.1 Water sodded Turf Grass Nursery Sod areas at weekly intervals to obtain optimum soil moisture conditions to depth of 100 mm.

3.9.2 Repair and resod dead or bare spots to satisfaction of Consultant.

3.9.3 Cut grass and remove clippings that will smother grass to height as follows:

3.9.3.1 Turf Grass Nursery Sod:

1. 50 mm during normal growing conditions.

3.9.3.2 Commercial Grade Turf Grass Nursery Sod:

1. 60 mm during normal growing conditions.

3.9.4 Cut grass at 2-week intervals, but at intervals so that approximately one third of growth is removed in single cut.

3.9.5 Fertilize areas in accordance with manufacturer recommendations. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.

3.9.6 Eliminate weeds by mechanical means to extent acceptable to Consultant.

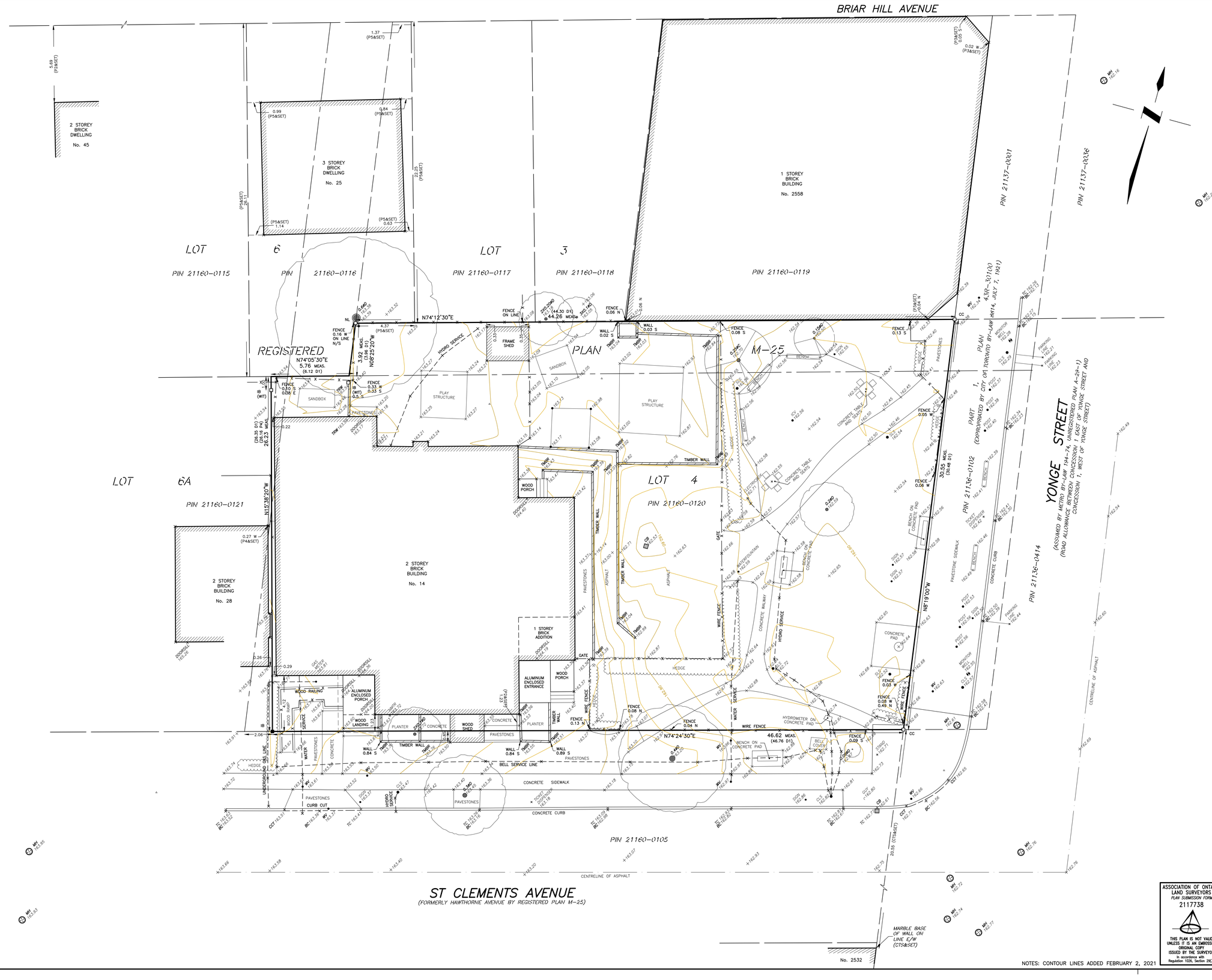
3.10 CLOSEOUT ACTIVITIES

3.10.1 Submit maintenance reports for sodding.

END OF SECTION

Appendix A

Topographic Survey with observations dated March 16, 2020 by Tarrasick McMillan Kubicki Limited Ontario Land Surveyors



SURVEYOR'S REAL PROPERTY REPORT

PLAN OF SURVEY WITH TOPOGRAPHY OF

LOT 4 AND PART OF LOTS 3 AND 6A REGISTERED PLAN M-25 CITY OF TORONTO

SCALE 1 : 125

2.5 0 2.5 5 7.5 metres

TARASICK McMILLAN KUBICKI LIMITED
ONTARIO LAND SURVEYORS

REPORT SUMMARY

PROPERTY DESCRIPTION: 14 ST CLEMENTS AVENUE, BEING LOT 4 AND PART OF LOTS 3 AND 6A, REGISTERED PLAN M-25, CITY OF TORONTO, PIN 21160-0120.

THERE ARE NO EASEMENTS REGISTERED ON TITLE.

COMMENTS: NOTE LOCATION OF FENCES.

METRIC

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

ELEVATION NOTE

ELEVATIONS ARE REFERRED TO CANADIAN GEODETIC VERTICAL DATUM-1928, AND WERE DERIVED FROM CITY OF TORONTO BENCHMARK No. 12219741589, HAVING A PUBLISHED ELEVATION OF 162.509 metres.

BEARING NOTE

BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE WESTERLY LIMIT OF YONGE STREET AS SHOWN ON REGISTERED PLAN M-25, HAVING A BEARING OF N08°19'00"W.

LEGEND

■	DENOTES	SURVEY MONUMENT FOUND
□	DENOTES	SURVEY MONUMENT PLANTED
IB	DENOTES	IRON BAR
TC	DENOTES	TOP OF CURB
BC	DENOTES	BOTTOM OF CURB
CCT	DENOTES	CURB CUT
MH	DENOTES	MANHOLE
CB	DENOTES	CATCH BASIN
WV	DENOTES	WATER VALVE
TRW	DENOTES	TOP OF RETAINING WALL
TMBR	DENOTES	TIMBER
GUY	DENOTES	GUY WIRE
CLS	DENOTES	CONCRETE LIGHT STANDARD
SLS	DENOTES	STEEL LIGHT STANDARD
P1	DENOTES	REGISTERED PLAN M-25
P2	DENOTES	YATES & YATES, O.L.S., MAY 12, 1976
P3	DENOTES	PAUL JAYSON CO. LTD., O.L.S., JUNE 4, 1979
P4	DENOTES	W.S. GIBSON, O.L.S., APRIL 25, 1924
CTS	DENOTES	CITY OF TORONTO SURVEYS
D1	DENOTES	PARCEL REGISTERED 21160-0120

0.20⌀D DENOTES DECIDUOUS TREE WITH TRUNK DIAMETER

0.20⌀C DENOTES CONIFEROUS TREE WITH TRUNK DIAMETER

TREE CANOPIES ARE DRAWN TO SCALE.

PREPARED FOR:

THIS REPORT WAS PREPARED FOR READ JONES CHRISTOFFERSEN LTD. AND THE UNDERSIGNED ACCEPTS NO RESPONSIBILITY FOR USE BY OTHER PARTIES.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON MARCH 6, 2020.

MARCH 16, 2020
DATE

BORYS KUBICKI
ONTARIO LAND SURVEYOR

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2117738
THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR
In accordance with Regulation 1026, Section 29(3)

NOTES: CONTOUR LINES ADDED FEBRUARY 2, 2021

TARASICK McMILLAN KUBICKI LIMITED
ONTARIO LAND SURVEYORS
4181 SLADEVIEW CRESCENT, UNIT 42, MISSISSAUGA, ONTARIO L5L 5R2
TEL: (905) 569-8849 FAX: (905) 569-3160
E-MAIL: office@tmksurveyors.com

DRAWN BY: H.P. | FILE No. 8432-SRPR-T

D (24"x36")

Appendix B

Arborist Report dated June 6, 2024 by Brightleaf Ltd.

Bright Leaf
Shane O'Neill – ISA ON-2918A
437 971 2445
shane@brightleaf.ca
brightleaf.ca

ARBORIST REPORT

14 St. Clements Ave. – Upper Yonge Village Daycare Centre (Ward 8)
June 6, 2024

Urban Forestry - Tree Protection & Plan Review
North York District
North York Civic Centre
5100 Yonge Street, 3rd Floor
North York, ON. M2N 5V7
416 395 6670
tpprnorth@toronto.ca

Forest and Field Landscape Architecture Inc.
Attn: Matthew Sweig
864 College Street, Suite 5,
Toronto, ON M6H 1A3
416 629 4687
garth@forestandfield.ca

This arborist report has been prepared at the commission of Forest and Field Landscape Architecture (FFLA). This arborist report aims to comment on the proposed construction at 14 St. Clements Ave. – Upper Yonge Village Daycare Centre, assess the impact on the existing tree cover and make recommendations to minimize the impact of the work.

This report and the Site Photos, Tree Inventory, and Tree Removals and Protection Plan L1.0-L3.6, prepared by FFLA are to be reviewed in conjunction with each other.

The construction includes:

- Installation of new playground equipment, sheds, cedar deck with fence, rubber surfacing with C.I.P. curb, and hardscape.

Summary of Applications

Tree #	Jurisdiction	Tree category	Nature of application	Total
1	TPPR	City-owned	Injure	1
6		City-owned (Parkland)		1
9		Privately-owned (Neighbour/Boundary)		1

Impact Assessment

Trees #1, 6, and 9 are city-owned and privately-owned trees located on or adjacent to the subject site. The subject trees will see demolition and/or excavation within their TPZs (tree protection zones) as part of the construction (see Table 1: Encroachments for relevant depths and distances). Trees #1, 6, and 9 will require a permit to injure to facilitate the project.

Tree #1 will see the installation of new concrete paving within its TPZ. This is being installed in an area which is already covered by hardscape; to reduce the impact to the subject tree, the existing base material will be retained and reused, eliminating the need for 'new' excavation.

Tree #6 will see the installation of an Acotrench flush surface drain and new asphalt. The asphalt is being installed where there is an existing hardscape, therefore, as with Tree #1, the existing base material is to be retained and reused. The surface trench will require new excavation as the encroachment depth is likely deeper than the base material of the existing hardscape. However, this is in the outer third of the subject trees TPZ, where no significant-sized roots (roots with a diameter of 5cm or more) are likely.

Tree #9 will see the installation of new asphalt and the cedar deck within its TPZ. The new asphalt is being installed where there is an existing hardscape. As with Trees #1 and 6, the existing base material is to be retained and reused. The construction of the cedar deck will see the installation of a single sono-tube within the TPZ of the subject tree. The sono-tube location is situated in the outer third of Tree #9's TPZ, and requires a relatively small area of excavation - no significant-sized roots are likely to be damaged while completing this work.

To ensure the best protection of the subject trees, any demolition, excavation, and installation work within the TPZ of a protected tree is to be conducted by hand, without the use of heavy machinery, under the supervision of a qualified arborist. Additionally, the trees are to be protected with 4' framed tree protection hoarding for the duration of the project (see Tree Removals and Protection Plan L1.0 prepared by FFLA). Assuming this work is completed according to specifications, the injuries are expected to be tolerable.

Recommendations

- Hoarding (see General Recommendations)
- Supervised excavation

- Supervised hardscape removal – pavement replacement

Table 1: Injury Encroachments

Tree #	TPZ (m)	Maximum Encroachment (m)	Encroachment Depth (m)
1	3	1.6 (concrete)	0.2-0.4
6	2.4	0.7 (surface drain)	0.6
9	3.6	3.5 (asphalt) 1.1 (sonotube)	0.3 1.2

Trees #2, 3, 4, and 5 are city-owned and city-owned parkland trees located on or adjacent to the subject site. The work envelope is to be enclosed with 8' temporary metal quick fence. The subject trees are sufficiently distant that the proposed construction poses no risk. No additional protection is required.

Trees #7 and 8 are privately-owned trees located on or adjacent to the subject site. The subject trees are less than 30cm in DBH (diameter at breast height) and therefore, are not regulated by the City of Toronto tree by-law and are not subject to permit requirements. However, as best practice, it is recommended that the same measures used for Trees #1, 6, and 9 should be followed here as well.

Recommendations

- Hoarding (see General Recommendations)
- Supervised excavation
- Supervised hardscape removal – pavement replacement

General Recommendations

The following general recommendations are to be used when directed:

- **Hoarding:** Specified tree(s) must be protected with hoarding throughout the construction process (see Tree Protection Plan). Hoarding is to be installed before construction by a qualified contractor as accurately as possible, using the scale plan for reference. Photos of the installed hoarding should be sent to Urban Forestry for approval. The hoarding is to remain in good condition and in place until the project's completion, at which point the site should be inspected, and Urban Forestry should be notified for permission to remove the hoarding.

    - *Hoarding protection*: Hoarding protects trees from grade changes, compaction damage caused by construction traffic or storage of building materials, and disposal of noxious construction tailings.

    - *Hoarding construction*: Hoarding is to be constructed from framed plywood or snow fence hoarding. Plywood is recommended for all privately-owned trees, particularly where fills may be piled against the hoarding. Snow fence is recommended for site line issues and all city-owned trees.

    - *TPZ signage*: Hoarding requires TPZ signage to be clearly visible on each hoarding section. The signs must be at least .4m x .6m made of weather-resistant white foam core. Signs should appear as shown:

- **Supervised Excavation:** Excavation within the TPZ of a protected tree is to be conducted under the supervision of a qualified arborist. The arborist must direct workers/work to minimize damage to tree roots. All excavation within the TPZ must be completed by hand, using hand tools only, i.e., shovels, picks, spades, etc. Roots unearthed should be documented, including size and approximate location, along with photographic documentation. Documentation should be made available to Urban Forestry upon request. When root pruning is required, the recommendation below must be followed.

  Roots unearthed should be documented, including size and approximate location, along with photographic documentation. Documentation should be made available to Urban Forestry upon request. When required, root pruning recommendations detailed below must be followed.

- **Supervised Hardscape Removal – Paving Replacement:** Hardscape removal within the TPZ of a protected tree is to be conducted under the supervision of a qualified arborist. Removal work is to be completed by hand. The arborist must direct workers/work to minimize damage to tree roots. Once the existing hardscape has been removed, the base material should be reused whenever possible and topped up as required with high-performance bedding, i.e. washed clear stone. Specifically, the base material should be left intact and in place when the hardscape is removed with an effort to disturb the base layer as little as possible. There will be no excavation below the base layer to facilitate the new paving installation.

  Roots unearthed should be documented - including size and approximate location, along with photographic documentation. Documentation should be made available to Urban Forestry upon request. When required, root pruning recommendations detailed below must be followed.

- **Root Pruning:** In areas of excavation, root pruning may be required. Root pruning should be avoided – workers should aim to work around roots whenever possible. The supervising arborist must conduct all root pruning work. Roots are to be pruned with sharp, sterilized cutting tools. Severed roots are to be covered with moist burlap or earth once pruned and watered to prevent desiccation.

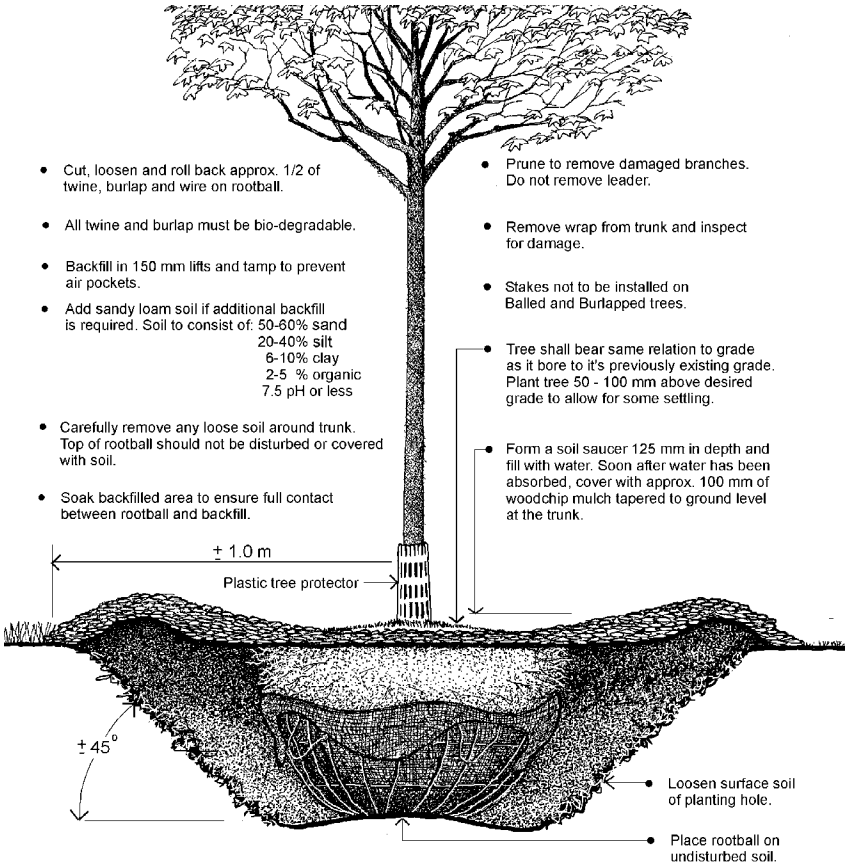
  Only roots with a diameter less than 5cm may be pruned; if a root is greater than 5cm in diameter, or if there is a plethora of roots smaller

than 5cm, all work must stop, and Urban Forestry contacted for approval of root pruning.

Tree Replacement

As no trees are scheduled for removal, no replacement trees are required. However, as part of the planting plan, 11 large growing shade trees are scheduled to be planted on-site (see Planting Plan L2.3 prepared by FFLA for the full planting schedule).

Planting is to be completed using the following detail:



Planting Detail for Balled and Burlapped Trees in Turf

TORONTO Parks and Recreation Division

Urban Forestry Services June 2002 **Detail PD -101**

Limitations

The purpose of this limitation clause is to ensure that the client is aware of what is practically and professionally realistic in assessing and retaining trees,

The assessment(s) presented in this report have been made using accepted arboricultural techniques. Such techniques may include but are not necessarily limited to, visual examination of the above-ground parts of the tree(s) referenced in this report (the "subject trees"). Except where expressly noted, the subject trees were not cored, probed, dissected, sounded, or climbed. Furthermore, and unless expressly noted, the subject trees were not assessed using any advanced methodology that goes beyond standard visual examination, nor were their root crowns inspected in a detailed manner involving excavation.

Notwithstanding the recommendations and conclusions outlined in this report, trees are living organisms with continually changing health and vigour. Changes in health and vigour have been known to occur suddenly and without prior indication. The reasons for such changes may include but are not necessarily limited to, changes in site and weather conditions along with general seasonal variations and other factors.

For this reason, the assessment of the subject trees presented in this report is valid only at the time of inspection. This report makes no guarantee, express or implied, as to the continued health of the subject trees. Like all trees, the subject trees are susceptible to the unpredictable processes of change referenced above. While efforts have been made to ensure accuracy in this report, the subject trees should be re-assessed periodically to ensure that the client is apprised of future developments in their health and vigour.

If any questions or clarifications are required, please get in touch with me at shane@brightleaf.ca

Thank you,

c/o Shane O'Neill
ISA Certified Arborist ON – 2918A

George Squire
ISA Certified Arborist ON – 1732A
Bright Leaf

Bright Leaf
647 809 8733
tree@brightleaf.ca
brightleaf.ca

Tree Inventory – 14 St Clements Ave.

April 27, 2024

An inventory of all city-owned and regulated privately-owned trees within 6m of the proposed work area was conducted on April 21, 2024. Trees were visually assessed from the ground only.

Tree ID	Common	Latin	Health	Structure	Comments	Category	DBH (cm)	TPZ (m)
1	Honey locust	*Gleditsia triacanthos*	Good	Good	Power lines run through canopy. Suckering and deadwood present within canopy. Heaving of asphalt around base of tree.	5	43.5	3
2	Honey locust	*Gleditsia triacanthos*	Good	Good	Powerlines pass through canopy. Minor suckering within canopy. Slight canopy imbalance with heavier weight distribution towards the north.	5	47.5	3
3	Honey locust	*Gleditsia triacanthos*	Good	Good		5	10	1.8
4	Sugar maple	*Acer saccharum*	Good	Good	Memorial tree, appears healthy with full rounded canopy good branch distribution with minor interfering growth.	3	25	1.8
5	Blue spruce	*Picea pungens*	Fair	Good	Canopy has been cut back from adjacent building leaving it somewhat sparse. Remaining Upper canopy appears healthy.	3	19.5	1.8
6	Blue spruce	*Picea pungens*	Good	Good	Tree appears healthy with full canopy slight imbalance with additional weighting on south side. Northern lower branches have been pruned away from adjacent building.	3	34	2.4
7	Callery pear	*Pyrus calleryana*	Fair-Poor	Fair-Poor	Canopy has been significantly reduced; upper canopy is composed only of epicormic shoots.	0	3X10**	1.8
8	Black locust	*Robinia pseudoacacia*	Good	Fair	Tree grows from low union obstructed by adjacent fence – structure of branch union unverified. Some deadwood and interfering growth within canopy.	0	2X20*	1.8

9	Norway maple	*Acer platanoides*	Fair	Poor	Canopy significantly imbalanced with weighting to the north. Long-lever limb within eastern canopy over playground. Suckering along trunk. Tree is in contact with fence.	1	60*	3.6

*Survey diameter used due to access restriction
**Diameter estimated due to access restriction

Categories:

0) Tree not regulated by the Toronto private tree bylaw
1) Trees with diameters of 30 cm or more, situated on private property on the subject site.
2) Trees with diameters of 30 cm or more, situated on private property, within 6 m of the subject site.
3) Trees of all diameters situated on City-owned parkland within 6 m of the subject site.
4) Trees of all diameters situated within lands designated under the City of Toronto Municipal Code, Chapter 658, Ravine and Natural Feature Protection.
5) Trees of all diameters situated within the City road allowance adjacent to the subject site.
6) Suspected boundary tree

Bright Leaf
647 809 8733
tree@brightleaf.ca
brightleaf.ca

June 6, 2024

Site Photos – 14 St Clements Ave

Photo documentation was taken during April 21, 2024 site visits.

Existing conditions along St Clements Ave.

Existing conditions in St Clements Ave and Yonge Parkette.

Existing conditions in St Clements Ave and Yonge Parkette.

Existing conditions within daycare.

Existing conditions within daycare.

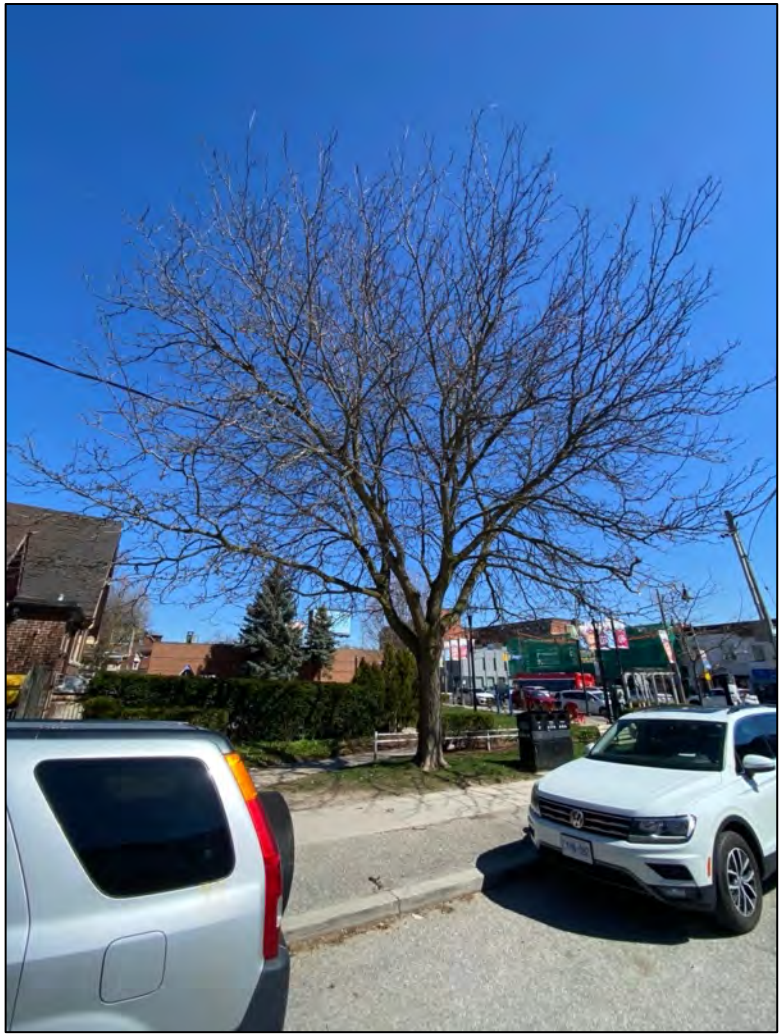
Existing conditions within daycare.

Existing conditions within daycare.

Existing conditions within daycare.

Tree #1

Tree #2



Tree #3

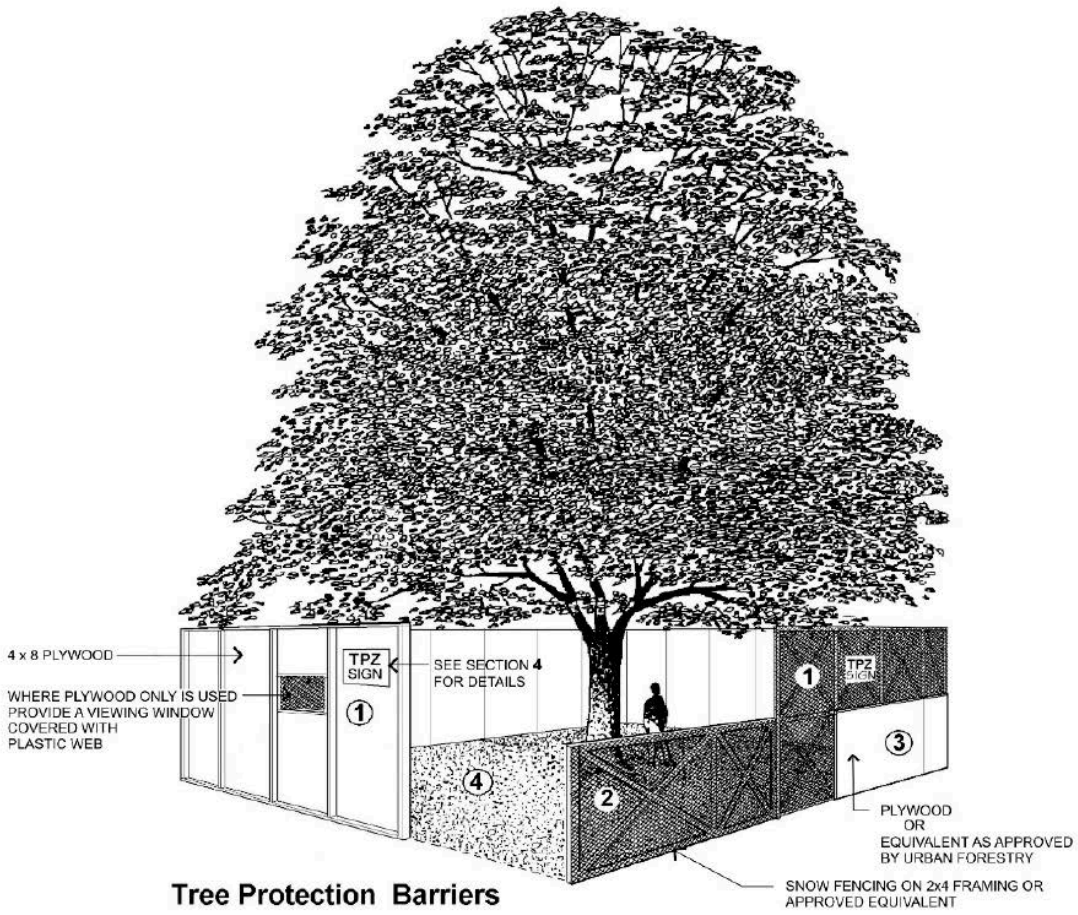
Tree #4

Tree #5

Tree #6

Tree #7 and 8

Tree #9



Tree Protection Barriers

1. Tree protection barriers must be constructed with a solid wood frame clad with plywood or approved equivalent. Height of hoarding may be less than 8 ft. to accomodate any branches that may be lower.
2. Tree protection barriers for trees situated on the City road allowance where visibility must be maintained can be 1.2m (4ft.) high and consist of orange plastic web snow fencing on a wood frame made of 2 x 4s.
3. Where some excavate or fill has to be temporarily located near a tree protection barrier, plywood must be used to ensure no material enters the Tree Protection Zone.
4. No construction activity, grade changes, surface treatment or excavations of any kind is permitted within the Tree Protection Zone.

Note:
Sediment control fencing shall be installed in locations indicated in an Urban Forestry approved Tree Protection Plan. The sediment control fencing must be installed to Ontario Provicial Standards (OPSD-219.130) heavy duty silt fence barrier and to the satisfaction of Urban Forestry. See Detail TP- 2

TORONTO

Parks, Forestry and Recreation

Urban Forestry

February 2016

Detail TP-1

Figure 4: Urban Forestry Detail TP-1

Appendix C

Quote for one Tosa Bold Powder-Coated Aluminum Pergola including engineering and installation dated December 4, 2023 by Stur Design

www.sturdesign.com
sales@sturdesign.com
855-207-9669

Bill To

Company: Forest & Field
Address: 864 College Street Suite 5, Toronto, ON, M6H 1A3
Contact: Matthew Sweig
Phone:
Email matthew@forestandfield.ca

Ship To

Company:
Address: , Toronto, ON,
Contact: Matthew Sweig
Phone:
Email matthew@forestandfield.ca

QUOTATION

Delivery Time	FOB	Terms	Sales Rep	Project	Quote Date	Quote Expiry	Quote #
Estimated production time 12 to 18 weeks from approved dwgs	Stur Dock	50% Deposit, balance due before shipping	Ashley Farmer	City of Toronto - Childcare site	Dec 4, 2023	Dec 11, 2023	20002361

Item	Description	Installation (hrs total)	Qty	Unit Price	Total
CP-TB-SL-6401X3048-IA33-SAP-CV	Custom Tosa Bold Powder-Coated Aluminum Pergola. Frame: 152mm x 152mm columns and beams constructed with 'SturLock' concealed stainless-steel connection system and stainless-steel hardware. Mounting plates 254mm x 254mm 4-bolt, with covers. Sloped Roof: Inset 76mm x 76mm rafters with top-mounted 3mm solid aluminum panels with foam sealant. Completed Frame Dimensions: 6401mm x 3048mm x 2540mm. All aluminum ASTM B221, finish standard Stur Design powder coat or stock RAL color. Detailed drawings and virtual load testing to be provided for approval before production. Subject to engineering. Permits, site preparation/excavation, concrete pad/footing, assembly, installation, and any electrical installations by others. Estimated max. time for assembly / installation is 8hrs (4-person crew, instructions provided), not including footings. Anchoring bolts/nuts not included.	8	1	$25,771.00	$25,771.00
ON Engineering Included	Engineering for structural design by Ontario Licenced Engineer (Does not include engineered design for footing/slab, site specific design beyond the anchor fasteners is by others).	0	1	$0.00	$0.00
ON Engineer's Footing Design	Ontario Engineer's Stamped Drawings for Footings / Slab Design and Connections (if required)	0	1	$1,500.00	$1,500.00
Installation	Assembly and Installation only, not including site preparation/excavation or concrete pad/footings/embedded mounting/anchors. Subject to site conditions and site access. Unloading, lifting/craning, electrical accessories / connections / installations by others. TO BE SEPARATELY BILLED AND INVOICED DIRECTLY BY INSTALLER. ANCHOR COSTS NOT INCLUDED.	0	1	$2,500.00	$2,500.00

P.I.E. Price in Effect Notice:
Due to current commodity fluctuations we reserve the right to increase or decrease delivery charge at time of shipment. Orders shipped beyond 6 months of order date may be subject to price adjustment.

Quote Provided By:
Ashley Farmer
ashley@sturdesign.com
Direct:

To execute this quotation as an order please sign, date and return.

Signature: _____ Date: _____

QUOTATION TERMS AND CONDITIONS: PRICES ARE ONLY VALID IF ALL ITEMS ARE ORDERED TOGETHER IN THE QUANTITIES QUOTED. PRICES ARE VALID UNTIL THE QUOTE EXPIRY DATE. SALES TERMS AND CONDITIONS: TITLE TO THE GOODS IN THIS SALES ACKNOWLEDGEMENT (OR OTHER RELATED DOCUMENTS) AND THE PROCEEDS, THEREOF, SHALL REMAIN WITH STUR DESIGN INC UNTIL SUCH TIME AS THE ACCOUNT IS FULLY PAID. GOODS DAMAGED DURING SHIPPING SHOULD BE NOTED ON THE BILL OF LADING, STUR DESIGN INC. TAKES NO RESPONSIBILITY FOR DAMAGED GOODS SIGNED FOR IN GOOD ORDER WHEN RECEIVED. MERCHANDISE MAY ONLY BE RETURNED WITH PRIOR AUTHORIZATION FROM THE SELLER. ALL SHORT SHIPMENTS AND DEFICIENCY LISTS MUST BE REPORTED IN WRITING UPON RECEIPT OF GOODS (SAME DAY). THIS AGREEMENT SHALL BE GOVERNED BY THE LAWS OF THE PROVINCE OF ONTARIO AND IN THE EVENT OF DEFAULT, JURISDICTION SHALL BE THAT OF THE SELLER.

Subtotal	**CAD**	$29,771.00
Estimated Delivery		$895.00
Total before tax		$30,666.00
Tax		$3,986.58
Total	**CAD**	**$34,652.58**