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Planning and
Infrastructure Services
Engineering and Development Services

SPECIFICATIONS – ISSUED FOR TENDER

Cassie Campbell Community Centre Park

Brampton, Ontario

1060 Sandalwood Parkway W.

The Corporation of The City of Brampton
2 Wellington Street West, Brampton, ON L6Y 4R2 T: 905.874.2000 TTY: 905.874.2130

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GEOTECHNICAL DATA

PART 1 – GENERAL

1.1 Geotechnical Data

.1 The following Geotechnical Report(s) are referenced in this Section:

.1 *Geotechnical Investigation Report Cassie Campbell Community Centre - Cambium Reference:* 19060-001, dated January 11, 2024 prepared by Cambium Inc. [87 pages]

.2 *Excess Soil Characterization – Cassie Campbell Community Centre - Cambium Reference:* 19060-001, dated May 13, 2024, prepared by Cambium Inc. [96 pages]

.2 The above reports are offered in good faith for general information and guidance. Consultant assumes no responsibility for the accuracy and completeness off the report.

.3 The Contractor shall not be entitled to extra payment or performance time for work which is reasonably inferable from report(s) as being necessary.

.4 In case of discrepancies between recommendations contained in the report and the requirements on the Contract Documents, the latter shall govern. The Consultant is to be notified in writing of any discrepancies discovered.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION - 00320

REQUEST FOR INFORMATION FORM

Request for Information No.:	
Posted Date:	Initiated Date:
Date Required:	Originated By:
Specification Section:	Drawing/Detail No.:

Subject:

Description/Question: (required)

Recommendations: (required)

Attachments:

Response:

Attachments:

Response From:	Date Rec'd:	Date Ret'd:
Signed by:		Date:

Copies: □ Owner	Consultants:	□ Structural	□ Mechanical
□ Electrical	□ _____	□ _____	□ File

END OF SECTION - 00610

GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 Work Covered By Contract Documents

.1 Work covers, in general terms: demolition, removals, site preparation and complete construction of the **Cassie Campbell Community Field Hockey Dome**.

.2 Related Requirements specified elsewhere:

1. All technical specifications.

.3 Contractor's Duties:

1. Except as specifically noted, provide and pay for:
    1. Labour, materials and equipment
    2. Tools, construction equipment and machinery
    3. Water and utilities required for construction
    4. Other facilities and services necessary for proper execution and completion of Work.
    5. Permits (unless otherwise stipulated)

2. Pay legally required sales, consumer and use taxes.

.4 Give required notices.

.5 Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities, which bear on Performance of the Work.

1.2 Contracts

.1 Construct Work under the Stipulated Price Contract. The General Conditions of the Contract for the Lump Sum Stipulated CCDC Document 2, 2008. Amendments to the Agreement and Supplementary Conditions form an integral part of this Specification.

.2 Work will be performed under one Contract. The Contractor shall be required to sign the Canadian Standard Construction Document, CCDC 2, 2008, Agreement Between Owner and Contractor.

.3 Definitions that apply to all Contract Documents shall be found in the CCDC2 Stipulated Price Contract.

.4 The intent of the Contract is to provide for the construction, performance and completion in every detail of the Work described or

implied by the Contract Documents.

.5 The Specifications generally specifies Work and co-ordination of the Work that is the direct responsibility of the Contractor, but shall not be interpreted to define absolutely the limits of responsibility that must be established between the Contractor and Sub-Contractors by their separate agreements, unless otherwise specified.

.6 Ensure that Sub-Contractors understand that the General Conditions of the Contract, Supplementary Conditions, and Division 1, General Requirements, apply to Sections of the Specifications governing their Work.

.7 Nothing contained in the Contract Documents shall imply or create any contractual relationship between any Sub-Contractor and the Owner.

.8 The documents constituting the Contract Documents are complementary to each other and any matter or thing included in any of such documents shall be considered to be included in all.

.9 Wherever in the Contract Documents the Works “approval”, “approved”, “direction”, “directed”, “selection”, “selected”, “request”, “requested”, “report”, and similar words are used, such approvals, directions, selections, requests and reports shall be given by the Consultant or Owner.

.10 Wherever in the Contract Documents the word “provide” is used in any form, it shall mean that Work concerned shall include both supply and installation of the products required for completion of that part of the Work.

.11 Wherever in the Specifications it is specified that Work is to proceed or to meet approval, direction, selection or request of jurisdictional authorities or others, such approval, direction, selection or request shall be in writing.

.12 Wherever in the Specifications it is specified that Work shall be repaired, made good or replaced, it shall be performed without any additional cost to the Owner.

1.3 Contacts for Site Inspection

.1 Consultant:

Landscape Planning Limited

95 Mural Street, Suite 207
Attention: Paul Gardner, OALA, Partner

1.4 Completion Date

.1 Substantial Performance of the Work shall be: November 28, 2025

.2 Total Performance of the Work shall be attained within 30 days from Substantial Performance of the Work.

1.5 Liquidated Damages

.1 Time is of the essence for the Contract and the completion date shall be strictly enforced. If the Work called for under the Contract is not finished or completed by the completion date as outlined in **1.4 COMPLETION DATE**, a loss or damage will be sustained by the Owner. Since it is and will be impracticable and extremely difficult to ascertain and determine the actual loss or damage which the Owner will suffer in the event of any delay, the Contractor shall pay the Owner as liquidated damages and not as a penalty the sum of **FIVE HUNDRED DOLLARS ($500.00) for each and every calendar day** that any portion of the Work is incomplete after the completion date. The Owner may at its sole discretion deduct from monies owing to the Contractor.

1.6 Related Work

.1 Refer to all sections indicated in **Section 00010 - Table of Contents**.

.2 All Work on this project is to be completed in accordance with the Specifications set out in the Contract Documents.

.3 Any other required Work, for which no Specifications are contained herein, shall conform to the Ontario Provincial Standard Specifications and the Ontario Provincial Standard Drawings.

.4 Where there are conflicting statements between any of the City of Brampton and the Ontario Provincial Specifications and Drawings, the City of Brampton Specifications and drawings shall govern.

.5 The Ontario Provincial Specifications and drawings are not included with the Contract Documents but will form part of the Contract and shall be considered as such by every Contractor bidding the Work.

.6 It shall be the Contractor’s responsibility to be familiarized with these

Specifications and drawings and to keep a current copy on-site at all times.

1.7 Work Not in Contract (NIC)

1. Work not to be included in the Contract shall be as noted by “NIC” or “by others” on the Contract Drawings.

1.8 Project Meetings

.1 Administrative

.1 Attend project progress meetings throughout progress of Work on a bi-weekly basis or as per the Consultant’s direction.

.2 Provide physical space and make arrangements for meetings.

1.9 Schedules

.1 **Schedule Required from Contractor**

.1 Construction Progress Schedule and progress of Work.

.2 Submittal Schedule for Shop Drawings, Product Data and Samples.

.3 The Contractor shall provide an updated schedule on or before the end of each calendar month or any other time as determined by the contract administrator. The contractor shall supply the updated schedule within (3) days of the request.

1.10 Submittals

.1 Administrative

.1 Submittals must be reviewed and approved by the Consultant. Submit promptly and in an orderly sequence as to avoid delays in the Work.

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

.3 Procedure on other submittals, refer to **01330 – Submittals**.

1.11 Schedules

.1 Schedules required from the Contractor:

.1 The Contractor shall prepare and update as required a Construction schedule indicating the timing of the major activities of the Work. The schedule shall be submitted to the Consultant within a reasonable time from the Work relative to the Construction schedule. Advise the Consultant in writing of any revisions required as the result of delays.

.2 The Contractor shall submit the Construction schedule within ten (10) days after award of Contract.

.3 The Contractor shall cooperate with all parties doing Work on this project to permit proper execution of the Work.

.4 The Contractor shall provide a Construction Progress schedule on a weekly basis during the execution of the Work to the Consultant for their review.

.5 The Contractor shall provide a Substantial schedule for Shop Drawings, Product Data and Samples. Refer to **01330 – Submittals**.

1.12 Qualification of Contractor

.1 All Work shall be completed by an established Contractor with proven related experience and who has skilled Workers properly trained and competent to execute the Work specified. Documentation to support Work experience may be requested.

1.13 Site Examination Before Execution of Work

.1 In accordance with the terms and conditions, prices shall include all Work required as a result of the existing site conditions at the close of the tender, as well as those conditions encountered during construction.

.2 The Contractor shall have responsibility to study the Contract Documents to determine the extent of Work required by each Section and upon which Work of other Sections depend and to coordinate scope and extent of Work to be performed. Neither organization of Specifications into Divisions and 3-part Sections format nor arrangements of Drawings, Schedules and Standard Drawings shall affect in any way Contractor's control in dividing Work or establishing scope of Work. Claims for additional compensation arising from

disputes due to lack of coordination by the Contractor will not be considered.

.3 The Contractor shall promptly and not later than five (5) Working days of becoming aware of circumstances which may require a change in the Work or other directions, give written notice to the Consultant outlining such circumstances and requesting written directions. Do not Work in affected area, or that would prevent the Consultant from properly assessing the situation or evaluating change, without prior written approval. The Consultant will act promptly to give the Contractor directions so Work is not unreasonably delayed.

1.14 Specialty Products

.1 Contractors approved by the manufacturer as installers of speciality products shall be utilized only where required.

1.15 Site Location and Access

.1 The Consultant and Contractor shall define the construction access route before construction begins. The Contractor shall not place material in areas that will obstruct pathways, roadways, or access to park facilities at any time during construction.

.2 The Contractor will be required to obtain and pay for Road Occupancy & Access Permits for all Works within the public right of way.

.3 The Contractor shall maintain the access in a clean condition at all times.

.4 The Contractor will be responsible for the provision of whatever temporary measures as required or the Consultant may define for clear safe access to the site (i.e. warning signs, protective fencing, etc.). Remove all temporary access provisions upon the completion of the Work or when directed by the Consultant.

.5 The Contractor shall be responsible to maintain accesses during construction. Mud and other debris tracked onto any local road or adjacent facilities shall be promptly removed at the Contractor's expense to the satisfaction of the Owner.

.6 The Contractor shall maintain the access during construction and shall protect all concrete curbs and sidewalk from damage. Any damage to the curbs or sidewalk and existing site during over the course of construction shall be replaced at the Contractor’s expense

to the satisfaction of the Owner.

1.16 Safety Codes and Standards

.1 All Work is to be in accordance or exceed the latest version of the Ontario Building Code (OBC).

.2 All Work shall meet or surpass the requirements of the City of Brampton standards and referenced documents.

.3 All Work within the Regional Right-of-way shall meet or surpass the requirements of the Region of Peel standards and referenced documents.

.4 All Work will be in accordance with the latest edition of the Province of Ontario Occupational Health and Safety Act and Regulations for Construction Projects.

1.17 Project Coordination

.1 The Contractor shall coordinate progress of the Work, progress schedules, and submittals, use of site, temporary utilities, and construction facilities.

.2 The Contractor shall coordinate Work of each Section as required for satisfactory and expeditious completion of Work. Take field dimensions where required. Take into account existing installations to assure the best arrangements of components in available space. Confirm with the Consultant prior to commencing Work in critical locations. Fabricate and erect Work to suit field dimensions and field conditions.

.3 The Contractor shall examine all drawings, Specifications, shop drawings and other instructions and shall report any conflicts, interferences etc. between various parts of the Work to the Consultant.

.4 The Contractor shall provide forms, templates, anchors, sleeves, inserts and accessories or other components required to be fixed to or inserted in Work. As applicable set them in place or instruct related Sections as to their location.

.5 The Contractor shall pay cost of extra Work caused by, and make up time lost as result of failure to comply with these requirements.

1.18 Working Hours

.1 Refer to by-law or permit requirements for Working hour restrictions.

.2 The Owner may permit an extension to the Working hour restrictions provided written application is made by the Contractor through the Consultant and the extended operations do not result in excessive noise as permitted by the by-law.

1.19 Extra Work

.1 No extra Work in excess of the items described in the Contract Documents is to be carried without the prior written authority of the Owner via the Consultant.

.2 Submission of a detailed report of the proposed extra Work and total cost(s) associated is mandatory prior to the issuance of such written authority by the Owner. Extra Work must be approved by the Owner in writing or no payment will be made.

.3 All claims submitted for Work done, without such prior written authority, shall not be accepted. Work which is carried out without such written authority shall be at the Contractors' own expense.

1.20 Work Outside Designated Area

.1 Provide a minimum of forty-eight (48) hours written notice to the Owner prior to commencement of Work outside of the designated area.

.2 The Contractor shall prepare and update as required a construction schedule indicating the timing of the major activities of the Work outside the designated area. The schedule shall be designed to ensure conformance with the required Contract Time. The schedule shall be submitted to the Consultant for their information within a reasonable time from the date of Contract award. The Contractor shall monitor the progress of the Work relative to the schedule and advise the Consultant in writing of any revisions required as the result of delays.

.3 Co-operate with all parties doing Work on this project to permit proper execution of the Work.

1.21 Specified Products

.1 Work of this Contract is based on Products specified by:

a. Manufacturer's catalogues trade names and;
b. Reference Standards (i.e. CAN, CGSB, CSA, ASTM) or;
c. Prescriptive Specifications or;
d. Performance Specifications.

.2 When one or more manufacturer's trade name is specified for a Product, any one of the specified Products will be acceptable. Products by other manufactures or indicated as alternate are subject to the Consultant's acceptance as an Approved Alternative in accordance with the specified requirements.

a. The Bid price shall be based on one of the manufacture's trade name specified for a Product. Submission of other manufacture's product indicated as Alternate will not be accepted prior to the Notice of Award and shall be delivered at no additional cost to the contract.

.3 When more than one manufacturer's catalogued trade names Product is specified along with a referenced standard, any one of the specified products will be acceptable on condition the Product complies with the referenced standard.

.4 When a Product is specified by reference to a standard only, the Contractor may select any Product that meets or exceeds the specified standard for the intended purpose. The onus shall be on the Contractor to establish that such products meet the reference standard requirements. Products exceeding the minimum standard will be accepted for the Work if such Products are compatible with the Work with which they are incorporated.

.5 When a Product is specified by a prescriptive or performance Specification, any Product meeting or exceeding the Specification will be accepted.

.6 When a Product is specified by reference to a standard or by prescriptive or performance Specification, upon request of the Consultant, obtain from the manufacturer, an independent testing laboratory report showing that the product meets or exceeds the specified requirements.

.7 Unless otherwise indicated in the Specifications, maintain uniformity of manufacture for any particular or like item throughout the Work.

1.22 Approved Alternates

.1 Proposals for Alternates for specified products will be considered after Contract Award. Product specifications for the Proposed

Alternates are to be submitted to the Consultant for review. The onus is upon the Contractor to prove that the Proposed Alternative is equal to, or better than, what is specified.

.2 No proposals for Alternates for specified products will be considered for any Sole Source Items.

.3 Requests for Approved Alternates will not be accepted during the bidding period. Request for Alternate will only be considered by the Consultant after during the Construction process after Contract Award and provided that:

a. The proposed Alternates have been investigated and complete data are submitted which clearly includes high-lighting all aspects that meet the specifications. The Consultants will only review data submitted. Incomplete data will be grounds for non-acceptance.
b. Data relating to changes in the Contract Schedule, if any, and the relation to other Work have been submitted.
c. The same Warranty is given for Approved Alternates as for the original Product specified.
d. All claims are waived for additional costs related to Approved Alternates which may subsequently arise.
e. Installation of the accepted Approved Alternates is co-ordinated into other Work and that full responsibility is assumed when substitutions affect the Work. Make any necessary changes required to complete the Work. Revisions to drawings for incorporation of the Approved Alternates shall be made by the Consultant and all the costs associated with the revisions shall be borne by the Contractor.

.4 Alternates to methods or processes described in the Specifications or drawings may be proposed for consideration by the Consultant. Ensure that such Alternates are in accordance with the following requirements:

a. Time spent by the Consultant in evaluating the proposed Alternates shall not be the basis for a claim by the Contractor for extensions to the Contract Schedule.
b. Clearly indicate how the proposed Alternate would be advantageous to the Owner or in the opinion of the Contractor would improve the operation of the installation.
c. Be responsible for changes to methods or processes concerning all Work affected by the proposed Alternates and ensure that the Warranty covering all parts of the Work will not be affected.

d. The cost of all changes in the Work of Sub-Contractors and other contractors, necessitated by the proposed Alternate methods or processes, if accepted, is borne by the Contractor.

e. The proposed Alternate methods or processes fit into the space allotted to the specified methods or processes. Revisions to drawings for incorporation of the substitution shall be made by the Consultant and all associated costs with the revisions shall be borne by the Contractor.

.5 Proposed Alternates shall not be considered if:

a. They are indicated or implied on shop drawings or Product data without formal requests.

b. Acceptance will require substantial revision to the Specification and Drawings.

.6 Procedures for proposing Alternates during construction:

a. Products may only be substituted during Construction period for one (1) or more of the following reasons:

i. Insolvency of the product manufacturer

ii. Inability of the Manufacturer to provide the product(s) in the time frame required to maintain the construction schedule.

iii. Specified Products have been discontinued

iv. Substitutions proposed offers better performance that that specified, at no additional costs.

v. Substitutions offers equivalent performance to that specified, at a reduced cost to the Owner as results in a reduction of the Contract Price.

b. Items a-ii. and a-iii. will require a letter from the manufacturer confirming their inability to provide the products specified, or the inability to meet the schedule.

c. Items a-iv. and a-v. will be at the discretion of the Owner.

.7 Do not substitute products or methods or processes into the Work unless such Alternates have been specifically approved for the Work by the Consultant.

.8 Approved Alternates shall be subject to inspection and testing procedures by the Consultant. Approved Alternates shall only be installed after receipt of the written approval by the Consultant.

.9 The Contract Price shall be adjusted accordingly to any and all credits arising to from the Approved Alternates.

GENERAL REQUIREMENTS

1.23 Approval of Products and Installation Methods

1. Wherever specified that Products and installations methods shall meet approval of authorities having jurisdiction, underwriters, the Consultant, and others, such approval shall be in writing.

1.24 Quality Control And Inspection

.1 Refer to **01450 - Quality Control and Inspection**

1.25 Construction Facilities & Temporary Controls

.1 Refer to **01500 – Temporary Construction Facilities & Controls**

1.26 Material and Equipment

.1 Refer to **01600 – Material, Equipment & Workmanship Quality**

1.27 Cleaning

.1 Refer to **01740 – Cleaning**

1.28 Project Closeout

.1 Refer to **01700 – Contract Closeout, Takeover & Warranties**

1.29 Drawing List

.1 Drawings listed herein and appended to this Section apply to Work of the Contract generally and form part of the Contract Documents.

.2 **DRAWINGS**

GENERAL REQUIREMENTS

Number Name/Title

Refer to List on sheet 2 of drawing package.

PART 2 PRODUCTS - (Not Applicable)

PART 3 EXECUTION - (Not Applicable)

END OF SECTION- 01001

PROJECT COORDINATION & MEETINGS

PART 1 GENERAL

1.1 Description of Work

.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 Pre-Construction Meeting

.1 Schedule a pre-construction meeting within ten (10) days after issuance of the Purchase Order (PO) or written notification to Commence Work.

.2 Purpose: To review personnel assignments, responsibilities, and administrative and procedural requirements.

.3 Attendees:

.1 Contractor and Sub-Contractor's representatives as necessary.

.2 Consultant and Sub-Consultant's representatives as necessary.

.3 Owner and Owner's representative as necessary.

.4 Agenda:

.1 Introduction of the Consultant and Owner to Contractor team.

.2 Review of significant contractual responsibilities and administrative and procedural requirements.

.3 Other business.

1.3 Construction Progress Meetings

.1 Schedule regular construction progress meetings during the course of the Work.

.2 Purpose: to monitor construction progress and to identify problems and action required for their solution, to expedite the Work.

.3 Frequency: bi-weekly, or as otherwise directed by the Consultant.

.4 Location: On site or as directed by the Consultant.

.5 Attendees:

.1 Contractor and Sub-Contractor's representatives as necessary.

.2 Consultant and Sub-Consultant's representatives as necessary.

.3 Owner and Owner's representative as necessary.

.4 Others as required or directed by the Consultant.

.6 Agenda:

.1 Review and approval of minutes of previous meeting.

.2 Review of items of significance that could affect progress.

.3 Other topics for discussion as appropriate to current status of the Work.

.7 Minutes:

.1 The Consultant will be responsible for recording minutes at meetings.

.2 Minutes will be distributed to all attendees within three (3) days after the meeting.

1.4 Warranty Meetings

.1 Warranty meetings shall be held between Total Performance of the Work and the completion of the Warranty period.

.2 Purpose: to bring to Contractor's attention Contract Deficiencies identified during warranty period, determine action required for their correction, and monitor progress of Contract Deficiency correction.

.3 Frequency: called by the Owner or Consultant and Contractor.

.4 Location: same as progress construction meetings.

.5 Attendees: same as construction progress meetings.

.6 Agenda:

.1 Review and approval of minutes of previous meeting.

.2 Review of progress of Contract Deficiency correction.

.3 Identification of problems impeding Contract Deficiency correction.

.4 Review of outstanding Contract Deficiencies.

.5 Other business

.7 Minutes: same as construction progress meetings.

END OF SECTION - 01040

SUBMITTALS

PART 1 GENERAL

1.1 Related Work

.1 Section 01001 General Requirements
.2 Section 01700 Contract Closeout, Take Over & Warranties

1.2 Photographs

.1 The Contractor is to thoroughly photo document the work as it progresses to the satisfaction of the consultant. The contractor shall submit complete photo record monthly along with payment certificate or as requested by the consultant.

.2 In addition, illustrate any special operation, phase of construction or special detail of unusual interest for record purposes.

.3 All photographs will become the property of the Owner at the time of Substantial Performance.

1.3 Reports

.1 The Contractor shall submit one (1) copy of the inspection and test report(s) promptly to the Consultant for acceptance or approval prior to proceeding with the Work.

1.4 Mix Designs

.1 The Contractor is to submit a mix design for pavement to the Consultant not less than thirty (30) days prior to commencing paving Work.

1.5 Samples

.1 The Contractor to submit samples for review to the Consultant as specified.

.2 Submittals shall include:

.1 Date and revision dates

.2 The General Contractor shall Stamp, initial or sign, certifying review of submittal, verification of field measurements, and compliance with Contract Documents.

.3 Make corrections or changes to rejected submittals and resubmit, as

specified for initial submission.

.4 Coordinate each submittal with requirements of work and Contract documents. Individual drawings will not be reviewed until all related shop drawings and product data are available.

.5 Resubmit samples as required to obtain final review.

.6 The Owner or the Consultant will retain one reviewed sample until Work completed.

.7 Remove rejected samples, or samples no longer required, when requested and within five (5) working days.

.8 Finished work shall conform to final reviewed samples for all visual characteristics designated such as colour, texture, finish and to all other requirements of Contract Documents unless otherwise authorized in writing.

.9 Make submittals sufficiently in advance of the date reviewed. Submittals will be required and in such sequence as to cause no delay in the Work.

1.6 Responsibility for Errors, Omissions and Deviations

.1 The Consultant's review of submittals does not relieve the Contractor from responsibility for errors and omissions, or deviations from requirements of the Contract Documents.

1.7 Administrative

.1 The Submittals must be reviewed by the Consultant and approved by the Owner. The Contractor is to submit promptly and in an orderly sequence so as to avoid delays in the Work.

.2 Work affected by submittal shall not proceed until authorization is given.

.3 The Contractor is to review all Submittals prior to submission to the Consultant. This review is to confirm the specified requirements of the work and the Contract Documents have been established in the Submittal.

.4 The General Contractor shall review the contract documents in their entirety and submit a master submittals list for the Contract Administrator's review within twenty (20) days of award. This list and

consultants review are for coordination purposes only and does not alleviate the contractor's responsibility to provide all materials as listed in the contract documents.

1.8 Shop Drawings

.1 The Contractor is to submit Shop Drawings to the Consultant for review. Shop Drawings are prepared and submitted to indicate in detail the method of fabrication, construction and interface and material information. If Shop Drawings show, indicate or imply materials or qualities that are different from those shown, indicated or implied by the specifications or drawings, they must be highlighted. Such variations are not approved unless specifically requested and received in writing from the Owner or Consultant. Review of Shop Drawings does not in any way relieve the Contractor from full compliance with the drawings and specifications nor from the full performance of the construction.

.2 Identify field dimensions on drawings.

.3 Manufacturer's standard schematic drawings, catalogue sheets, diagrams, schedules, performance charts, illustrations and descriptive data will be accepted in lieu of shop drawings provided that:

.1 Information not applicable to the Work of this Contract is deleted and,

.2 Standard information is supplemented with information specifically applicable to the Work of this Contract.

.4 Shop drawing submissions will be organized as stated by the Consultant.

1.9 Product Data

.1 Product data consisting of manufacturers' standard schematic drawings, catalogue sheets, diagrams, schedules, performance charts, illustrations and descriptive data will be accepted in lieu of shop drawings provided that:

.1 Information not applicable to the Work of this Contract is deleted, and

.2 Standard information is supplemented with information specifically applicable to the Work of this Contract.

.3 Determine and verify:
- .1 Field measurement
- .2 Field construction criteria
- .3 Conformance with Contract Documents

1.10 Record Drawings

.1 As the work progresses and through the duration of the project the Contractor is to maintain project record drawings in a neat and legible form. Record accurately all significant deviations from the Contract documents in the work as constructed, caused by site conditions and including Consultant – originated changes, Contractor and Sub-Contractor oriented changes, site instructions, supplementary instructions, addenda, instructions by correspondence and jurisdictional authority approvals. Carefully record location of concealed elements, the location of which is required for maintenance, alteration of work and building additions.

.2 Clearly mark each of the project record drawings “Project Record Copy”. Maintain in good condition, available at all times for inspection by the Consultant or Owner

.3 Do not use record drawings for construction purposes.

.4 Keep the project record drawings current and do not record irrelevant information. Do not permanently conceal any work until required information has been recorded.

.5 Submit all record drawings to the Consultant within thirty (30) days after Substantial Performance of the project.

1.11 Extended Guarantees

.1 The Contractor is to provide the extended guarantees specified. These extended guarantees shall commence immediately after the expiration of the standard guarantee included in the Contract under Article GC-12.3, Warranty of the Contract.

.2 The Contractor shall submit them on the Form of Guarantee, a sample of which is included in this section.

SAMPLE FORM OF EXTENDED GUARANTEE

1. Items shown in brackets are to be changed to give the specific information for this project and trade.

2. Extended Guarantees are to be submitted through the General Contractor.

3. If validity of Extended Guarantee is related to proper maintenance and servicing of equipment, etc., full details must be provided in the maintenance manuals.

(DATE) To (Owner's name and address)

EXTENDED GUARANTEE

(Name of trade and specification section, or brief description of work covered.)

OWNER: (Owner's name and address)

PROJECT: (Full name and correct address)

WORK COVERED: (Clear description of work covered, including consequential damage to other work and what remedial action will be taken under the guarantee.)

GUARANTEE PERIOD: Commences on date of Certificate of Substantial Performance and expires on.

(Name and address of General Contractor) (Name and address of General Contractor)

(Signature and Corporate Seal) (Signature and Corporate Seal)

ISSUE DATE:
L/C NO.:

1.12 Schedule Submittals

.1 Refer to Section **01001 General Requirements**

1.13 Operating And Maintenance Data

.1 For all operating maintenance data, warranties, and commissioning submittals refer to Section **01700 Contract Closeout, Takeover & Warranties.**

1.14 Project Concrete Submittals

.1 Section **03200 Concrete Reinforcement**

.2 Section **03300 Cast-In-Place Concrete**

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION - 01330

QUALITY CONTROL & INSPECTION

PART 1 GENERAL

1.1 Description of Work

.1 All labour, materials, equipment and services necessary to accomplish the Work of this section as indicated or specified herein.

1.2 Related Work

.1 Section 01330 Submittals
.2 Section 01500 Temporary Construction Facilities & Controls
.3 Section 01561 Environmental Protection
.4 Section 01600 Material, Equipment & Workmanship Quality
.5 Section 01700 Contract Closeout, Takeover & Warranties
.6 Section 01740 Cleaning

1.3 Inspections

.1 All materials delivered are subject to an inspection upon arrival. Any material that does not meet the terms and fails in any way to meet the Contract requirement is subject to rejection (refer to Rejected Work herein) or to be paid for on an adjusted price basis. The decision of the Consultant shall be final.

.2 The Owner and Consultant shall have access to the Work at all times. If parts of the Work are in preparation at locations other than the place of the Work, access shall be given to such Work whenever it is in progress.

.3 An inspection notice shall be provided at a minimum of forty-eight (48) hours in writing requesting inspection to the Consultant if Work is designated for special tests, inspections or approvals by the Consultant, or required by law.

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

.5 The Owner or Consultant may order any part of the Work to be periodically inspected and examined if such Work is suspected to not be in accordance with the Contract Documents. The Contractor shall correct such Work and pay the cost of examination and correction.

1.4 Independent Inspection and Testing Agencies

.1 Independent Inspection and Testing Agencies will be engaged by the Contractor for the purpose of inspecting and testing portions of the Work.

.2 Costs of such services will be paid by the Contractor through the contract's cash allowance. The Contractor is responsible for submitting a materials testing and inspections spreadsheet with each payment request indicating the test complete, report reference and invoiced amount.

.3 The Contractor is to provide equipment required for executing inspection and testing.

.4 Where re-testing is required through non-compliance or poor scheduling by the Contractor, the Contractor shall absorb costs of re-testing.

.5 Employment of inspection and testing Agencies does not relax the responsibility to perform Work in accordance with the Contract Documents.

.6 If defects are revealed during inspection and testing, the appointed Agency will be required to perform additional inspection and testing to ascertain full degree of the defects. The Contractor shall correct defects and irregularities as advised by the Consultant and at no cost to the Owner. The Contractor shall pay costs for retesting and re-inspection.

1.5 Regulations & Authorities

.1 The Contractor shall comply with all provincial regulations and the requirements of the MOE, MTO, TRCA, the Region of Peel, the City of Brampton, and any other authority having jurisdiction over the Work.

.2 All Work shall be completed in strict adherence with O. Reg 406/19. The general contractor shall be responsible to:

- Furnish the third-party engineerable fill source review consultant with copies of all applicable material testing and reporting documentation required to adhere to O. Reg 406/19.

- Pay for all costs associated with gathering the pertinent documentation necessary to comply with the O.Reg 406/19, including any costs associated with preparing representative

due diligence sampling as required by the third party consultant. Only the third-party consultants review shall be billed against the allowance item; all costs associated with material sampling so to conform with the O. Reg shall be borne by the contractor and considered as part of the base bid.

.3 The third-party engineerable Fill Source Due Diligence Review consultant shall be determined by the owner.

.4 The third-party engineerable fill source due diligence review consultant shall review the documentation for quality control purposes only and validate the suitability of each source site. This review process does not alleviate the contractor's responsibility to comply with the O.Reg 406/19 in any way or alleviate the contractor's responsibility to source suitable material. If additional sample analysis is required, costs associated with these are not included and shall be the responsibility of the source site. The environmental consultant's scope of work includes review of source site documentation and analytical results and does not include any field investigation services. Additional source site reviews, above the allowance, shall be paid for directly by the Contractor.

1.6 Access to Work

.1 The Contractor shall allow Inspection or Testing Agencies access to the Work on-site and at off-site manufacturing and fabrication plants.

.2 The Contractor shall cooperate to provide reasonable facilities for such access.

1.7 Reports

.1 The Contractor shall submit two (2) copies of inspection and test reports promptly to Consultant for acceptance or approval prior to proceeding with Work.

1.8 Damages

.1 The Contractor is responsible for any damage on corporate or private property that is incurred as a result of Quality Control and Inspection.

1.9 Permits

.1 The Contractor shall pay for all permits, licences and fees, and give

all notices and comply with all by-laws and regulations of the City of Brampton and any other governing bodies.

1.10 Dewatering

.1 The Contractor must provide equipment and construct required measures to affect the adequate drainage of the site and excavations during construction. Provide sufficient equipment to keep excavations and site clear of water at all times. Refer to Section 00320 Geotechnical Data.

1.11 Delivery

.1 All equipment or material delivered must be standard new equipment or material of the latest model except as otherwise specifically stated in the tender. Where any part or nominal appurtenances or equal is not described, it shall be understood that all the equipment and appurtenances which are usually provided in the manufacturers stock shall be furnished.

1.12 Site Storage & Loading

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

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

.3 No Storage of equipment or material will be permitted upon existing roads, parking lots or other existing hard surface areas, within or adjacent to the construction site.

1.13 Project Cleanliness

.1 The Contractor shall keep the premises (including road access points, sidewalks, etc.), on a daily basis, free from accumulations of surplus material or debris caused by the Work or as directed on site by the Consultant.

.2 At the end of the work day, the Contractor is to remove all plant, tools and surplus materials. The site shall be left “broom clean”.

.3 If the site is left in an unacceptable manor, the Owner will conduct clean-up, remove the debris and back charge the cost to the Contractor.

1.14 Manufacturer's Instructions

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

.2 Notify the Consultant, in writing, of conflicts between specifications and manufacturer's instructions.

.3 Improper installation or erection of products, due to failure to comply with these requirements authorizes the Consultant to require removal and reinstallation at no increase in Contract Price.

1.15 Specialty Products Contractors & Warranties

Contractors approved by the manufacturer as installers of specialty products shall be utilized only where required.

1.16 Procedures

.1 Notify the appropriate Agency and the Consultant in advance of the requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the Work. Refer to Section **01330 Submittals.**

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

1.17 Rejected Work

.1 Refer to Section **01600 Material, Equipment, & Workmanship Quality**

1.18 Test and Mix Designs

.1 Contractor shall produce test results and mix designs as may be requested.

.2 The cost for testing and mix designs beyond those called for in the

Bid Documents or beyond those required by Law of the Place of Work shall be appraised by the Consultant and may be authorized as recoverable.

1.19 Accuracy

.1 Verify all dimensions; report any errors shown on the Contract Document drawings to the Consultant.

.2 Have a registered Ontario Land Surveyor to locate all property lines. All costs shall be paid by the Contractor unless specified in Bid Documents. The Contractor is responsible for coordination of survey and layout of Work.

END OF SECTION - 01450

TEMPORARY CONSTRUCTION FACILITIES & CONTROLS

PART 1 – GENERAL

1.1 DESCRIPTION

.1 To provide construction facilities and temporary controls in order to execute Work expeditiously.

.2 Remove all Temporary Work from site all such Work after use.

.3 The Contractor shall have sole responsibility for the design, erection, operation, maintenance, and removal of all Temporary Facilities.

1.2 RELATED WORK

.1 Section 01450 Quality Control & Inspection
.2 Section 01561 Environmental Protection
.3 Section 01600 Material, Equipment, & Workmanship Quality
.4 Section 01740 Cleaning

1.3 DESIGN OF TEMPORARY FACILITIES

.1 The Contractor shall be responsible for design and safety of temporary facilities. Temporary facilities of such nature that engineering proficiency is required for their design to ensure safety during construction shall be stamped by a Professional Engineer. Prior to the temporary structure used, the Engineer shall inspect the structure and issue a certificate to the Consultant stating that it has been instructed according to the design.

1.4 FIELD OFFICES AND SHEDS

.1 Contractor's Office: Provide and maintain, during the entire progress of the Work, a suitable office on the site, for own use, with suitable tables or benches for the examination of drawings, specifications, etc., and where all notices and instructions from the Consultant may be received and acknowledged.

.2 Materials Storage: Provide suitable weather and waterproof structures for storage and protection of materials. These structures shall be under lock and key maintained in good condition until the completion of the project.

1.5 EQUIPMENT, TOOLS, HANDLING, & STORAGE

.1 The Contractor is to provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials to protect against the elements;

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

.3 Handle and store Products to prevent damage, adulteration, deterioration and soiling in accordance with manufacturer's instructions when applicable;

.4 Store packaged or bundled Products in original and undamaged condition. Ensure manufacturer's seals and labels intact are visible and intact.

1.6 UTILITIES

.1 Water Supply:

.1 The Contractor is to provide a continuous supply of potable water;

.2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal;

.3 Pay for utility charge at prevailing rates.

.2 Telephone:

.1 The Contractor is to be available by mobile phone or page system while the Work is in progress, during working hours. All costs shall be borne by the Contractor.

.3 Electric Power:

.1 Supply: Electric power for all construction requirements, as required to be provided by the Contractor.

1.7 DUST BARRIERS AND PROTECTION

.1 Dust Nuisance and Sidewalk Control: The Contractor shall prevent nuisance to adjust properties near the works from dust rising by taking appropriate anti-dust measures, at such time as found necessary and as directed by the Consultant, or at any other times complaints of dust are received from the public by either the Contractor, the Consultant. Keep walkways broom-cleaned at all times.

1.8 SITE STORAGE & LOADING

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

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

1.9 CONSTRUCTION AIDS

.1 Work shall include all temporary roads and walks required for construction purposes. Remove them when no longer required, or at project completion. Completely restore all surfaces disturbed by temporary roads and walks.

.2 Work shall include adequate temporary bridges and crossings over water mains, sewers, heating lines, telephone and electrical conduits and any other buried services.

.3 Work shall include temporary culverts and ditches to provide adequate site drainage within the site and to maintain existing drainage off-site.

.4 Furnish all necessary transportation, scaffolding, forms, labour, tools and mechanical appliances, machinery services and material required for executing the work.

.5 Provide for access of emergency vehicles to premises at all times.

.6 Provide dewatering system, as necessary.

1.10 DEWATERING

.1 Provide for access of emergency vehicles to premises at all times.
Temporary drainage and pumping facilities; keep excavations and site free from standing water.

1.11 SANITARY FACILITIES

.1 Provide sufficient sanitary facilities for workers in accordance with local health authorities.

.2 The Contractor must maintain in clean condition.

1.12 SITE SIGNS

.1 No signs or advertisements of any type are permitted. Only signs regarding safety, caution, or any instructions shall be posted.

.2 The installation of the project sign board is required for this contract approximate size is 2400mm x 2400mm. The City of Brampton will provide the required information to be displayed on the project sign. Cost to be borne by the Contractor. The City of Brampton is to provide template on

request.

.3 The installation of the project's sign board will be by the Contractor.

.4 Prior to installation of the sign, the Contractor must submit the appropriate shop drawing(s) for Consultant approval.

1.13 HOARDING AND SECURITY FENCING

.1 Erect and maintain hoarding and security fencing where indicated on Contract Document drawings or as directed by Consultant to protect workers, public and private property from injury or damage. Maintain the hoarding and security fencing removal is directed by the Consultant.

.2 The tree protection area(s) are beyond the tree(s) corresponding drip line. Refer to the Contract Document drawings for the extent(s).

1.14 LOCAL STREETS AND TRAFFIC

.1 Provide all necessary flag people, detour signs, warning lights, signs and barricades necessary to direct and protect pedestrian and vehicular traffic in accordance with the municipal traffic control manual and traffic management plan approved by the appropriate road authority.

.2 Strengthen, repair, and maintain the shoulders of the roads in order to accommodate traffic.

.3 Provide access to branch streets, service stations, private and commercial properties along the line of construction, unless otherwise ordered by the Consultant. During the duration of construction, keep all fire hydrants free from obstruction of any kind.

.4 The Contractor is to obtain all necessary permits such as Road Occupancy for the duration of the construction. Costs for permits shall be borne by the Contractor.

1.15 CONSTRUCTION SAFETY MEASURES

.1 The Contractor shall observe and enforce construction safety measures required by the latest issue of the Canadian Safety Code, Occupations Health and Safety Act and Regulations for construction. Projects as well as all other applicable legislation, Worker's Compensation Act and jurisdictional authorities.

.2 In the event of conflict between applicable regulations the most stringent provisions shall be followed.

1.16 SAFEGUARDS

.1 In addition to the requirements of all applicable safety legislations, provide temporary safeguards and protection adequate to protect against:

.1 Accident or injury to any Work person and other persons on the site, adjacent Work and property, roads and walks.

.2 Damage to any part of the Work and to any adjoining or adjacent structure, property, pavement, walks, services, and other similar items by frost, weather overloading and any other cause resulting from the execution of Work.

.2 Should any part of the Work or any building, pavements, trees, poles, hydrant, and cultivated or grassed areas, etc, on or surrounding the site and adjacent to any road leading thereto, become damaged or disfigured due to lack or failure of such protection, they shall make good with material identical with existing and adjoining surfaces or the Owner shall be compensated for value of same.

.3 Provide all necessary temporary enclosures, boarding, fences, gates, guardrails, hoists, stairs, ladders, scaffolding, staging, runways, night-lights, and barriers for the Work. All such apparatuses shall meet all requirements of the labour laws and other provincial or local labour safety requirements of the labour laws and other provincial or local labour safety laws, applicable thereto.

.4 Should Work be stopped for any cause, provide protection for the Work and all necessary temporary cold weather heating during all such periods of Work stoppages.

.5 Keep all portions of the Work properly and effectively drained during construction and until completion and the Contractor will be held responsible for all damages which may be caused or result from water backing up or flowing over, through, from or along any part of the Works, whether such damage is to the works or neighbouring properties.

1.17 REPORTING OF ACCIDENTS

.1 The Contractor shall immediately notify the Consultant or delegate of any work place accidents involving injury to staff or property damage, giving full details of occurrences and subsequent action taken.

END OF SECTION - 01500

ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 Description of Work

1. Keeping site environmentally protected at all times.

2. Ensure all measures are in accordance with the specifications, drawings, and requirements of other authorities having jurisdiction.

1.2 Related Work

.1 Section 01450 Quality Control & Inspection
.2 Section 02231 Clearing & Grubbing
.3 Section 02311 Site Grading
.4 Section 02315 Excavation, Trenching & Backfilling
.5 Section 02901 Tree & Shrub Preservation
.6 Section 02911 Site Topsoil & Finish Grading

1.3 Fires

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

1.4 Protection

.1 Prevent damage to fencing, trees, landscape, natural features, benchmarks, existing buildings, existing pavement, surface or underground utility lines which are to remain, and to adjacent properties.

.1 Erect siltation and sediment controls where indicated on the Contract Document drawings or as directed by the Consultant or other authorities having jurisdiction prior to construction. Maintain the controls during construction until the sodding or seeding phase is complete or as directed by the Consultant or other authorities having jurisdiction.

1.5 Disposal of Wastes

.1 The Contractor agrees to assume full responsibility and cost to procure and obtain all permits and documentation necessary to effect the proper disposal of materials.

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

.3 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

1.6 Drainage

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

.2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.

.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.7 Conservation

.1 The Contractor shall take the necessary precautions to ensure construction activities are carried out with consideration given to the conservation of energy, water, and materials.

1.8 Plant Protection

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

.2 Wrap with tree protection fencing as per the City of Brampton Standard Detail (Wrap in burlap, trees and shrubs adjacent to construction Work, storage areas and access areas, and encase with protective wood framework from grade level to height to 2m).

.3 Protect roots of designated trees beyond the drip line during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict tree removal to areas indicated or designated by the Consultant as indicated on Contract Document drawings.

.6 Do not place surplus material over root systems within any protective fencing.

.7 No contaminants will be dumped or flushed where feeder roots of trees exist, that is within 1.5 times the diameter of the tree’s canopy.

.8 Do not drive over any roots of trees or other vegetation. Any

damage caused will be made good at the expense of the Contractor.

1.9 Temporary Tree Protection Fencing

.1 Existing trees shall be properly protected with temporary fencing as per the approved landscape plan and details until Preliminary Acceptance.

.2 Maintain existing grade with fencing line of all trees to be preserved.

.3 The area within the protected fencing shall remain undisturbed and free of debris, building materials and equipment.

.4 Prune dead wood unless directed otherwise by the Consultant, do not prune leaders.

.5 Trees, as determined by the Consultant, shall be borne by the Contractor. The species and size(s) must be as per the City of Brampton Standard.

1.10 Fertilizing Existing Trees

.1 The Work shall be carried out between April 15th and September 15th of the fiscal year.

.2 The Contractor shall provide fertilizer as recommended by soil testing results and analysis, and as directed by the Consultant.

.3 The Contractor shall use the product packaged in its original containers and prepare each tank in the presence of the Consultant.

.4 The equipment to be used will have to be inspected and approved by the Consultant.

.5 The Owner reserves the right to take samples of the mixture used, for analysis.

1.11 Work Adjacent to Waterways

.1 Do not operate construction equipment in waterways unless otherwise approved by the appropriate Conservation Authority.

.2 Do not use waterway beds for borrow material.

.3 Do not dump excavated fill, waste material or debris in waterways.

.4 Do not use skid logs or other sediment control structures as determined by appropriate Conservation Authority,

.5 Avoid indicated spawning beds or other designated Environmentally Sensitive Areas as identified by the Ministry of Natural Resources and Forestry (MNRF) & Conservation Authorities when constructing temporary crossings of waterways.

.6 Install silt-traps or other sediment control structures as determined by appropriate agencies.

1.12 Pollution Control

.1 Maintain temporary erosion and pollution control features installed under this Contract.

.2 Control emissions from equipment and plant to local authorities emission requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.

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

END OF SECTION - 01561

MATERIAL, EQUIPMENT & WORKMANSHIP QUALITY

PART 1 GENERAL

1.1 Related Work

.1	Section 01330	Submittals
.2	Section 01450	Quality Control & Inspection
.3	Section 01500	Temporary Construction Facilities & Controls
.4	Section 01561	Environmental Protection
.5	Section 01700	Contract Closeout, Takeover, Warranties
.6	Section 01740	Cleaning

1.2 Reference Standards

.1 Within the text of the specifications, reference maybe made to the following standards:

ACI - American Concrete Institute
AISC - American Institute of Steel Construction
ANSI - American National Standards Institute
ASTM - American Society of Testing and Materials
CGSB - Canadian General Standards
CISC - Canadian Institute of Steel Construction
CLA - Canadian Lumberman's Association
CNTA - Canadian Nursery Trades Association
CSA - Canadian Standards Association
CWB - Canadian Welding Bureau
NSGA - Nursery Sod Growers Association
OPSS - Ontario Provincial Standard Specifications
ULC - Underwriters' Laboratories of Canada

Conform to these standards, in whole or in part, as specifically requested in the specifications.

.2 If there is question as to whether any product or system is in conformance with applicable standards, the Consultant reserves the right to have such products or systems tested to prove or disprove conformance.

.3 The cost for such testing will be borne by the Contractor in the event of non-conformance. Refer to **01450 – Quality Control & Inspection**.

.4 When material or equipment is specified by the specifications, upon request of the Consultant, obtain from manufacturer an independent testing laboratory report, stating material or equipment meets or exceeds specified requirements.

MATERIAL, EQUIPMENT & WORKMANSHIP QUALITY

1.3 Products, Materials & Rejected Work

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

.2 The Contractor is responsible for products, whenever identified, whether defective, result of poor workmanship or damage; will be rejected regardless of previous inspections. Inspection does not relieve responsibility, but is a precaution against oversight or error. Contractor is to remove and replace defective products at own expense and is responsible for delays and expenses caused by rejection. All Work is to be replaced or re-executed in accordance with the Contract Documents.

.3 If, in the opinion of the Consultant it is not expedient to correct defective Work or Work not performed in accordance with the Contract Documents, the price difference of Work may be deducted from the Contract Price. The cost will be calculated by the difference in value of Work performed versus Work stipulated in the Contract Documents. The Consultant shall determine that sum.

.4 The Contractor is to make good on all removals or replacements that cause damage promptly.

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

.6 Unless otherwise indicated in the specifications, maintains uniformity of manufacture for any particular or like item throughout the project.

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

1.4 Reports

.1 Refer to **01330 Submittals.**

1.5 Equipment, Tools, Handling, & Storage

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

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

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

.4 Store Products subject to damage from weather in weatherproof enclosures.

.5 Store packaged or bundled products in original and undamaged condition. Ensure manufacturer's seals and labels intact are visible and intact.

.6 Location of storage materials as per identified on Contract Document drawings or as otherwise noted.

1.6 Workmanship

.1 General

.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.

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

.2 Co-ordination

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.3 Cutting and Remedial Work

.1 Perform cutting and remedial Work required to make the parts of the Work come together. Co-ordinate the Work to ensure this requirement is maintained.

.2 Should Work performed outside this contract necessitate cutting and remedial Work to be performed, the cost of such Work will be valued by the Consultant.

.3 Perform cutting and remedial Work by specialists familiar with the materials affected. Perform in a manner to neither damage nor endanger any portion of Work.

.4 Fastenings

.1 Provide fastenings and accessories in same texture, colour and finish unless indicated otherwise.

.2 Supply appropriate fastenings, anchors, accessories and adhesives required for fabrication and erection of Work.

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

.4 Space anchors within their load limit or shear capacity and ensure they provide positive permanent anchorage.

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

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

.7 Supply adequate instructions and templates and, if necessary supervise installation, where fastenings or accessories for your Section are required to be built into Work of other Sections.

.5 Protection and Safety of Work in Progress

.1 Comply with the requirements of all Acts and Regulations with respect to health and safety.

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

.3 Take care not to spill or allow oil, grease, gasoline, diesel and

fuel oil, chemicals and other substances to contaminate soil or water on or adjacent to Site. Should such contamination accidentally occur report it immediately and clean up.

.4 Damaged Work shall be made good at no additional expense to the Owner.

.6 Existing Utilities

.1 The Contractor is responsible for obtaining, coordinating and paying for all stake-outs or locates for all potential utilities unless otherwise noted in the Bid Documents – Price Schedule.

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

.3 Protect, relocate or maintain existing active services as directed. When inactive services are encountered, cap off in a manner approved by authority having jurisdiction and stake or otherwise record location of capped service.

END OF SECTION - 01600

CONTRACT CLOSEOUT, TAKEOVER & WARRANTIES

PART 1 GENERAL

1.1 Description of Work

.1 Accomplish Work in an orderly progression of steps to satisfy performance requirements of the Specification.

1.2 Related Requirements

.1 General Conditions of the Contract: Fiscal provisions, legal submittals, and other administrative requirements.

1.3 Related Work

.1 Section 01330 Submittals
.2 Section 01450 Quality Control & Inspection
.3 Section 01740 Cleaning

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 Final Submission Format

.1 All final documents requested shall be organized as stated below unless otherwise stated in this Section. Submit to the Consultant.

.1 Submission format is as follows (hardcopy and electronic):

.1 Table of Contents
.2 Title of the project labelled
.3 8.5” x 11” format or drawings accordion folded to this size if larger
.4 3 hole punched, and binders to suit document capacity.
.5 Dividers with indexed tables

.2 Binders:

.1 Commercial quality, fabric coated, hard covers attached to spine with metal piano hinges, three hole, designed to accommodate 8.5” x 11” paper.

.3 Electronic Files:

.1 As-built drawings are to be placed on CD and submitted in both AutoCAD and .pdf formats.

.4 Collect reviewed submittals and assemble documents executed by Subcontractors, suppliers and manufacturers.

.5 All photographs are to be placed on a CD or made available by digital download and submitted.

.6 Submit material prior to final application for Substantial Performance.

3.2 Operating And Maintenance Data Final Submission

.1 General: Provide operating and maintenance manuals and training as required herein.

.2 Manuals and reports: Provide three (3) binders containing one (1) clean copy each of all applicable operating and maintenance data as described below prior to Acceptance of the Work (if applicable):

.1 Operating Instructions: manufacturer's printed instructions describing proper operation.

.2 Installation Instructions: manufacturer's printed instructions describing manufacturer's recommended installation procedures.

.3 Equipment Identification: Name plate information for each piece of equipment, on forms approved by the Consultant.

.4 Maintenance or Operational Instructions: manufacturer's printed instructions describing manufacturer's recommended maintenance. Include type of frequency of cleaning. Repair data including drawings, diagrams, and catalogue cuts and parts list.

.5 Spare Parts Lists: parts lists and manufacturer's recommended spare parts.

.6 Suppliers and Contractors List: list of contractors and suppliers who supplied and installed equipment, systems, materials or finishes, organized by Division and system. Includes company name, address, and telephone number.

.7 Shop Drawings: Final reviewed shop drawings.

.8 Product Data: manufacturer's product data for equipment, systems, materials, and finishes.

.9 Certifications: includes the following:

.1 Copies of inspection reports prepared by authorities having jurisdiction.

.2 Certified copies of test reports prepared by independent testing agencies.

.3 Any other certificates required by the Contract Documents.

.4 Contractor is responsible for obtaining certificates of closure of all Building Permits from the City of Brampton Building department. All certificates to be provided.

.10 Manufacturer's Warranty and Bonds, guarantee forms and service contracts.

.11 Reports documenting the performance of tests required by the Contract Documents and the results of those tests.

.12 Documentation of other material, equipment or system related information required by the Contract Documents.

3.3 Equipment And Systems Demonstration And Instructions

.1 Prior to inspection, demonstrate operation of each system to the Consultant and others required for maintenance if required.

.2 Equipment Presentations

.1 Present information dealing with equipment. Include the following in presentations:

1. Explanation of how equipment operates.
2. Recommend preventative and routine maintenance.

.3 Seminar Organization

.1 Coordinate content and presentations for seminars.

.2 Coordinate individual presentations and ensure representatives scheduled to present at seminars are in attendance.

.3 Coordinate proposed dates for seminars with the Consultant.

.4 System Demonstrations

.1 Demonstrate operation of equipment and systems. Include

the following in demonstration:

.1 Start-up and shut-down
.2 Operation
.3 Scheduled and preventative maintenance
.4 Troubleshooting

3.4 Warranty

.1 For work requiring rectification, as determined by the Contract Administrator and itemized in the End of Maintenance Inspection Report, the Contractor shall have ten (10) full working days, following the receipt of a copy of the report to commence and continue to correct the default until timely completion. If the Contractor does not correct the default within ten (10) working days of commencement, then the Contract Administrator, without prejudice, has the right to direct others to remedy the situation and all costs arising from the work, plus an administration fee of 20%, shall be deducted from any monies owing to the Contractor.

.2 Submission Requirements:

.1 Submit extended warranties as part of “Operating and Maintenance Data Final Submission”

.2 Warranties must include the following information:

.1 Name and address of the project
.2 Owner: City of Brampton
.3 Seal or Certification stamp
.4 Date of warranty start
.5 Duration (date of end of warranty expiry)
.6 Conditions (including restrictions and exclusions)

.7 All work shall be guaranteed for a minimum of two (2) years (24 months) from the date of Substantial Performance of the Contract unless otherwise stated.

.8 The Consultant is responsible for reviewing defects and deficiencies during the warranty period, and notifying the contractor of items requiring attention. Prior to the anniversary date of the two (2) year warranty, the Consultant is to arrange a review of the project. The review will include:

.1 The Consultant

.2 Owner: (City Representative)
.3 The Contractor
.4 The Commissioning Agent (if applicable)

.9 Expedite and complete deficiencies and defects identified by the Consultant. All deficiencies to be rectified as agreed upon by the Consultant and Contractor.

.10 Submit one (1) copy of all approved extended warranties.

3.5 Project Commissioning Submittals

.1 Record and provide "As-Built" record drawings for completeness and submit one (1) full size hard copy and digital copy in both .pdf and AutoCAD 2018 to the Consultant.

.2 Provide digital site photos showing progression the project and submit to the Consultant.

.3 Following issuance of the Certificate of Substantial Performance, publish Substantial Performance in the Daily Commercial News and provide the Consultant with proof of publication.

.4 Provide a hard copy of the Electrical Safety Authority (ESA) and Canadian Standards Association (CSA) Permits.

.5 Provide a digital copy of all Shop Drawings, Permits, approvals, and certificates of Preliminary Acceptance inspection.

3.6 Inspection And Take-Over Procedures

.1 Prior to application for Certificate of Substantial Performance, the Contractor is to carefully inspect the Work and ensure it is complete, that major and minor construction deficiencies are complete, defects are corrected and site is clean and in condition for acceptance. Notify the Consultant in writing, of satisfactory completion of the Work and request an inspection.

.2 During the Consultant’s inspection, a list of deficiencies and defects will be recorded. The Contractor shall correct such deficiencies and defects within the time specified by the Consultant.

.3 The Certificate of Performance Acceptance can be made when the

.4 Consultant considers deficiencies and defects corrected and the requirements of the Contract have been performed.

END OF SECTION - 01700

CLEANING

PART 1 GENERAL

1.1 Project Cleanliness

.1 The Contractor shall keep the premises (including parking lot, road access points, sidewalks, etc.) on daily basis, free from accumulations of surplus material or debris caused by the Work or as directed on site by the Consultant.

.2 At the completion of the Work, the Contractor shall remove all tools, equipment and surplus material, and shall leave the works “broom clean” or its equivalent.

.3 In case of dispute, the Owner will remove the debris and back charge the cost to the Contractor.

1.2 Safety Requirements

.1 Standards: Maintain project in accordance with the current Occupational Health and Safety Act.

.2 Hazard Control

.1 Store volatile wastes in covered metal containers and remove from premises daily.

.2 Prevent accumulation of wastes which create hazardous conditions.

.3 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

.1 Do not burn or burry rubbish and waste materials on project site.

.2 Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.

.3 Do not dispose of wastes in streams or waterways.

.4 During construction: Execute cleaning to ensure that grounds and public properties including roads (assumed or unassumed) are maintained free from accumulations of mud, soil, waste materials and rubbish. Keep site clear of mud and pooling water due to severe rain. Ensure that Work is not stopped because of failure to provide access to site.

.5 Wet down dry materials to prevent blowing dust.

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

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

.8 At reasonable intervals during progress of Work, clean site and public properties and dispose of waste materials, debris and rubbish.

.9 Remove waste materials, debris and rubbish from site and legally dispose of it at public or private dumping areas off the Owner's property. Obtain permits from authorities having jurisdiction for disposal of waste and debris.

.10 Schedule cleaning operations so that dust and other contaminant resulting from cleaning process will not fall on wet, newly painted or paved surfaces.

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

.12 Remove snow and ice to allow access.

1.3 Surplus Material

.1 The Contractor shall remove surplus material from the site or relocate as directed by the Consultant in accordance with applicable Ontario Regulations.

.2 Remove material unsuitable for fill, grading or landscaping from site as directed by the Consultant, in accordance with applicable Ontario Regulations.

.3 Provide a brief inventory of all surplus material, Consultant to verify.

1.4 Restoration

.1 The Contractor shall repair all damages caused to adjacent property, public or private, such as sidewalks, roadways, grassed areas, trees, and shrubs and any structures, at his or her own expense;

.2 Repair all areas having been damaged in the process of execution of the Work, replace and make goods all items damaged beyond repair, to the complete satisfaction of the Owner. In all cases, match existing conditions.

1.5 Final Cleaning

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

.2 Clean all sight-exposed surfaces; leave project clean and ready for occupancy.

.3 The Contractor will be responsible for the cleaning up of all dirt and any other rubbish from his operations and shall proceed with such clean up forthwith when requested by the Consultant.

.4 Remove waste products and debris other than that caused by the Owner, other Contractors or their employees, and leave the Work clean and suitable for occupancy by the Owner.

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

.6 Remove all debris, mud etc. from access routes, sidewalks etc., to the satisfaction of the Consultant. Broom clean and wash exterior walks, steps and surfaces.

.7 Before applying for Substantial Performance, the Contractor, shall remove waste products and debris, other than that resulting from the Work of the Owner, other Contractors or their employees, and shall leave the place of Work clean and suitable for use or occupancy by the Owner. The Contractor shall remove products, tools, Construction Equipment, and Temporary Work not required for the performance of the remaining Work. Remove surplus products, tools, construction machinery and equipment.

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

.9 Remove dirt and other disfigurations from exterior surfaces.

.10 Inspect finishes, fitments and equipment and ensure specified

workmanship and operation.

.11 Sweep and wash clean site paved areas.

1.6 Dust Control

.1 Dust to be controlled by hand or mechanical means as required and as directed by the Consultant.

.2 Potable water, clear from suspended fine settlement is to be the primary means of control for application. Any additives such as calcium chloride are to be approved by the Consultant prior to use.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION - 01740

SITE WORK DEMOLITION & REMOVALS

PART 1 GENERAL

1.1 Protection

.1 Prevent damage to existing fencing, trees, landscape, natural features, bench marks, existing buildings, existing pavement, utility lines, site appurtenances, water courses and root systems of trees which are to remain. Make good any damage to the satisfaction of the Consultant.

1.2 Related Work

.1 Section 01740 Cleaning
.2 Section 02231 Clearing and Grubbing
.3 Section 02311 Site Grading

1.3 Scope of Work

.1 Demolition and removal shall apply to all areas of the site designed in the Contract Document drawings.

1.4 Demolition Work & Removal

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

.2 At all times when cutting steel or using welding equipment or using a torch. Keep a fire extinguisher on hand within five (5) feet of the operation.

1.5 Maintaining Traffic

.1 Do not close or obstruct streets, sidewalks, alleys, passageways without permits. Do not place or store materials in streets, alleys or passageways. Do not block or close exits and exit paths from the existing buildings.

.2 Conduct operations with minimum interference with roads, streets, driveways, alleys, and passageways.

.3 The Contractor is to obtain all required permits prior to commencing Work.

1.6 Services

.1 Before commencing Work in the existing site locate all existing services. Disconnect and seal electrical and utility service lines interfering with new construction. Post warning signs on all services which must remain energized during the period of excavation and demolition.

.2 Disconnect and cap mechanical services in accordance with requirements of local authority having jurisdiction. Natural gas supply lines shall be removed by the Gas Company or by a qualified tradesman in accordance with Gas Company instructions. Remove sewer and water lines to property line and cap to prevent leakage. Remove and dispose of other existing underground services.

.3 The Contractor is to ensure that all local authorities are notified as required prior to commencing Work.

PART 2 PRODUCTS

2.1 Temporary Hoarding Fencing

.1 Temporary hoarding fence to be 1.8m height, modular metal fence by Moduloc (or approved alternate) installed in accordance with manufacturer's specifications. Refer to project details.

2.2 Silt Fence & Sediment Trap

.1 Silt Fence to be 1.2 m height and installed in accordance with drawings and details. Contractor to note differentiation between type A and type B.

.1 Sediment traps to be installed beneath lids of drainage structures and removed following completion of construction in accordance with drawings and details.

PART 3 EXECUTION

3.1 Preparation

.1 Inspect site and verify with the Consultant items designated for removal and items to remain.

.2 Locate and protect utility lines, posts and guys. Preserve in operating condition active utilities traversing site.

.3 The Contractor will obtain and pay for the required permits.

3.2 Salvage

.1 Salvaging of materials must be approved by the Consultant.

3.3 Disposal of Material

.1 Dispose of materials not designated for salvage or re-use off site. Contractor to pay for all costs of disposal.

.2 Disposal of all hazardous material(s) are to be approved by the Consultant.

END OF SECTION - 02050

GEOTEXTILES

PART 1 GENERAL

1.1 Related Work

.1 Section 01330 - Submittals
.2 Section 02315 - Excavating, Trenching and Backfilling
.3 Section 02620 - Sub-Drainage

1.2 References

.1 American Society for Testing and Materials (ASTM)

.1 ASTM D 4491-[99a], Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

.2 ASTM D 4595-[86-94], Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

.3 ASTM D 4716-[00], Standard Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.

.4 ASTM D 4751-[99a], Standard Test Method for Determining Apparent Opening Size of a Geotextile.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-4.2-[M88], Textile Test Methods.

.2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Geomembranes.

.1 No.2-[M85], Mass per Unit Area.

.2 No.3-[M85], Thickness of Geotextiles.

.3 No.7.3-[92], Grab Tensile Test for Geotextiles.

.4 No.6.1-[93], Bursting Strength of Geotextiles Under No Compressive Load.

.3 Canadian Standards Association (CSA)

.1 CAN/CSA-G40.20/G40.21-[98], General Requirements for Rolled or Welded Structural Quality Steel.

.2 CAN/CSA-G164-[M92(R1998)], Hot Dip Galvanizing of Irregularly Shaped Articles.

1.3 Samples

.1 Submit samples in accordance with **Section 01330 Submittals**.

.2 Submit to Consultant following samples at least two (2) weeks prior to commencing work.

.1 Minimum length of 2 m of roll width of geotextile.

.2 Minimum of 1 m seam with at least 300 mm of geotextile on both sides of seam.

1.4 Mill Certificates

.1 Submit to Consultant 2 copies of mill test data and certificate at least 4 weeks prior to start of work.

1.5 Delivery and Storage

.1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

1.6 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with **Section 01740 - Cleaning.**

PART 2 PRODUCTS

2.1 Material

.1 Geotextile: as specified in drawings and details.

.2 Physical properties:

.1 Thickness: to CAN/CGSB-148.1, No.3,

.2 Mass per unit area: to CAN/CGSB-148.1, Tensile strength and elongation (in any principal direction): to ASTM D 4595.

.3 Grab tensile strength and elongation: to CAN/CGSB-148.1, No.7.3.

.4 Ball burst strength: to CAN/CGSB-4.2, method 11.2,

.5 Bursting strength: to CAN/CGSB-148.1, No.6.1

.3 Hydraulic properties:

.1 Apparent opening size (AOS): to ASTM D 4751

.2 Transmissivity: to ASTM D 4716,

.3 Permittivity: to ASTM D 4491.

.4 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m2 to CAN/CSA G164.

.5 Factory seams: sewn in accordance with manufacturer's recommendations.

.6 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

PART 3 EXECUTION

3.1 Installation

.1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position.

.2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.

.3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.

.4 Overlap each successive strip of geotextile 600 mm over previously laid strip.

.5 Join successive strips of geotextile by sewing or gluing as per manufacturer's recommendation.

.6 Pin successive strips of geotextile.

.7 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.

.8 After installation, cover with overlying layer within 4 hours of placement or as otherwise specified by manufacturer.

.9 Replace damaged or deteriorated geotextile to approval of Consultant.

3.2 Protection

.1 No vehicles permitted directly on geotextile.

END OF SECTION - 02072

CLEARING & GRUBBING

PART 1 GENERAL

1.1 Related Work

.1 All Division 1 Specification Sections
.2 Section 01561 Environmental Protection
.3 Section 01740 Cleaning
.4 Section 02050 Site Work Demolition & Removals

1.2 Measurement Of Payment

.1 Measurement for payment will be as per the Bid Documents.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 Clearing

.1 Clear trees, shrubs, vegetation, uprooted stumps and surface debris not designated to remain and obstructions interfering with the Work on the approved plans or as stated on-site by the Consultant.

.2 Cut off trees, brush, and scrub as indicated or as directed by Consultant at a height of not more than 300 mm above ground. In areas to be subsequently grubbed, height of stumps left from clearing operations to be not more than 1000 mm above existing ground.

.3 Any required pruning to be conducted as per **Section 02232 Tree Pruning**.

3.2 Close Cut Clearing

.1 Cut off trees, shrubs, stumps and other vegetation at ground level.

.2 Perform close cut clearing by hand so that existing insulation of fibrous material is not damaged.

.3 Cut off unsound branches and cut down trees over-hanging area cleared at no extra cost.

3.3 Isolated Trees

.1 Cut off isolated trees as indicated or as directed by Consultant at height of not more than 100 mm above existing ground.

3.4 Underbrush Clearing

.1 Clear underbrush from areas as indicated at ground level.

3.5 Grubbing

.1 Grub out stumps and roots to not less than 450 mm below existing ground surface.

.2 Grub out visible rock fragments and boulders, greater than 300 mm in greatest dimension.

3.6 Protection

.1 Prevent damage to existing fencing, trees landscaping, natural features, benchmarks, existing buildings, existing pavement, utility lines, site appurtenances, water courses and root systems of trees which are to remain. Make good any damage to the satisfaction of the Owner and the Consultant.

3.7 Remove And Disposal

.1 Remove cleared and grubbed materials off site as indicated or designated by the Consultant.

3.8 Finished Surface

.1 Leave ground surface in condition suitable for immediate operations.

END OF SECTION - 02231

GRANULAR BASE

PART 1 GENERAL

1.1 Description or Work

.1 The Contractor shall provide all materials, equipment, and labour necessary to haul, place, and compact the granular base material for the concrete paved walkways, retaining walls, concrete curbs and beneath play surface profiles in accordance with the specifications and details, or as specified in any other section or detail.

1.2 Related Work

.1 All Division 1
.2 Section 02701 Aggregate Materials
.3 Section 02311 Site Grading
.4 Section 02315 Excavation, Trenching & Backfilling
.5 Section 02743 Asphalt Paving
.6 Section 02770 Concrete Walks and Curbs
.7 Section 03300 Cast-In-Place Concrete

1.3 Warranty

.1 All granular required by the Work of this Contract shall be replaced by the Contractor to the requirements of these specifications, at his or her own expense. Should defects surface due to materials or Workmanship, for a period of twenty-four (24) months from the date of written Substantial Performance of the Work of this Contract. Refer to **Section 01700 Contract Closeout, Takeover & Warranties** for submittal requirements.

PART 2 PRODUCTS

2.1 Materials

.1 Granular materials as specified on plans and in accordance with **Section 02701 – Aggregate Materials**

PART 3 EXECUTION

3.1 Inspection of Underlying Sub-Base or Subgrade

.1 Do not place granular base until finished sub-grade surface is inspected and compaction tests confirm 95% S.P.D. for undisturbed subgrade or 98% S.P.D. for disturbed sub grade, unless otherwise indicated in the contract documents.

.2 All granular base material specified to be used shall comply and be laid in accordance with the requirements of OPSS standards.

.3 The Contractor shall coordinate compaction testing for all granular bases. Should any test results be sub-standard and not in accordance with the specifications, the Contractor shall correct all deficiencies and re-test areas corrected at the Contractor's expense.

3.2 Placing

.1 Place material only on clean unfrozen surface, properly shaped and compacted and free from snow and ice.

.2 Place using methods which do not lead to segregation or degradation of aggregate.

.3 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. The Consultant may authorize thicker lifts (layers) if specified compaction can be achieved.

.4 Shape each layer to smooth contour and compact to specified S.P.D. before succeeding layer is placed.

.5 Remove and replace that portion of layer in which material becomes segregated during spreading.

3.3 Compaction Equipment

.1 Compaction equipment must be capable of obtaining required densities in materials on project.

3.4 Compacting

.1 Compact to density not less than 98% maximum dry density in accordance with ASTM D698-78 unless otherwise directed by the Geotechnical Engineers report or contract documents.

.2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.

.3 The material shall be sprinkled with water during rolling, tamping and blading when and if directed by the Contractor to aid in compacting or to reduce dust nuisance or both. If material is excessively moist, aerate with suitable equipment until moisture content is corrected.

3.5 Finish Tolerances

.1 After the required thickness has been attained; the finished surface shall be shaped and compacted by additional rolling as necessary to produce the required contour of the surface. The tolerance in cross sections or longitudinal profile shall not be more than plus or minus 10mm.

.2 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.6 Proof Rolling

.1 Proof roll top of base upon completion of fine grading and compaction to the satisfaction of the consultant.

.2 Make sufficient passes with proof roller to subject every point on surface to three separate passes.

.3 Where proof rolling reveals areas of defective subgrade, at no extra cost:

.1 Remove base, Sub-base and subgrade material to depth and extent directed by the Consultant.

.2 Place geogrid or backfill excavated subgrade with material as directed by the Consultant and compact in accordance with this section.

.3 Replace sub-base material and compact in accordance with this section.

.4 Replace base material and compact in accordance with this section.

3.7 Maintenance

.1 Maintain finished base in condition conforming to this section until succeeding material is applied or until Substantial Completion.

END OF SECTION - 02233

PRESERVATION OF TOPSOIL

PART 1 GENERAL

1.1 Related Work

.1 All Division 1 Specification Sections

.2 Section 02050 Site Work Demolition & Removals

.3 Section 02231 Clearing and Grubbing

.4 Section 02311 Site Grading

.5 Section 02911 Site Topsoil & Finish Grade

PART 2 PRODUCTS

2.1 Not Used

.1 Not Used.

PART 3 EXECUTION

3.1 Stripping of Topsoil

.1 Establish erosion controls and tree protection in accordance with drawings and in advance of commence stripping operations.

.2 Strip and dispose off-site top 75mm vegetative cover (grass, weeds, etc.)

.3 Handle topsoil only when it is dry and warm.

.4 Commence topsoil stripping of areas as indicated after area has been cleared of stumps, boulders, brush, weeds and grasses and removed from site in accordance with **Section 02231 – Clearing and Grubbing**

.5 Strip topsoil to full natural depth below all hardscape areas and as required to facilitate proposed grades. Avoid mixing topsoil with subsoil.

.6 Pile topsoil in berms in locations as directed by the Consultant. Stockpile height not to exceed 2.5m – 3.0m.

.7 Dispose of unused surplus topsoil off-site at contractors expense.

.8 Protect stockpiles from contamination and compaction.

.9 Verify Constructed Rough-Grades in accordance with **Section 02311 – Site Grading.**

3.2 Preparation of Grade

.1 Verify that grades are correct. If discrepancies occur, notify Consultant and do not commence work until instructed by Consultant.

.1 Grade area only when soil is dry to lessen soil compaction.

.2 Grade soil establishing natural contours and eliminating uneven areas and low spots, ensuring positive drainage.

3.3 Placing of Topsoil

.1 Place topsoil only after consultant has accepted subgrade.

.2 During dry conditions spread topsoil in uniform layers not exceeding 150mm, over unfrozen subgrade free of standing water.

.3 Establish traffic patterns for equipment that will prevent driving on topsoil after it has been spread to avoid compaction.

.4 Cultivate the soil following spreading procedures.

3.4 Sub-Soiling

.1 Following the spreading and cultivating procedures sub-soil the area to improve drainage and agricultural potential of soil.

.2 With a vibrating sub-soiler work the area to a depth of 40 cm. Follow the contour lines of the natural grades of the area.

.3 Cross sub-soil the area following the first pass.

.4 Cultivate the soil with a chain harrow to de-clod the soil.

.5 Remove surface debris, roots, vegetation branches and stones in excess of 50 mm diameter.

END OF SECTION - 02234

SITE GRADING

PART 1 GENERAL

1.1 Description of Work

.1 This section specifies the requirements for site grading.

1.2 Related Work

.1	All Division 1	Specification Sections
.2	Section 02233	Granular Base
.3	Section 02234	Topsoil Preservation
.4	Section 01561	Environmental Protection
.5	Section 02701	Aggregate Materials
.6	Section 02743	Asphalt Concrete Paving
.7	Section 02901	Tree & Shrub Preservation
.8	Section 02911	Site Topsoil & Finish Grading
.9	Section 03300	Cast-in-Place Concrete

1.3 Protection

.1 Contractor to verify location of all existing structures, underground services and survey monuments prior to beginning site grading. Notify in writing of any damage to existing structures prior to the beginning of any Work.

.2 Prevent damage to fencing, trees, landscaping, natural features, benchmarks, existing buildings, existing pavement, surface or underground utility lines which are to remain, and to adjacent properties. Contractor to make good on any damage.

.3 Install sediment controls prior to the commencement of Work.

.4 The Contractor is responsible for repairs to existing structures damaged by their Work at no extra cost to the Contract.

PART 2 PRODUCTS

2.1 Fill

.1 The Contractor is to obtain approval of excavated or graded material used as fill for grading Work. Protect approved material from contamination.

.2 Import engineerable material as required.

PART 3 EXECUTION

3.1 Stripping of Topsoil

.1 Complete Stripping of Topsoil in accordance with **Section 02234 Topsoil Preservation.**

.2 Strip topsoil to full natural depth below all hardscape areas and as required to facilitate proposed grades. Avoid mixing topsoil with subsoil. **Refer to Section 00320 Geotechnical Data.**

3.2 Grading

.1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated. The contractor shall be responsible to import/export sufficient material as required to meet the design grades.

.2 Verify rough grades and notify the Contract Administrator of discrepancies prior to performing the work.

.3 **Refer to Section 00320 Geotechnical Data.**

.4 Rough grade to following depths below finish grades, unless otherwise specified:

.1 300mm minimum for sodded areas
.2 300mm minimum for seeded areas.
.3 500mm for shrub beds.
.4 600mm depth for treepits unless otherwise indicated
.5 As indicated on details for all paved surfaces.

.5 Slope rough grade at minimum 2% for drainage unless otherwise specified.

.6 Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

.7 Compact filled and disturbed areas to corrected maximum dry density, as follows:

a. 85% S.P.D. under landscaped areas.
b. 98% S.P.D. under hardsurface areas unless otherwise specified.
c. 98% S.P.D. under concrete slabs unless otherwise specified

.8 Do not disturb soil within drip line or branch spread of trees or shrubs to remain.

3.3 Testing

.1 Inspection and testing of soil compaction will be carried out by designated testing laboratory.

.2 Costs of tests will billed out in accordance with **Section 01450 - Quality Control & Inspection.**

3.4 Verification of Constructed Rough-Grade

.1 Provide Contract Administrator with “as-built” elevations. Contract Administrator shall provide a plan indicating specifically where grade verification is required. Contractor, for the purpose of pricing shall assume a maximum of 500 grade points.

.2 Obtain approval from Contract Administrator of rough grades before commencing finished grade.

3.5 Surplus Material

.1 The Contractor is to remove surplus material from site or relocate on site, as directed by the Consultant;

.2 Remove material unsuitable for fill, grading or landscaping from site as directed by the Consultant.

END OF SECTION - 02311

EXCAVATION, TRENCHING & BACKFILLING

PART 1 GENERAL

1.1 Description of Work

.1 The section refers to excavation, trenching, backfilling and all Work pertaining thereto.

1.2 Related Work

.1 All Division 1 Specification Sections
.2 Section 01561 - Environmental Protection
.3 Section 02233 - Granular Base
.4 Section 02311 - Site Grading
.5 Section 02901 - Tree & Shrub Preservation
.6 Section 02911 - Site Topsoil & Finish Grading

1.3 Definitions

.1 Common excavation of materials of whatever nature, which are not included under definitions of rock excavation including dense tills, hardpan, frozen materials and partially cemented materials which can be ripped and excavated with heavy construction equipment.

.2 Rock excavation: Excavation of material from solid masses of igneous, sedimentary or metamorphic rock which, prior to its removal, was integral with its parent mass, and boulders or rock fragments having individual volume in excess of 1 m^3. Frozen material not classified as rock.

.3 Topsoil: Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.4 Waste material: Excavated material unsuitable for use in Work or surplus to requirements.

1.4 Coordination

.1 Coordinate Work specified in this Section with pipe, bedding and other related Work specified in other Sections.

1.5 Samples

.1 Inform the Consultant of proposed source of fill materials and provide access for sampling.

.2 Reviewed and accepted samples will be standards for Workmanship and materials against which installed Work will be verified.

.3 Reviewed and accepted samples will be standards for workmanship and materials against which installed work will be verified.

1.6 Protection of Existing Features

.1 Existing buried utilities and structures:

.1 Prior to commencing any excavation Work, notify owner or authorities; establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during Work.

.2 Confirm locations of buried utilities by careful test excavations.

.3 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.

.4 Obtain direction of the Consultant before moving or otherwise disturbing utilities or structures.

.5 Advise utility company to reroute existing lines in area of excavation. Costs for such Work will be paid by contractor.

.6 Record location of maintained, re-routed, and abandoned underground lines.

.2 Existing buildings and surface features:

.1 Conduct, with consultant, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks and paving, survey bench marks and monuments which may be affected by Work.

.2 Protect existing buildings and surface features from damage which may be affected by Work while Work is in progress and repair damage resulting from Work.

.3 Where excavation necessitates root or branch cutting, do so only in accordance with Section **02901 - Shrub & Tree Preservation.**

1.7 Imported Fill Supply & Testing

.1 Prior to commencing Work, Contractor is to inform the Consultant of

the proposed source of fill materials and provide a Geotechnical Engineers assurance letter indicating that all imported material meets current Ministry of the Environment (MOE) standards.

.2 Material Tests: Include with the list of material sources three (3) copies of gradation analysis and a moisture density relation analysis for granular backfill materials. Provide such test results well in advance of proposed works so as not to delay work scheduled.

.3 Complete Testing in accordance with **Section 01450 Quality Control & Inspections.**

PART 2 PRODUCTS

1.8 Materials

.1 Refer to the Contract Document drawings and details for required backfill materials.

.2 Granular Materials in accordance with **Section 02701 – Aggregate Materials.**

.3 Imported Fill material in accordance with **Section 02311 – Site Grading**

.4 In Situ Fill: selected compactable material from excavation or other sources, approved by consultant for re-use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials and in accordance with **Section 02311 – Site Grading.**

PART 3 EXECUTION

3.1 Site Preparation

.1 Remove all brush, weeds, grasses, ice, snow and accumulated obstructions from surfaces to be excavated within limits indicated.

.2 Saw-cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly. Concrete curbs and sidewalks shall be sawn at existing joints.

.3 For trench work in landscaped statutory right-of-way, carefully remove fences, shrubs, small trees and other items for replacement after backfilling is completed.

3.2 Surface Conditions

.1 Inspection: Inspect the existing Work of all other trades on which the Work of this Section is dependant, and verify that all such Work is complete to the extent that the excavation and backfill may commence.

.2 Site Preparation: Remove obstructions, ice and snow from surfaces to be excavated within limits indicated.

3.3 Stripping of Topsoil

.1 See Section **02234 – Topsoil Preservation** and Section **02311 - Site Grading.**

3.4 Stockpiling

.1 Stockpile materials where designated by the Consultant. Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

3.5 Dewatering

.1 Keep excavations free of water while Work is in progress.

.2 Protect open excavations against flooding and damage due to surface run-off.

.3 Dispose of water in a manner not detrimental to public and private property, or any portion of Work completed under construction.

.4 Submit details of proposed Dewatering methods, such as well points or filter socks for Consultant Approval. **Refer to Section 0320 Geotechnical Data.**

3.6 Excavation

.1 Excavate to lines, grades, elevations, and dimensions indicated or as directed by the Consultant.

.2 Remove and dispose off site any obstructions encountered during excavation.

.3 Excavation must not interfere with normal 45 degree splay of bearing from bottom of any footing.

.4 For trench excavation, do not excavate more than 30m of trench in advance of installation operations and do not leave open more than 5.0m at end of day's operation unless otherwise authorized by the Consultant in writing. Provide appropriate hoarding to protect public from injuries.

.5 Dispose of surplus and unsuitable excavated material off site at contractor's expense.

.6 Do not obstruct flow of surface drainage or natural watercourses.

.7 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.8 Notify the Consultant when soil at bottom of excavation appears unsuitable and proceed as directed by the Consultant.

.9 Obtain approval of completed excavation from the Consultant prior to backfilling.

.10 Remove unsuitable material from trench bottom to extent and depth directed by the Consultant.

.11 Where required due to unauthorized over-excavation, correct as follows:

.1 Fill under bearing surfaces and footings with concrete specified for footings.

.2 Fill under other areas with Type 4 fill compacted to minimum of 98% standard proctor maximum dry density to ASTM D698-78, method D.

.3 Hand trim, make firm and remove loose material and debris from excavations. Compact disturbed foundation soil to a density at least equal to undisturbed soil. Clean out rock seams and fill with concrete mortar or grout to approval of the Consultant.

.12 Dewatering: keep excavations free of water while backfilling walls. Protect open excavations against flooding and damage due to surface run-off. Dispose of water in a manner not detrimental to public and private property, or any portion of Work completed or under construction.

3.7 Cofferdams, Shoring, Bracing and Underpinning

.1 Codes and Regulations: Comply with the Building Code and applicable local regulations.

.2 Conflicting Requirements: The more stringent requirements shall govern conflicts with Building Codes and Requirements, the reference standards or these specifications.

.3 Construct temporary Works to depths, heights and locations as necessary.

.4 During backfill operation:

.1 Unless otherwise indicated or directed by the Consultant, remove shoring from excavations.

.2 Do not remove bracing until backfilling has reached respective levels of such bracing.

3.8 Fill types and Compaction

.1 Use fill of types as indicated or specified, compact depth as indicated to following densities: 98% maximum dry density to ASTM D698-78, Method D unless otherwise indicated.

3.9 Backfilling

.1 Do not proceed with backfilling operations until the Consultant has inspected and approved installations.

.2 Areas to be backfilled to be free from debris, snow, ice and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Install drainage system in backfill as indicated or directed by the Consultant.

.5 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

.6 Other Materials: Excavated materials approved for re-use by the Consultants shall be compacted to 100% Standard Proctor Density.

.7 Granular Backfill:

.1 Ensure the placement of sub-drains clear stone trenches and filter fabric are correct prior to placing backfill behind and under retaining walls.

.2 Proof roll subgrade where applicable, with vibratory roller to the Consultants approval prior to placement of granular backfill.

.3 Place fill material in 150mm loose layers, bring to proper moisture content and compact.

.4 Compact all granular backfills to min. 98% Standard Proctor Density.

3.10 Backfilling Around Installations

.1 Place bedding and surround material as specified elsewhere.

.2 Do not backfill around or over cast-in-place concrete within twenty-four (24) hours after placing of concrete.

.3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 600 mm.

.4 Do not backfill where temporary unbalanced earth pressures are liable to develop on walls or other structures.

.5 Permit concrete to cure for minimum fourteen (14) days or until it has sufficient strength to withstand earth and compaction pressure, and approval obtained from the Consultant.

.6 Erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by the Consultant.

.7 Do not place, spread or compact any fill or backfill materials during unfavourable weather.

.8 Do not commence any fill or backfill operation without adequate compaction equipment on site.

.9 Do not proceed with backfilling operations until the Consultant has inspected and approved installations.

3.11 Restoration

.1 Upon completion of Work, the Contractor is to remove surplus materials and debris; trim slopes, and correct defects as directed by the Consultant.

.2 Replace topsoil as indicated in Section **02911 Site Topsoil & Finish Grading.**

.3 Reinstate asphalt pavement and concrete sidewalks and all sodded areas to condition and elevations indicated on the Contract Document drawings.

.4 Clean and reinstate areas affected by Work as directed by the Consultant.

3.12 Disposal of Excavated Material

.1 Surplus or waste excavated material shall be removed during the excavation or backfilling operations and shall not be left along the trench following the completion of backfilling the trench. Contractor to move at own expense.

.2 Surplus excavated material which is not required as shown on the drawings or specified elsewhere herein shall be disposed of at sites obtained by the contractor at their expense, including all costs so to permit dumping at preferred locations. Waste material is not permitted to be dumped on private property without written permission and a fill permit obtained by the Owner.

END OF SECTION - 02315

AGGREGATE MATERIALS

PART 1 GENERAL

1.1 Related Work

.1 All Division 1 Specification Sections.
.2 Section 02233 - Granular Base
.3 Section 02311- Site Grading
.4 Section 02315 - Excavation, Trenching and Backfilling
.5 Section 02743 - Asphalt Concrete Paving
.6 Section 02712 - Sub-Drainage
.7 Section 03300 - Cast-in-Place Concrete

1.2 Reference

.1 Society for Testing and Materials (ASTM) Society for Testing and Materials (ASTM)

.1 American Current ASTMC117, Test Method for Material Finer Than 0.075mm Sieve in Mineral Aggregates by Washing.
.2 Current ASTMC127, Test Method for Specific Gravity and Absorption of Coarse Aggregate.
.3 Current ASTM C 136, Method for Sieve Analysis of Fine and Coarse Aggregates.
.4 Current ASTM D698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft3) (600kN-m/m3).
.5 Current ASTM D698, Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb. (2.49-kg) Rammer and 12-in (304.8-mm) Drop
.6 Current ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700kN-m/m3).
.7 Current ASTM D4318, Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
.8 Current ASTM D4791- [99], Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
.9 ASTM E11, Specification for Wire - Cloth Sieves for Testing Purposes.
.10 Current ASTM F355-95, ASTM F1292-99 (Playground Sand)

.2 Canadian General Standards Board (CGSB)
.1 Current CAN/CGSB-8.1-[88], Sieves, Testing, Woven Wire, Inch Series.
.2 Current CAN/CGSB-8.2-[M88], Sieves, Testing, Woven Wire, Metric.

.3 Canada Standards Association (CSA)
- .1 Current CAN/CSA-A5, Portland Cement.
- .2 Current CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
- .3 Current CSA A82.56, Aggregate for Masonry Mortar.

.3 Ontario Provincial Standard Specifications (OPSS)

1.3 Samples

.1 Submit samples in accordance with Section **01330 Submittals**.

.2 Submit to the Consultant, samples of material for sieve analysis at least three (3) weeks before installation of aggregate materials.

1.4 Testing

.1 Contact the testing agency for compaction and materials tests as per Section **01450 Quality Control & Inspection**.

.2 Testing to be conducted for this section of Work is as follows:
a. Sieve designation of specified aggregate.

PART 2 PRODUCTS

2.1 Materials

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated, or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.

.2 Flat and elongated particles of coarse aggregate: to ASTM D4791.

.3 Aggregate materials to satisfy the following requirements:

.1 Bedding and Surrounding Material - Catch Basins and Manholes.
- .1 Crushed or screened stone, gravel or sand.
- .2 Gradations to be within limits specified when tested to current ASTM C136 and ASTM C117. Sieve sizes to current CAN/CGSB-8.1.

.3 Table:

Sieve Designation	% Passing	% Passing

AGGREGATE MATERIALS

(mm)	Stone/Gravel	Gravel/Sand
25	100	-
12.5	65-90	100
4.75	35-55	50-100
2.00	-	30-90
0.425	10-25	10-50
0.075	0-8	0-10

.2 Bedding and Surrounding Material – Storm Sewer Pipe

.1 Crushed or screened stone, gravel or sand.

.2 Gradations to be within limits specified when tested to current ASTM C136 and ASTM C117. Sieve sizes to current CAN/CGSB-8.1.

.3 Table

Sieve Designation (mm)	% Passing Stone/Gravel	% Passing Gravel/Sand
25	100	-
12.5	65-90	100
4.75	35-55	50-100
2.00	-	30-90
0.425	10-25	10-50
0.075	0-8	0-10

.3 Playground Sub Drains, French Drains & Modular Wall Backfill

.1 Open graded, hard, durable particles, 19mm diameter clear stone.

.4 Type 3 Fill

.1 In accordance with Section **02315 Excavating, Trenching and Backfilling**.

.5 Granular Base

.1 In accordance with Section **02233 Granular Base**.

2.2 Quality Control

.1 Inform Consultant of proposed source of aggregates and provide access for sampling at least four (4) weeks prior to commencing production.

.2 If, in opinion of the Consultant, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.

.3 Advise Consultant four (4) weeks in advance of proposed change of material source.

.4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

PART 3 EXECUTION

3.1 Preparation

.1 Processing
- .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
- .2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified.
- .3 Wash aggregates, if required to meet specifications.
- .4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.

.2 Handling
- .1 Handle and transport aggregates to avoid segregation, contamination and degradation.

.3 Stockpiling
- .1 Stockpile aggregates on site in locations as indicated unless directed otherwise by the Consultant. Do not stockpile on completed pavement surfaces.
- .2 Stockpile aggregates in sufficient quantities to meet project schedule.
- .3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
- .4 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
- .5 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by the Consultant within forty-eight (48) hours of rejection.
- .6 Stockpile materials in uniform layers of thickness as follows:
    1. Max 1.5m for coarse aggregate and base course materials.
    2. Max 1.5m for fine aggregate and sub-base materials.
    3. Max 1.5m for other materials.

.7 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.

.8 Do not cone piles or spill material over edges of piles.

.9 Do not use conveying stackers.

.10 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.2 Cleaning

.1 Restore stockpile areas to pre-construction condition or as otherwise specified.

.2 Dispose of any unused aggregates.

END OF SECTION - 02701

SUB-DRAINAGE

PART 1 GENERAL

1.1 General Requirements

.1 The General Conditions and General Requirements are a part of this Section and shall apply as if written herein.

1.2 Related Work

.1 All Division 1 Specification Sections
.2 Section 02234 - Topsoil Preservation
.3 Section 02315 - Excavation, Trenching & Backfilling
.4 Section 02311 - Site Grading
.5 Section 02911 - Site Topsoil & Finish Grading

1.3 Scope of Work

.1 Work for this Section, includes, but is not necessarily limited to: Supply and installation of all tile drainage, pipe, services, and fittings, Trenching, excavation, and back filling as necessary, flushing and testing.

1.4 Notification of Utilities

.1 The Contractor must obtain stake outs from all utilities concerned and must obtain all permits with regard to this installation.

1.5 Inspection of Materials

.1 All materials shall be inspected by the Contractor for damage in transit. No defective materials shall be delivered to the site. Any material subsequently damaged shall be removed from the site immediately.

1.6 Guarantee

.1 All material and workmanship related to the sub-drainage shall be guaranteed for a period of two (2) years from the date of Substantial Performance.

PART 2 PRODUCTS

2.1 PIPE

.1 Refer to drawings for pipe size and materials.

.2 Pipe to be 150 mm Rigid Perforated Plastic Drainage Tubing for subsurface drainage use and shall meet all standards of CGSB 41-GP-25.

.3 Pipe to be 100 mm Flexible Perforated Plastic Drainage Tubing for subsurface drainage use and shall meet all standards of CGSB 41-GP-25.

.4 Pipe to be 300mm Solid SDR Drain Pipe for subsurface drainage use and shall meet all standards of CGSB 41-GP-25

.5 Pipe material shall be resistant to chemicals present in soils and ground water and shall be resistant to deterioration from ultraviolet light.

.6 Tubing must be of uniform colour and density, free from any defects.

.7 150mm tubing must have an internal diameter of 141.00mm. 100mm tubing must have an internal diameter of 89mm. Minimum water-inlet area must be 15.7 cm^2/m in length.

.8 Individual inlet openings must have an opening width ranging from 1 - 2 mm and should be ranged in a minimum of 3 rows, uniformly spaced about the circumference of the tubing.

.9 150 mm tubing shall have a minimum stiffness of 800 Pa at 5% deflection when tested in a parallel plate. There should be no evidence of a crack or split following an impact test.

.10 At any change of direction, use manufactured bends and fittings.

.11 All ends to be capped with manufactured caps.

.12 Granular backfill to be 19mm crushed stone in accordance with OPSS 1004.

.13 Filter Fabric – Terrafix 270R non woven or approved alternate.

2.2 Aggregate

.1 Drainage trench to be backfilled with 10mm dia. washed pea stone or as noted on drawings and in accordance with Section 02701 – Aggregate materials.

2.3 Geotextile Fabric

.1 Geotextile: Non-woven Terrafix 270R or approved alternate, synthetic fibre fabric, supplied in rolls.

.1 Width: 3.3m minimum
.2 Length: 150m minimum

.2 Physical Properties:

.1 Thickness: to CAN/CGSB-l48.l-M85, number 3, minimum 3mm.

.2 Mass per unit area: to CAN/CGSB-l48.l-M85, number 2, minimum 270 g/m^2.

.3 Tensile strength and elongation (in any principal direction): to CAN/CGSB-4.2-M77, method 9.2.
.1 Tensile strength: minimum 556 N, wet condition.
.2 Elongation at break: 70-100%.
.3 Ball burst, strength: to CAN/CGSB- 4.2-M77, method ll.2, minimum l350 N, wet condition.

.4 Securing pins and washers: to CAN3-G40.2l-M8l, Grade300W, hot-dipped galvanized with minimum zinc coating of 600g/m^2 to CSA G164-M8l.

PART 3 EXECUTION

3.1 Trenching

.1 After completing all rough grading, excavate trenches using a farm type wheel ditcher or backhoe. Other methods to be approved by the Consultant. Trenches to have smooth "U" shaped bottoms with excavated material deposited away from trench.

.2 All trenches are to be excavated starting from the lowest elevation at the outlet and proceed upgrade.

.3 Trench locations to be as shown on the Contract Document layout and grading drawings.

3.2 Geotextile

.1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with securing pins.

.2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.

.3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.

.4 Overlap each successive strip of geotextile 500 mm over previously laid strip.

.5 Join successive strips of geotextile by sewing.

.6 Join successive strips of geotextile with securing pins as indicated.

.7 Protect geotextile material from displacement and damage until and during placement of additional material layers.

.8 After installation, cover with overlying layer within l day of placement.

.9 Replace damaged or deteriorated geotextile.

3.3 Piping

.1 Lay rigid and flexible pipe on bottom of trench, over filter fabric, starting at outlet and proceeding upgrade at a constant slope as indicated on layout and grading drawings. Connect pipe at junctions as shown on drawing.

3.4 Backfilling

.1 Place granular cover material in accordance with detail drawings. Ensure no contamination of granulars with adjacent soils.

.2 Place granular cover material in uniform layers not exceeding 150 mm.

.3 Close filter fabric over top of granulars with minimum 300mm overlap. Pin fabric seams at 1.0 metre intervals as per 2.2.3.

.4 Complete finished grading operations with placement of topsoil over drain. Ensure that the filter fabric barrier remains intact at all times.

3.5 Flushing

.1 Prior to Preliminary Acceptance inspection for final approval, the Contractor shall flush and thoroughly clean all sub-drains. The Contractor shall provide all equipment and water required for this

operation.

END OF SECTION - 02712

ASPHALT CONCRETE PAVING

PART 1 GENERAL

1.1 Related Work

.1 All Division 1 Specification Sections
.2 Section 01330 - Submittals
.3 Section 01450 - Quality Control & Inspection
.4 Section 02311 - Site Grading
.5 Section 02233 - Granular Base
.6 Section 02315 - Excavation, Trenching & Backfilling
.7 Section 02761 - Painted Traffic Lines
.8 Section 02701 - Aggregate Materials

1.2 SCOPE

.1 This section is specific to all asphalt walkways, roadways and parking lot areas.

1.3 References

.1 American Society for Testing and Materials International (ASTM):

.1 ASTM-C88, Standard Test Method for soundness of Aggregates by use of Sodium Sulphate or Magnesium Sulphate.
.2 ASTM-C177, Standard Test Method for Material Finer than 00.75 mm Sieve in Mineral Aggregates by Washing.
.3 ASTM-C123, Standard Test Method for Lightweight Particles in Aggregate.
.4 ASTM-C127, Standard Test Method for Density Relative Density (Specific Gravity), and Absorption of Course Aggregate.
.5 ASTM-C128, Standard Test of Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
.6 ASTM-C136, Standard Method for Sieve Analysis of Fine and Course Aggregates.

1.4 Protection

.1 The Contractor to keep vehicular traffic off newly paved areas until paving surface temperature has cooled below 38 degrees Celsius. Do not permit stationary loads on pavement until 48 hours after installation.

.2 Arrange paving schedule to prevent interference with normal use of premises.

1.5 Mixing Plant Qualifications

.1 Asphalt concrete mixing plants shall conform to ASTM D995-95b.

1.6 Scheduling and Coordination

.1 For any work required for access to a building, ensure that work does not interfere with use of the Community Centre facility.

PART 2 PRODUCTS

2.1 Materials

.1 Granular base: Material to Section **02233 - Granular Base.**

.2 Asphalt concrete aggregates:
1. Material Specification to OPSS No. 1003, May 2010, Material Specification for Aggregates – Hot Mix Asphalt.

.3 Asphalt cement: to OPSS, No. 1150
a. Hot mix, hot laid HL3
b. Hot mix, hot laid HL8

2.2 Mix Design

.1 Design of mix: provide a design mix for each type of asphalt by Marshall Method as directed by the Consultant.

.2 Submit mix design for pavement to the Consultant not less than three (3) days prior to commencing paving.

.3 Refer to OPSS No. 1150, November 2010 Hot Mix Asphalt.

PART 3 EXECUTION

3.1 Subgrade Inspection

.1 Refer to Section **02311 - Site Grading**.

.2 Verify 'as built' layout and elevations of existing drainage structures for conformance with Contract Document drawings prior to placing granular base material.

.3 Prior to placement of granular base course, the compaction of the

finished subgrade shall be tested as follows:

.1 In a cut situation into native soil and following fine grading and compaction, the subgrade shall be proof-rolled three times with a fully loaded rubber tire tandem axle vehicle in the presence of the Consultant. Where proof rolling reveals areas of defective material the areas shall be excavated to the depth and extent as directed by the Consultant and backfilled with granular materials or properly compacted clean earth fill to the densities noted below at no additional cost to the Owner.

.2 In fill situations compact cohesion less fill soils to at least 98% of corrected maximum dry density and cohesive soils to at least 95% of corrected maximum dry density in lifts not exceeding 200 millimetres.

.3 Obtain written approval of the subgrade compaction test results by the Consultant prior to placing the granular base.

3.2 Granular Base

.1 Refer to Section **02233 - Granular Base**.

.2 Place granular base to compacted thickness as indicated.

.3 Place in layers not exceeding 150mm compacted thicknesses. Compact to no less than 98% SPD.

.4 Finished base surface to be within 10mm of specified grade, but not uniformly high or low.

3.3 Asphalt Concrete Paving

.1 Arrange for the Consultant to inspect and approve the base at least forty-eight (48) hours prior to commencing asphalt operations. Failure to obtain approval from the Consultant shall result in rejection of placed asphalt.

.2 Bituminous material, primer to ASTM D2027-76, MC-30 and asphalt cement to ASTM D946-82.

.3 Aggregate is to consist of crushed stone, crushed gravel, sand, and mineral filler to ASTM D692-94a and ASTM D1073-94. Mineral filler to be Portland cement, pozzolan, or commercially grown stone dust conforming to ASTM D242-95. Minimum of 60% aggregate retained on the 5mm sieve shall have at least one fractured face. Gradation

of the aggregate is to be through sieves to CAN/CGSB-8.2-M88 as follows:

Nominal Sieve Opening	Percent By Weight Passing Sieve Sizes 10.0*	12.5*	16.0*	20.0*	Mineral Filler
20.0 mm				100	
16.0 mm			100	85-95	
12.5 mm		100	80-95	70-90	
10.0 mm	100	83-95	70-85	63-87	
5.0 mm	55-85	48-77	50-70	40-68	
2.5 mm	32-67	35-60	35-55	28-55	
1.25 mm	25-54	25-48	25-45	20-45	
630 µm	17-40	15-40	18-40	13-35	100
315 µm	8-30	10-30	10-30	8-28	95-100
160 µm	5-20	5-20	5-20	5-18	
80 µm	2-10	2-10	2-10	70-100	

*Maximum size of aggregate (mm).

.4 Compact each course with roller as soon as it can support roller weight without undue cracking or displacement.

.5 Roller: power driven, minimum mass of 4.5 tonnes, minimum wheel width 600 mm.

.6 Eliminate all marks and ridges. Compact to density not less than 98% of density obtained with Marshall Design Density specimens prepared in accordance with ASTM D1559-82 from samples of mix being used.

.7 Maintain roller speed to avoid mix displacement. Do not stop roller on fresh pavement.

.8 Moisten roller wheels with water to prevent adhesion to roller.

.9 Compact mix with hot tampers or other approved equipment in areas inaccessible to roller.

.10 Finish surface smooth, uniform, without ridges and true to grade to within 6 mm and with no irregularities greater than 6 mm over 3.0m

length.

3.4 Two Lift Pavement – Medium Duty

.1 Using a mechanical spreader for walkways, place asphalt in a double lift to a compacted thickness of 100mm minimum (and as indicated on the Contract Document drawings).

.2 HL8 Base lift: 60mm thickness

.3 HL3 Surface lift: 40mm thickness

.4 In areas where base lift asphalt is placed, Contractor is to include the cleaning, and application of tack coat prior to placement of top coat. Tack coat to be SS-1 to OPSS 1103.

3.5 Two Lift Pavement – Heavy Duty

.5 Using a mechanical spreader, for roadways and parking lots, place asphalt in a double lift to a compacted thickness of 130mm minimum (and as indicated on the Contract Document drawings).

.6 HL8 Base lift: 90mm thickness

.7 HL3 Surface lift: 40mm thickness

.8 In areas where base lift asphalt is placed, Contractor is to include the cleaning, and application of tack coat prior to placement of top coat. Tack coat to be SS-1 to OPSS 1103.

3.6 Two Lift Pavement – Artificial Turf Field Base

.9 Using a mechanical spreader for the base of the artificial turf field, place asphalt in a double lift to a compacted thickness of 80mm minimum (and as indicated on the Contract Document drawings).

.10 HL8 Base lift: 50mm thickness

.11 HL3 Surface lift: 30mm thickness

.12 In areas where base lift asphalt is placed, Contractor is to include the cleaning, and application of tack coat prior to placement of top coat. Tack coat to be SS-1 to OPSS 1103.

.13 Finish surface smooth, uniform, without ridges and true to grade to within 6 mm and with no irregularities greater than 6 mm over 3.0m

length.

3.7 Pavement Mix and Placement Temperatures

.1 Place asphalt mix only when base course, or previous course is dry and air temperature is above 7 degrees C.

.2 Minimum 120 degrees Celsius mix temperature required when spreading.

.3 Maximum 160 degrees Celsius mix temperature permitted at any time.

.4 Do not place asphalt on a surface which is wet or covered by snow or ice of if the ground is frozen.

3.8 Protection

.1 Protect any structures, buildings, sidewalks, landscape work and any other design features against potential damage by paving installation.

3.9 Paving at Catch Basins

.1 Ensure surface correctly drains to catch basins as per drawings.

.2 Do not pave over any valve chambers or manholes.

3.10 Joints

.1 Saw cut bituminous course to full depth in neat lines to expose fresh vertical surfaces. Remove broken and loose material.

.2 Immediately prior to paving, apply a tack coat with a heavy brush to the joint between the asphalt paving and all manholes, catch basin frames, curbs and similar items.

.3 Use an approved bituminous emulsion such as type SS-1 or SS-1H as a tack coat. Place no more tack coat than can be covered in the same day's work.

.4 Place tack coat around manhole covers, catch basin lids and valve boxes after they have been raised to grade.

.5 Where paving comprises two lifts (walkways, roadways, parking lots) overlap longitudinal joints minimum 150 mm.

.6 Where paving comprises two lifts (artificial turf field base), HL8 base lift and HL3 surface lift are to be paved perpendicular to each other.

.7 Carefully place and compact hot asphaltic concrete against joints.

3.11 Clean Up

.1 Remove all loose pavement, aggregate, spillage, and overspray, from the site sidewalks, and buildings.

3.12 Testing

.1 Refer to Section **01450 – Quality Control & Inspection**

.2 Testing shall include subgrade, granular base and asphalt concrete compaction and material composition of the granular base and asphalt material(s). Sampling will follow recommended practice of ASTM D979-96.

END OF SECTION - 02743

PAINTED TRAFFIC LINES AND MARKINGS

PART 1 GENERAL

1.1 General Requirements

.1 Comply with requirements of Division 1.

1.2 Related Work

.1 Section 01740 - Cleaning
.2 Section 02743 - Asphalt Concrete Paving
.3 Section 03300 - Cast in Place Concrete

1.3 Protection

.1 Protect fresh paint until fully cured. Provide suitable barriers, devices and warning signs as required.

PART 2 PRODUCTS

2.1 Materials

.1 Traffic paint: alkyd type to CGSB1-GP-74M + Amdt-May-81:

.1 Colours:

.1 White: Traffic Paint White 9011 by ICI or equivalent product by other manufacturer approved by Consultant.

.2 Yellow: Traffic Paint White 9011 by ICI or equivalent product by other manufacturer approved by Consultant.

.2 Paint thinner: CAN/CGSB-1.5-M91

.2 Paint applicator: approved pressure type mobile equipment, capable of depositing paint uniformly, at rates required and in accordance with supplier's application specifications.

PART 3 EXECUTION

3.1 Preparation

.1 Substrates shall be dry, free from water, frost, ice, dust, oil, grease and any other foreign substance which would impair proper bonding and performance of paint.

.2 Lay out traffic markings prior to paint application. Space control points at intervals to ensure accurate spacing and direction of lines.

3.2 Application

.1 Spray paint parking zone lines and other pavement markings required, including but not limited to, hash marks for no parking areas, direction arrows and handicap parking symbols.

.2 Apply paint in full and uniform coat, completely concealing substrate.

.3 Apply paint only when ambient temperature is above 10°C and wind speed is less than 15 km/h, and no rain is forecast within nest 12 hours.

.4 Use templates for symbols, arrows, lettering.

.5 Paint lines straight, or uniformly curved, with well defined, sharp edges.

.6 Unless otherwise indicated, paint lines 125mm wide.

.7 Paint curb depressions to meet safety and accessibility requirements.

.8 Unless otherwise shown provide the following colours:

.1 White: crosswalks, stop bars, arrows and driving lane designation lines separating traffic travelling in same direction, parking lot stalls.

.2 Blue: Wheelchair accessible logo in parking stalls as per City accessibility standards.

END OF SECTION – 02761

CONCRETE WALKS AND CURBS

PART 1 GENERAL

1.1 Related Sections

.1 Section 02315 - Excavating, Trenching and Backfilling.

.2 Section 03100 - Concrete Formwork.

.3 Section 03200 - Concrete Reinforcement.

.4 Section 03300 - Cast-in-Place Concrete.

1.2 References

.1 Canadian Standards Association (CSA).

.1 CAN/CSA-A23.1-[94], Concrete Materials and Methods of Concrete Construction.

.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-1.2-[M89], Boiled Linseed Oil.

.2 CAN/CGSB-3.3-[M89], Kerosene.

.3 American Society for Testing and Materials (ASTM).

.1 ASTMD698-[91], Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft3) (600kN-m/m3).

PART 2 PRODUCTS

2.1 Materials

.1 Concrete mixes and materials: to Section 03300- Cast-in-Place Concrete.

.2 Reinforcing steel: to Section 03200- Concrete Reinforcement.

.3 Joint filler: to Section 03300- Cast-in-Place Concrete.

.4 Granular base: to Section 02315- Excavating, Trenching and Backfilling, type: crusher run limestone

.5 Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water soluble soap.

.6 Fill material: to Section **02315 - Excavating, Trenching and Backfilling**

.7 Kerosene: to CAN/CGSB-3.3.

PART 3 EXECUTION

3.1 Grade Preparation

.1 Do grade preparation work in accordance with Section **02315- Excavating, Trenching and Backfilling.**

.2 Place fill in maximum 150mm layers and compact to at least 98% of maximum density to ASTMD698.

3.2 Granular Base

.1 Obtain Consultant's approval of subgrade before placing granular base.

.2 Place granular base material to lines, widths, and depths as indicated.

.3 Compact granular base to at least 98% of maximum density to ASTMD698.

3.3 Concrete

.1 Obtain Consultant's approval of granular base and reinforcing steel prior to placing concrete.

.2 Do concrete work in accordance with Section **03300- Cast-in-Place Concrete.**

.3 Immediately after floating, give sidewalk surface uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom in direction normal to centre line.

.4 Provide edging as indicated with 10 mm radius edging tool.

.5 Slip-form pavers equipped with string line system for line and grade control may be used if quality of work acceptable to Consultant can be demonstrated. Hand finish surfaces when directed by Consultant.

3.4 Tolerances

.1 Finish surfaces to within 3 mm in 3 m as measured with 3.0m straightedge placed on surface.

3.5 Expansion and Contraction Joints

.1 Install tooled transverse contraction joints after floating, when concrete is stiff, but still plastic, at intervals of 1.5m. or as illustrated on drawings.

.2 Install expansion joints as per drawings and details.

.3 Install expansion joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.

.4 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

.5 Install joint filler in expansion joints in accordance with Section **03300- Cast-in-Place Concrete.**

.6 Seal all expansion joints with sealant approved by Consultant.

3.6 Curing

.1 Cure concrete by adding moisture continuously in accordance with CAN/CSA-A23.1 to exposed finished surfaces for at least 1 day after placing, or sealing moisture in by curing compound approved by Consultant.

.2 Where burlap is used for moist curing, place two pre-wetted layers on concrete surface and keep continuously wet during curing period.

.3 Apply curing compound evenly to form continuous fil in accordance with manufacturer's requirements.

3.7 Backfill

.1 Allow concrete to cure for 7 days prior to backfilling.

.2 Backfill to designated elevations with material approved by Consultant. Compact and shape to required contours as indicated or as directed by Consultant.

END OF SECTION - 02770

CHAIN LINK FENCES & GATES

PART 1 GENERAL

1.1 Related Work

.1 All Division 1 Specification Sections
.2 Section 02911 - Site Topsoil & Finish Grading
.3 Section 02743 - Asphalt Concrete Paving
.4 Section 03300 - Cast-in-Place Concrete

1.2 Reference Standards

.1 OPSS 541, Construction Specification for Chain Link Fence

.2 Canadian Standards Association (CSA).
- .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construct ion/Methods of Test for Concrete.
- .2 CAN/CSA-G164-M92 (R2003), Hop Dip Galvanizing of Irregularly Shaped Articles.
- .3 CSA-W59.2-M1991(R2003), Welded Aluminium Construction
- .4 CSA-W59-03, Welded Steel Construction
- .5 CSA-W47.1S1-M1989 (R1998), Certification of Companies for Fusion Welding of Aluminum
- .6 CSA-W47.1-03, Certification of Companies for Fusion Welding of Steel

.3 American Society for Testing and Materials (ASTM).
- .1 ASTM-A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM-A90/A90M, Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc Alloy Coatings.

.4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-138.1, Fabric for Chain-Link Fence.
- .2 CAN/CGSB-138.2, Steel Framework for Chain Link Fence.
- .3 CAN/CGSB-138.3, Installation of Chain Link Fence.
- .4 CAN/CGSB-138.4, Gates for Chain Link Fence.
- .5 CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating.

1.3 General Requirements

.1 Perimeter Fencing and Gates: Fencing shall be supplied with black vinyl coated mesh and black powder coated posts, railings and hardware.

.2 Contractor to provide Shop Drawings of each fence type for the

consultant review prior to executing work on site.

PART 2 PRODUCTS

2.1 Materials

.1 Fencing

.1 Concrete mixes and materials: Cast-in-Place CSA-A23.1/A23.2.

.1 Nominal aggregate size: 40-5

.2 Compressive strength: 21Mpa minimum 28 days.

.2 Chain-link fence fabric: to CAN/CGSB-138.1.

.1 Type 1, Class A, medium style

.2 Height of wire: 1.8m or as indicated on drawings

.3 Posts and Rails: to CAN/CSGB-138.2 + ASTM A53, galvanized steel pipe, Schedule 40 pipe minimum.

.4 Bottom tension wire: single strand, galvanized steel wire, 5 mm diameter. **A bottom tension wire will only be used in locations as directed in writing by the Consultant. All other installations require a bottom rail.**

.5 Tie wire fasteners: single strand, galvanized steel fabric, 3 mm diameter.

.6 Tension bar: 5 x 20 mm minimum galvanized steel

.7 Tension bar bands: 3 x 20 mm minimum galvanized steel

.8 Gate Frames: to ASTM A53/A53M, galvanized steel pipe, standard weight 45 mm outside diameter pipe for outside frame, 35 mm outside diameter pipe for interior bracing.

.1 Fabricate gates as indicated with electrically welded joints, and hot-dip galvanized, painted with zinc pigmented paint after welding.

.2 Fasten fence fabric to gate with wire fasteners.

.3 Furnish gates with heavy duty galvanized hinges, latch and latch catch with provision for padlock which can be attached and operated from either side of installed gate.

.4 Furnish double gates with chin hook to hold gates open and

centre rest with drop bolt for closed position.

.9 Fittings and hardware: galvanized steel. Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail.

.10 Zinc pigmented paint: to CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating

.11 Knuckled wire: 2 mm diameter galvanized steel wire to ASTM A121.

2.2 Finishes

.1 Galvanizing

.1 For chain link fabric: to CAN/CGSB-138.1, Grade 1 coating.

.2 For pipe: 550 g/m2 minimum to ASTM A90/A90M. For other fittings: to CSA G164.

.3 Vinyl coating: Black .1 (0.045) mm dry film thickness minimum.

.2 Painting

.1 Painted posts, rails, gates and hardware shall be finished in a black gloss enamel powder cost application. Prior to powder coating all surfaces are to be chemically cleaned and treated with Parker Bonderite and Chlorothene solvent or approved equivalents. Powder coating must be a Polyester 2000 series applied in a thickness of 4-5 mils by electrostatic coat and oven cured to a smooth even finish.

PART 3 EXECUTION

3.1 Grading

1. Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts. Provide clearance between bottom of fence and ground surface neither less than 30 mm nor more than 50 mm.

3.2 Installation

.1 Erect fence along lines as directed by the Consultant and in accordance with CAN/CGSB-138.3.

.2 Install to alignment specified, line posts, corner posts, gate posts and top rails to provide rigid structure for 1.8m high fabric and gates. Excavate post holes to dimensions indicated by methods approved by City Representative or Consultant.

.3 Install corner post where change in alignment exceeds 10 degrees.

.4 Install additional straining posts at sharp changes in grade and where directed by the Consultant.

.5 Install end posts at end of fence and at buildings. Install gate posts on both sides of gate openings.

.6 Maximum spacing of posts is 3.0 m O.C, measured parallel to ground surface.

.7 Install line and corner posts plumb.

.8 Set posts in cylindrical cast-in-place concrete footings sized in accordance with the contract documents.

.9 Set concrete in post holes then embed posts into concrete to depths indicated. Slope concrete to drain away from posts. Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.

.10 Set posts to within 150 mm from bottom of concrete footing.

.11 Set top of concrete footing as illustrated in the contract documents relative to finished grade. Slope top of footing to ensure water run-off.

.12 Do not install fence fabric until concrete has cured a minimum of five (5) days.

.13 Position bottom of fabric above finished grade in accordance with contract documents at consistent elevation.

.14 Align top of posts to ensure that top rail varies gradually with changes in ground elevations.

.15 Pass top rail through line post tops to form continuous bracing. Install 178 mm long couplings mild-span at pipe ends.

.16 Brace each gate and corner post back to adjust line post with horizontal centre brace rail. Install brace rail, one bay from corner to

gate posts.

.17 Install 10 mm steel truss rod and truss tightened diagonally from top of gate post back to adjacent line post.

.18 Fasten fabric to top rail, line posts, braces and bottom tension wire with 3.5 mm wire ties, maximum 300 mm centres.

.19 Attach fabric to corner and gate posts with tension bars and tension bar clips. Stretch fabric between posts at intervals of 30.0 m maximum.

.20 Secure fabric to top and mid rails, line posts, stretcher bar and bottom rail or bottom tension wire (where directed in writing by the City of Brampton) with tie wires at 450 mm intervals. Give tie wires minimum two twists.

.21 Secure bottom rail, brace rails, top rail using continuous welds where indicated on the contract plans.

3.3 Installation of Gates

.1 Install gates in locations indicated or as directed by the Consultant.

.2 Set gate bottom approximately 40 mm above ground surface.

.3 Install gate stops where indicated.

3.4 Touch-Up

.1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats or approved zinc pigmented paint to damaged areas.

3.5 Cleaning

.1 Clean and trim areas disturbed by operations. Dispose of surplus excavated material and replace damaged turf with sod as directed by the Consultant.

END OF SECTION - 02821

TREE & SHRUB PRESERVATION

PART 1 GENERAL

1.1 Description of Work

.1 This section specifies the preservation of existing vegetation on the site.

1.2 Related Work

.1 All Division 1 Specification Sections
.2 Section 01561 - Environmental Protection
.3 Section 02231 - Clearing & Grubbing
.4 Section 02232 - Tree Pruning
.5 Section 02311 - Site Grading
.6 Section 02315 - Excavating, Trenching & Backfilling
.7 Section 02911 - Site Topsoil & Finish Grading

1.3 Quality Control (Specific)

.1 Contractor shall have a thorough knowledge of horticulture, being able to identify trees, shrubs and ground covers by both common and botanical nomenclature. All persons overseeing tree work must be trained according to the tree care standards accepted by the International Society of Arboriculture.

1.4 Product Delivery, Storage, and Handling (Specific)

.1 Roots of existing trees to be preserved are not to be driven on.

.2 Surplus soil, equipment, vehicles, debris or materials shall not be placed over root systems of the trees within the protective fencing. No contaminants will be dumped or flushed where feeder roots of trees exist, that is within 1.5 times the diameter of the tree's canopy. No cables of any type shall be wrapped around or installed in trees.

PART 2 PRODUCTS

2.1 Temporary Tree Protective Fencing (Specific)

.1 Existing trees shall be properly protected beyond the drip line with minimum 1.2m high temporary fencing as per City of Brampton standard until Substantial Performance.

.2 Maintain existing grade within drip line of all trees to be preserved.

.3 The area within the protecting fencing shall remain undisturbed and

free of debris, building materials and equipment.

.4 Prune dead wood only unless directed otherwise by the Consultant. Do not prune leaders, all cuts greater than 25mm diameter shall be treated pe the Consultant's instruction.

.5 Silt control fabric as per layout and extent on drawings.

2.2 Fertilizing Existing Trees

.1 The Work will be carried out between October 15th and November 14th of the calendar year.

.2 The Contractor will provide 2.7 kg of actual nitrogen in an organic or synthetic organic form or 9 kg of product 30-10-7 per 100 square meters of area or to a 40 cm diameter tree suspended in 225 litres of water (6 lbs. of nitrogen or 20 lbs. of product in 50 gallons of water).

.3 The Consultant reserves the right to take samples of the mixture used, for analysis.

.4 The Contractor will be responsible for any damage caused to turf, walkways, trees or structures.

PART 3 EXECUTION

3.1 Layout

.1 Stake out and locate any major root systems from existing trees.

.2 All proposed construction Works that may intersect with root systems of existing trees are to be identified and staked out using yellow flags.

.3 Protective fencing location(s) are to be staked out as directed by the Consultant.

3.2 Execution

.1 **Through Existing Root Systems:** Excavation required through existing root systems due to proposed Works is to be excavated by hand. Roots are to be cut with a sharp axe, and all cuts to be sealed with approved Tree Surgeons paint.

.2 **Pruning:** Prune vegetation, loose bark, hazardous wood removal and all dead and broken branches. Prune branches to compensate for root loss then treat with tree paint.

.3 **Grade Change Higher Around Trees:** Place 100mm diameter perforated pipe on the existing grade, radiating a minimum of 8 spokes out from the trunk, to the spread of branches, sloping away from the trunk. Connect tiles and place tiles at the end of each slope. The upright spokes shall be extended to reach the new grade to allow for aeration and watering. Tiles are to be covered with clean crushed rock and fill area covered with the tile system with sandy gravel fill.

.4 **Grade Change Lower Around Trees:** A 1:3 downward slope is be constructed to the new grade. Water is to be applied at least three (3) times during dry summer periods and once prior to freeze-up, until the tree has adapted to the new conditions, or until the project has been certified Substantially Performed.

.5 **Fencing:** Maintain Temporary Tree Protective Fencing until removal which is directed by the Consultant.

.6 **Fertilize**: Fertilize in accordance with good horticulture practises to ensure promotion of root growth for two (2) years after acceptance. Where trees whose roots have been disturbed, within the drip line, drill holes 20mm in dia. and 40mm deep at 1000mm intervals on a square grid pattern under the trees drip line, fill holes with topsoil, and water.

3.3 Trees To Be Replaced

.1 Existing trees to remain as per the Contract Documents that have been severely damage or die as a result of the construction shall be replaced with the same species or as approved by the Consultant. Trees to be removed shall be cut completely flush to ground or as otherwise directed by the Consultant.

3.4 Damage

.1 Contractor to repair or make good any damage to trees or other vegetation, at no additional cost to the Owner.

END OF SECTION - 02901

PLANTING OF TREES, SHRUBS, GROUNDCOVERS & TRANSPLANTING

PART 1 GENERAL

1.1 Description of Work

.1 This section describes the labour, all materials and installation requirements necessary to complete the tree, shrub, and groundcover planting and transplanting as indicated or specified herein.

1.2 Examination

.1 Contractor to report to the Consultant, in writing of any conditions or defects encountered on the site during or before construction upon which Work of this section depends and which may adversely affect its performance.

.2 Do not commence Work until such conditions or defects have been investigated and corrected.

.3 Commencement of Work shall imply acceptance of surfaces and conditions and no claim for damages or extras resulting from such conditions or defects will be accepted thereafter, except in cases where such conditions cannot be known prior to or during the course of construction.

1.3 Testing

.1 Test stockpiled topsoil as specified in Section **02911 Site Topsoil & Finish Grading,** and as noted on the Contract Document drawings, and submit results to the Consultant for review, prior to starting Work on site.

1.4 Related Work

.1 **Establishing Sub-Grade for Planting Beds**
Section 02311.....Site Grading

.2 **Preparation of Planting Beds**
Section 02911.....Site Topsoil & Finish Grading

1.5 Submittals

.1 Planting Soil (Imported): Before delivery of Planting Soil: provide Contract Administrator with Triple Mix Product Data in accordance with Section 01330 – Submittal Procedures

1.6 Reference Standards

.1 Trees, shrubs and ground covers are to be supplied and installed in accordance with the Metric Guide Specification for Nursery Stock Current Edition of the Canadian Nursery Trades Association except where specified otherwise.

1.7 Source Quality Control

.1 Contractor to ensure that all plant material at source is acceptable prior to digging operations;

.2 Imported plant materials must be accompanied with necessary permits and import licenses. Conform to federal and provincial regulations.

1.8 Samples

.1 Provide samples for: Mulch - Canada Red Mulch or Gro-Bark.

1.9 Qualifications

.1 All planting Work described in the Section shall be executed by experienced personnel under the direction of the Contractor.

1.10 Substitutions

.1 All plants shall be supplied as specified in the Contract Documents. Alternates will not be allowed unless approved in writing from the Consultant.

.2 Give timely notice in writing to the Consultant when applying for substitutions.

.3 The Contractor must verify to the Consultant, the lack of availability and source of the specified plant material.

1.11 Delivery, Storage and Protection

.1 Protect plant material from frost, excessive heat, wind and sun during delivery.

.2 Immediately store and protect plant material which will not be installed within one (1) hour after arrival at site in storage location approved by the Consultant.

.3 Protect plant material from damage during transportation:

.1 When delivery distance is less than 30 km and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.
.2 When delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle.

.4 Protect stored plant material from frost, wind and sun and as follows:

.1 For bare root plant material, preserve moisture around roots by heeling-in or burying roots in sand or topsoil and watering to full depth of root zone.
.2 For pots and containers, maintain moisture level in containers. Heel-in fibre pots.
.3 For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.

1.12 Warranty

1. The Contractor hereby warrants that plant material as itemized on plant list will remain free of defects for two (2) years from the date of acceptance of Substantial Performance.

.2 End-of-warranty inspection will be conducted by the Consultant and Owner.

.3 Consultant reserves the right to extend Contractor's warranty responsibilities for an additional one (1) year if, at end of initial warranty period, plant development and growth is not sufficient to ensure future survival.

1.13 Job Conditions

.1 The Contractor shall receive the site with the planting areas free of waste or debris developed by other trades. Any discrepancy shall be reported to the Contractor prior to planting.

PART 2 PRODUCTS

2.1 Plant Material and Accessories

.1 Type of root preparation, sizing grading and quality: comply with Metric Guide Specification for Nursery Stock, latest addition of the

Canadian Nursery Trades Association.

.2 Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.

.3 Plant material: root pruned regularly, but not later than one growing season prior to arrival on site.

.4 Trees: with straight trunks, with no bark damage or stump wounds, well and characteristically branched for species except where specified otherwise.

.5 Bare root stock: nursery grown, in dormant stage, not balled and burlapped or container grown.

.6 Collected stock: maximum 40 mm in calliper, with well developed crowns and characteristically branched; no more than 40% of overall height may be free of branches.

.7 Water: potable and free of minerals which may be detrimental to plant growth.

.8 Stakes: T-bar steel stakes 40 x 40 x 5 x 2440 mm drilled to receive # 10 wire and pine or fir wood 38 x 38 x 2400 mm, treated with Pentox preservative.

.9 Black Rubber Hose: 12 mm outside diameter.

.10 Cables and accessories: factory galvanized cables, wire tighteners, eyebolts and turnbuckles. Use turnbuckles with 150 mm long eyebolts and 10 mm diam. threaded opening for tightening.

.11 Guy wires: steel wire strand to CSA G4-M1977 at following sizes:
- .1 Shrubs and trees under 70 mm calliper use l.5 mm diameter wire.
- .2 Trees 70 to l50 mm caliper use 3 mm diameter wire.

.12 Eyebolts: coarse threaded galvanized steel at following sizes:
- .1 Trees l50-500 mm calliper uses 10 mm dia.

.13 Flagging: High visibility plastic flagging ribbon 12mm to 25mm width, affixed to midpoint of guy wires.

.14 Tree rings: fabricated from 3 mm galvanized wire encased in two ply reinforced 12 mm dia. rubber garden hose or equivalent.

.15 Wire mesh: galvanized, electrically welded.
- .1 For tree guards use 1.4 mm wire with 25 x 50 mm mesh.
- .2 For gunite reinforcing use l.4 mm wire with 50 x 50 mm mesh.

.16 Reinforcing rod: 10 mm bars to CSA G30.12 - Ml977.

.17 Gunite concrete: to ACI 506-66.

.18 Fibreglass fabric: tight woven, min 2.5 kg/m2 mass, 1 m wide.

.19 Root ball burlap: 150 g Hessian burlap.

.20 Tree wrapping material: new, clean, plain burlap strips minimum 2.5 kg/m2 mass 150 mm wide.

2.2 Mulch

.1 Shredded bark wood: varying in size from 25 to 75 mm in length, from coniferous trees or approved alternate, and free of chemicals. "Gro-Bark" or "Canada Red Mulch" is acceptable. Approval of substitutions must be requested in writing prior to commencement of Work.

2.3 Fertilizer

.1 Where topsoil is supplied by the Contractor, the quantities of fertilizers required shall be based on the following minimum rates.

10-6-4 @ 36g/1 mm cal. for trees
12-6-4 @ 890g/m3 of topsoil for shrubs

.2 Fertilizers shall be complete, commercial fertilizers containing not less than 60% urea formaldehyde and the following percentages by weight.

Nitrogen	Phosphoric Acid	Potash
10	6	4
12	6	6

.3 Synthetic commercial type, ratio 5:3:2.

2.4 Anti-Dessicant

.1 Anti-desiccants: wax-like emulsion to provide film over plant surfaces reducing evaporation but permeable enough to permit transpiration.

PART 3 EXECUTION

3.1 Pre-Planting Operations

.1 Ensure plant materials acceptable to the Consultant.

.2 Remove damaged roots and branches from plant material.

.3 Apply anti-desiccant to conifers and deciduous trees in leaf in accordance with manufacturer's instructions.

.4 Remove burlap trunk wrap and notify the Consultant to inspect and accept trees. Re-wrap immediately after inspection.

3.2 Excavation and Preparation of Planting Beds

.1 Establishment of sub-grade for planting beds is specified in Section 02311 **Site Grading**.

.2 Preparation of planting beds is specified in Section 02911 **Site Topsoil & Finish Grading.**

.3 For individual planting holes:

.1 Stake out location and obtain approval from Consultant prior to excavating.

.2 Stake-out all plant material to be approved prior to planting.

.4 If planting drainage is required:

.1 Excavate to depth and width as indicated.

.2 Remove subsoil, rocks, roots, debris and toxic material from excavated material that will be used as planting soil for trees and individual shrubs. Dispose of excess material.

.3 Scarify subgrade sides of planting hole.

.4 Remove water which enters excavations prior to planting. Notify Consultant if water source is ground water.

3.3 Digging for Plants

.1 All plants shall be dug and delivered to the site as specified on the

Plant List, or in the case of relocation of existing plant material on the site, dug according to the following specification.

.2 Plants specified "B/R" shall be moved with bare roots. They shall be dug and moved while dormant, with the major portion of the fibrous root system provided.

.3 Immediately after digging, the root system shall be wrapped or puddle and shall be kept moist to prevent drying out until planted on the site.

.4 All plants specified "B&B" shall be moved with solid balls wrapped in burlap.

.5 No plant shall be used when the ball of earth surrounding the roots has been cracked or broken preparatory to or during the process of planting, or when the burlap and ropes holding the soil ball have been removed prior to planting.

.6 The sizes of root balls for trees shall be as specified below. Ball sizes are minimum and shall be adjusted according to growth habits of plants, and shall be sufficiently large to contain at least 75% of the fibrous root system.

Deciduous Trees

Caliper	Root Ball Diameter
25mm – 40mm	0.60m
50mm	0.75m
75mm	0.90m
100mm	1.05m
125mm	1.35m
150mm	1.50m
200mm	1.80m
250mm	2.50m

Coniferous Trees

Height	Root Ball Diameter
1.8m-2.4m	0.75m
2.4m-3.0m	0.90m
3.0m-3.6m	1.05m
3.6m-4.6m	1.20m
4.6m-5.4m	1.35m

3.4 Handling of Plants

.1 All plants shall be well protected against damage and drying out from the time of digging until they are planted on the site.

.2 All roots shall be cleanly cut; split roots are not acceptable. Where combing is not practised, the roots shall be evenly cut at the edges of the ball. The cut ends of all roots 25 mm in diameter and larger shall be painted with asphalt emulsion.

.3 Plants shall be transported with care taken to prevent damage. Branches shall be carefully tied in such a manner so as not to break or damage trunks. Points of contact with equipment shall be padded.

.4 Plants with broken or abraded trunks or branches are not acceptable.

.5 Root balls, trunks, branches and leaves shall be protected from sun and wind desiccation.

3.5 Planting

.1 For bare root stock, place 50 mm backfill soil in bottom of hole. Plant trees and shrubs with roots placed straight out in hole.

.2 For burlapped root balls, ensure the wire basket is sitting 100mm + below finished grade. Cut away top one-third 1/3 or of wrapping and wire basket without damaging root ball. Do not pull burlap or rope from under root ball. Cut and remove all nylon rope around tree trunks.

.3 For container stock or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.

.4 Plant vertically in locations staked and approved. Orient plant material to give best appearance in relation to structure, roads and walks.

.5 For trees and shrubs:

.1 Backfill soil in 150 mm lifts. Tamp each lift to eliminate air pockets. When two thirds of depth of planting pit has been backfilled, fill remaining space with water. After water has penetrated into soil, backfill to finish grade.

.2 Form watering saucer as indicated on detail.

.6 For ground covers, backfill soil evenly to finish grade and tamp to eliminate air pockets.

.7 Water plant material thoroughly.

.8 After soil settlement has occurred, fill with soil to finish grade.

.9 Dispose of burlap, wire and container material off site.

3.6 Trunk Protection

.1 Install trunk protection on deciduous trees as indicated.

.2 Install trunk protection after trees have been inspected and accepted by Consultant.

3.7 Tree Supports

.1 Install tree supports as indicated on detail(s) Deciduous Tree Planting and Coniferous Tree Planting, unless otherwise specified.

3.8 Mulching

.1 Mulch shall be free from deleterious materials and shall be stored as to prevent inclusion of foreign materials.

.2 For fall plantings placing of mulch to occur in following spring after soil thaws and warms up.

.3 Ensure soil settlement has been corrected prior to mulching.

.4 Spread mulch as indicated, minimum 100 mm thick.

3.9 Acceptance

.1 Plant material will be accepted by the Consultant after planting operation is completed provided that plant material exhibits healthy growing condition and is free from disease, insects and fungal organisms after the warranty period.

.2 Plant material installed less than ninety (90) days prior to frost will be accepted in following spring, thirty (30) days after start of growing season provided that acceptance conditions are fulfilled.

.3 A preliminary inspection will be held sixty (60) days from day of

acceptance to determine plant health and overall acceptability. All plants that are not healthy will be noted and shall be removed from the site and replaced with plants of the same species and size as originally specified. The Consultant may extend the warranty period for replacement plants if highly unsatisfactory conditions exists, two (2) years after acceptance of the replacement planting.

.4 A final inspection of the replacement plants will be conducted at the end of extended warranty period, if any, to determine acceptance or rejection. This will be the final replacement.

3.10 Replacements

.1 All plant materials found dead, or not in a healthy, satisfactory growing condition or which, in any other way, do not meet the requirements of the Specifications, shall be replaced by the Contractor. All costs shall be borne by the Contractor.

.2 All required replacement shall be plants of the same size and species as specified in the Plant List and shall be supplied and planted in accordance with the Contract Document drawings and specifications.

3.11 Maintenance

.1 Perform following maintenance operations from time of planting to Final Acceptance by the Owner.

.1 Water to maintain soil, moisture conditions for optimum establishment, growth and health of plant material without causing erosion. For all plant material, water thoroughly in late Fall prior to freeze-up to saturated soil around root system.

.2 Remove weeds monthly from planting beds and tree pits.

.3 Replace or respread damaged, missing or disturbed mulch.

.4 For non-mulched areas, cultivate as required to keep top layer of soil friable.

.5 Ensure plant material is in a healthy, vigorous state at time of Final Acceptance.

.2 Apply pesticides in accordance with Federal, Provincial and Municipal regulations as and when required to control insects,

fungus and disease. Obtain product approval from the Consultant prior to application.

.1 Remove dead or broken branches from plant material.

.2 Keep trunk protection and guy wires in proper repair and adjustment. Remove trunk protection, tree supports and level watering saucers at end of two (2) year warranty period, unless sooner as directed by the Consultant.

.3 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

.4 Submit semi-annual written reports to Consultant identifying:

.1 Maintenance Work carried out.

.2 Development and condition of plant material.

.3 Preventative or corrective measures required which are outside Contractor's responsibility.

END OF SECTION - 02906

SITE TOPSOIL & FINISH GRADING

PART 1 GENERAL

1.1 Related Work

.1 Section 02311 - Site Grading
.2 Section 02315 - Excavating, Trenching, & Backfilling
.3 Section 02906 - Planting of Trees, Shrubs, Ground Covers & Transplanting
.4 Section 02938 - Sodding

1.2 Source Quality Control

.1 **Testing of Topsoil**

.1 All topsoil to be used on park sites, sports fields, planting beds, trees etc. must be tested by an approved testing in accordance with General Requirements:

Section 01600 **Materials, Equipment and Workmanship Quality**
Section 01450 **Quality Control & Inspection**

.2 Test topsoil following amendments completed in accordance with Topsoil Testing Analysis Reports and Recommendations identified in reports outlined in **Section 00320 Geotechnical Data.**

.1 Particle size analysis (percentage of sand, silt and clay by Hydrometer Method).

.2 Organic matter, phosphorus (sodium bicarb), potassium, magnesium, calcium, soil pH, buffer pH, percent base saturation and calculated CEC. (Cation Exchange Capacity)

.3 Test for Sulphur, Zinc, Manganese, Iron, Copper, Boron and soluble salts content, and Atrizine.

.3 Use 25mm diameter sampling tube or spade and in the presence of the Consultant, take twenty-five (25) samples per hectare to full depth of topsoil at random across entire area to be stripped. Mix samples together thoroughly before submitting for testing.

.4 Submit 0.5 kg sample of topsoil to testing laboratory and indicate present use, intended use, type of subsoil and quality of drainage. Prepare and ship sample in accordance with provincial regulations and testing laboratory requirements.

.5 The Contractor shall arrange for and assume all costs for such testing of topsoil amended in accordance with the recommendation report. For onsite topsoil stockpiles, unless otherwise provided for in this document, the tests and report shall be arranged and paid for by the Contractor through the cash allowance. A Owner Representative must be present for the sample selection. Submit two (2) copies of soil analysis and recommendations for corrections to sustain vigorous plant growth including recommended fertilizer applications to the Consultant prior to commencing of topsoil spreading and topsoil delivery.

.6 Stockpiled topsoil will be amended by shredder as per the recommendations for corrections in the presence of the Consultant.

.7 When the source of such topsoil is exhausted, topsoil from a new source shall not be used until tested and approved.

.8 The Contractor has one (1) growing season from the time of soil testing to implementation on site. Any test result that is older than one (1) growing season may be asked to be retested at the discretion of the Consultant.

1.3 Scheduling of Work

.1 Schedule placing of topsoil and finish grading to permit sodding or seeding operations under optimum conditions.

PART 2 PRODUCTS

2.1 Materials

.1 On-Site Topsoil: in situ topsoil stockpiled for reuse

.2 Topsoil (imported): friable, neither heavy clay nor of very light sandy nature consisting of the following, within 5% +/-: 45% sand, 35% silt, 20% clay and pH of 6.2 to 7.2. Free from subsoil, roots, vegetation, debris, toxic materials, stones over 50 mm diameter, containing four percent (4%) **minimum** organic matter for clay loams and two percent (2%) **minimum** organic matter for sandy loams and must be capable of sustaining vigorous plant growth.

.3 All topsoil whether existing or imported topsoil for use under sodded areas shall be screened topsoil having passed through a 25mm size screen and ensure that it is free from:

.1 Debris and stones over 25 mm diameter.

.2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

.4 Planting Soil for planting of trees, shrubs and ground covers from the stockpile shall be mechanically shredded and amended as per the soil analysis recommendations for corrections. Rototilling or mixing by other means is not acceptable.

.5 Manure: Well-rotted, unleached cattle manure, free from harmful chemicals and other injurious substances and saw dust, shavings, or similar refuse, at least eight (8) months old, but not more than two (2) years old, and with no more than 25% straw, leaves or **other unacceptable materials** for planting use.

.6 Peat Moss: Shall be partially decomposed fibrous or cellular stems and leaves of Sphagnum Mosses with a texture varying from porous fibrous to spongy fibrous, fairly elastic and substantially homogeneous with a pH value of not less than 4.5 and not greater than 6.0. It shall be baled and free of decomposed colloidal residue, wood, sulphur and iron, be brown in colour and finely shredded, suitable for horticultural purposes. Shredded particles shall not exceed 5 mm in size.

.7 Fertilizer: All fertilizer and soil amendment materials and quality to meet recommendations and standards outlined in the soil testing report.

PART 3 EXECUTION

3.1 Soil Preparation of Existing Grade

.1 Grade soil, eliminating uneven areas and depressions, ensuring positive drainage. Remove soil contaminated with toxic materials. Dispose of removed materials as directed by Consultant.

.2 Cultivate entire area which is to receive topsoil to following depths:

.1	Sod:	300mm minimum for sodded areas
.2	Seed:	300mm minimum for sodded areas
.3	Shrub beds:	500mm
.4	Trees:	600mm depth for treepits unless otherwise indicated.

.3 Repeat cultivation in those areas where equipment used for hauling and spreading has compacted soil.

.4 Remove surface debris, roots, vegetation branches and stones in excess of 50 mm diameter.

.5 Special Conditions:

1. Environmentally sensitive areas, wetlands, or natural heritage sites where existing soil conditions are sufficient to sustain additional plantings, the Consultant may request that plantings be installed in native, undisturbed soil.

3.2 Spreading of Topsoil or Planting Soil

.1 Spread topsoil after the Consultant has inspected and certified rough grading.

.2 Spread topsoil with adequate moisture in uniform layers over approved, unfrozen subgrade, where, sodding or seeding is indicated. Irregularities in the surface resulting from topsoiling or other operations shall be corrected to avoid the formation of depressions causing standing water.

.3 Apply topsoil to following minimum depths: 150mm for seeded areas, 100mm for sodded areas.

.4 Apply planting soil to following **minimum** depths:

.1 Sod: 300mm
.2 Seed: 300mm
.3 Shrub beds: 500mm
.4 Trees: 600mm depth for treepits unless otherwise indicated.

5. Manually spread topsoil or planting soil around existing trees, shrubs and obstacles.

6. Where any portion of the surface becomes gullied or similarly damaged,
the Contractor will repair affected area adding topsoil as necessary to restore to the satisfaction of the Consultant.

7. Contractor is to install and maintain erosion control fencing to prevent soil erosion.

3.3 Application for Fertilizer

.1 Spread fertilizer uniformly over entire area of topsoil at manufacturer's recommended timing and rate of application.

.2 Mix fertilizer thoroughly to full depth of topsoil.

3.4 Finish Grading

.1 Fine grade and loosen top soil. Eliminate rough spots and low areas to ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Roll to consolidate topsoil for areas to be sodded leaving surface smooth, uniform, firm against deep foot printing, and with a fine loose, texture to approval of Consultant.

3.5 Restoration of Stockpile Sites

.1 Restore stockpile sites to a ‘rake clean' condition acceptable to the Consultant.

3.6 Surplus Material

.1 Dispose of materials not required off site or as directed by the Consultant.

END OF SECTION - 02911

SODDING

PART 1 GENERAL

1.1 Description of Work

.1 This section describes the labour, materials, and installation requirements necessary to complete the sodding turf planting related items as indicated or specified.

1.2 Related Work

.1 All Division 1 Specification Sections
.2 Section 02906 - Planting of Trees, Shrubs, Groundcovers & Transplanting
.3 Section 02911 - Site Topsoil & Finish Grading

1.3 Scheduling

.1 Scheduled sod laying to coincide with topsoil operations.

.2 Do not lay sod until topsoil finished grade. Obtain approval of topsoil fine grade prior to sodding.

1.4 Certification

.1 The supplier shall provide, upon request of the Contractor, a label or statement certifying the quality of grade, location of sod source and species of grass in the sod, and that the sod meets the specifications or requirements.

1.5 Delivery, Storage, And Acceptability

.1 All sod shall be reviewed by the Contractor at the job site prior to installation. The Contractor reserves the right to refuse the sod if it is deemed unacceptable.

.2 Schedule delivery in order to keep storage on the job site to a minimum without causing delays.

.3 Each palette, flat, or specified group of sod shall be labelled by the grower or manufacturer as separate items.

.4 During delivery, sod materials shall be protected from any drying or contamination by detrimental material.

.5 Deliver sod to site within twenty-four (24) hours of being lifted and lay sod within thirty-six (36) hours of being lifted.

.6 Do not deliver small, irregular, or broken pieces of sod.

.7 Turf materials shall be sprinkled with water and covered with moist burlap, straw, or other approved covering and protected from sun exposure to wind and direct sunlight. Covering shall be such that air can circulate and heating will not develop.

.8 During dry weather protect sod from drying and water sod as necessary to ensure its vitality. Dry sod is to be rejected by the Contractor.

.9 Deliver fertilizers and similar material to the site packed in standard containers, clearly marked with contents, weight, analysis, and name of manufacturer.

.10 Store fertilizer in dry, weatherproof storage areas.

1.6 Alternatives

.1 Alternatives shall not be accepted.

.2 Should the Contractor proceed to use material not previously approved or materials contrary to the specifications, the Consultant will proceed to have such works rectified at the Contractor's expense.

1.7 Handling

.1 Sod shall not be dropped or dumped from vehicles.

1.8 Source Quality Control

.1 Contractor:

.1 The Contractor shall supervise all work in this section including implementation and all maintenance until Preliminary Acceptance of the Works by the Owner;

.2 Shall obtain approvals for suppliers, Sub-Contractors, and materials to be used in this section of Work;

.3 Shall obtain approvals from Consultant of sod at source.

.2 Sod Supplier:

.1 The supplier of sod shall meet the standards and requirements of the "Nursery Sod Growers Association of Ontario"

.2 **Obtain Owner approval of sod source.** Contractor shall submit proof to the Consultant that the sod delivered to the site was obtained from the approved source and is #1 Nursery Sod.

PART 2 PRODUCTS

2.1 Materials

.1 Turf Grass Nursery Sod: specifically sown and cultivated in a nursery field all in compliance with the specifications published by Nursery Sod Growers Association of Ontario, Number One Grade Turfgrass Nursery Sod.

.1 Broken, dry, discoloured pieces will be rejected by the Consultant.

.2 Size of Sections: Turfgrass shall be cut by able methods by machines designed for that purpose, to the suppliers length and width, plus or minus 12mm in width and plus or minus 5% in length. Broken pieces and torn or uneven ends are not acceptable.

.3 Thickness of cut: Turfgrass sod shall be cut at a uniform soil thickness (excluding top growth and thatch) of 15mm plus or minus 5 min.

.4 Strength of sod: Minimum age of twelve (12) months, with root development that will support its own weight without tearing, when suspended vertically by holding the upper two corners.

.1 Sod shall be strong enough that a nominal sized section can be grasped at one end, picked up and handled without damage.

.2 Sod shall have strong fibrous root system, free of stones, burned or bare spots.

.5 Moisture Content: Turfgrass sod shall not be harvested or transplanted when its moisture content is too low or too high, resulting in potential damage to the sod.

.6 Grass height: The height of the grass in the sod at the time of

harvesting shall be between 40mm and 60mm.

.7 Thatch: Turfgrass sod shall be reasonably free from thatch. Up to 10 mm of thatch (uncompressed) is acceptable.

.8 Diseases, Fungi, Nematodes, Insects: Turfgrass sod shall be reasonably free from diseases, fungi, nematodes and soil-born insects, to the extent that with proper installation methods and initial maintenance new turf will not deteriorate due to such causes.

.9 Wire mesh: 40 mm, plastic.

.10 Wooden pegs, 25 x 25 x 250 mm.

.11 Water used should be potable and shall be free of impurities that would inhibit germination and growth or may be harmful to the environment.

.12 Fertilizer: As recommended by testing agency as per topsoil sample.

PART 3 EXECUTION

3.1 Laying of Sod

.1 Prior to sodding, the Contractor is to verify that the finished grade and depth of topsoil is satisfactory.

.2 Fertilizer as per recommendation by testing agency as per topsoil sample. Refer to Topsoil Section **02911**, **Subsection 3.5 Application for Fertilizer**.

.3 Sodding during excessively wet conditions, at freezing temperatures or over frozen soil is not acceptable.

.4 Lay sod in rows, perpendicular to slope, and with joints staggered. Butt sections closely without over-lapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

.5 Where new sod abuts existing sodded areas/seeded areas, new sod must be knitted to existing with finish grade of new sod same as existing.

.6 Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

.7 Water sod immediately after laying to obtain moisture penetration into top 100 mm of topsoil.

3.2 Laying of Pegged Sod

.1 Place approved mesh on top of topsoil of slopes steeper than 3:1. Secure mesh in place with wooden pegs or staples at maximum intervals of 1000 mm. Cover mesh lightly with topsoil.

.2 Lay sod sections perpendicular to slopes greater than 3:1 (run/rise) and secure with wooden pegs. Place pegs 3 per m2, 100 mm below to edge to prevent shifting of sod and drive pegs flush with top of sod soil.

3.3 Maintenance

.1 Maintain sodded area from the time of installation until the second cut has been completed AND until all sodded areas have received Preliminary Acceptance by the Owner.

.2 Maintenance shall include all necessary measures to establish and maintain grass in a healthy, vigorous growing condition. Maintenance shall include, but not be limited to the following work until Preliminary Acceptance:

.1 Watering: When required in sufficient quantities and at a frequency to prevent sod from drying out and to maintain topsoil under sod continuously moist to a depth of 75 to100 mm. Water sufficiently to ensure that sod has become firmly rooted in the topsoil.

.2 Mowing: Regular intervals to maintain a maximum height of 50 mm. Do not cut more than 1/3 of the grass height at any one mowing. Trim and clip edges. Remove clippings.

.3 Fertilizing: If instructed by the Consultant, sodded areas may be fertilized based on mixtures and rates as per supplier’s and manufacturer’s instructions and soil test results. Postpone fertilizing until the spring following a fall installation.

.4 Make good any erosion that results from faulty workmanship or material at no extra cost.

.5 Replace any deteriorated or bare spots with new sod.

3.4 Preliminary Acceptance

.1 Prior to Preliminary Acceptance by the Owner, the sodded areas shall meet the following criteria:

.1 Sodded areas are properly established and are self-sustaining.

.2 Sod is free of bare and dead spots and without weeds.

.3 No surface soil is visible when grass has been cut to height of 40 mm.

.4 Sodded areas have been cut minimum two (2) times prior to acceptance review.

.2 The Contractor is responsible to arrange review of sod for Preliminary Acceptance within one (1) week of second cut.

.3 Areas sodded in fall will be accepted in following spring one (1) month after start of growing season provided acceptance conditions are fulfilled.

.4 The Owner will take over the cutting of the sod following a successful Preliminary Acceptance.

3.5 Cleaning

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION - 02938

CONCRETE FORMWORK

PART 1 GENERAL

1.1 Related Work

.1 All Division 1 Specification Sections
.2 Section 02233 - Granular Base
.3 Section 02311 - Site Grading
.4 Section 03200 - Concrete Reinforcement
.5 Section 03300 - Cast-In–Place Concrete
.6 Section 07910 - Joint Sealant

1.2 References

.1 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-086.01, Supplement No.1 to CAN/CSA-086-01, Engineering Design in Wood.

.3 CSA-O121, Douglas Fir Plywood.

.4 CSA O151, Canadian Softwood Plywood.

.5 CSA-S269.1, Falsework for Construction Purposes.

.6 CAN/CSA-S269.3.Concrete Formwork.

1.3 Submittals

.1 Submit shop drawings in accordance with Section **01330 Submittals**.

.2 Indicate method and schedule of construction, materials, arrangement of joints, ties shores and location of embedded parts including waterstops and anchor bolts.

.3 Each shop drawing submitted shall bear the stamp and signature of a qualified Professional Engineer licensed in the Province of Ontario.

.4 At time of submission, the Contractor shall notify the Consultant in writing of any deviations in shop drawings from requirements of Contract Documents.

.5 The Consultant will review and return shop drawings in accordance with an agreed schedule. Review of the shop drawings by the

Consultant is intended as assistance to the Contractor and does not relieve the Contractor of responsibilities for the completeness and accuracy of the work and conformance with the Contract drawings and specifications.

1.4 Shop drawings

.1 Submit shop drawings in accordance with Section **01330 Submittals**.

.2 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, and materials, arrangement of joints, special architectural exposed finishes, ties, liners and locations of temporary embedded parts. (Comply with CSA-S269.1 for drawings. Comply with CAN/CSA-S269.3 for formwork drawings.)

.3 Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms.

.4 Each shop drawing submission shall bear stamp and signature of a qualified Professional Engineer registered or licensed in the Province of Ontario.

1.5 Sample Panel

.1 Sample panel shall be 600 mm x 600 mm to fully indicate special treatment, pattern, module or finish required. Obtain the Consultant's approval prior to casting concrete sample.

.2 Obtain the Consultant's approval resulting concrete surface finish prior to erecting subsequent forms.

.3 Approved concrete surface of sample will be considered the standard of quality for the finished work. Quality of all formwork shall match the approved sample panel.

.4 Leave sample panel and concrete sample exposed to view for duration of concrete work.

.5 Remove sample panel and concrete sample, if not incorporated into the work, from site when directed by the Consultant.

1.6 Description

.1 Install anchors, ties, expansion joint components and other items to be built into, anchored to, or passing through concrete Work which

are specified for supply on Work of other section(s).

.2 Co-operation with Work of other Sections:

.1 Check project drawings and specifications for requirements of other sections that affect construction of formwork.

.2 Inform those performing Work of other sections, in writing or by schedules, of requirements for services, materials and built-in items prepared or supplied by other sections which affect Work of this section.

.3 Co-operation with the Consultant.

.1 Before commencing Work, review with the Consultant the sampling program for Work performed under this section.

.2 Schedule Work to allow sufficient time and access for the Consultant to carry out sampling program during regular working hours.

.4 Definition: Architectural Concrete shall mean concrete surfaces designated as “Architectural Concrete” in the contract documents. Exposed paving surfaces and curbs shall be considered as architectural concrete.

1.7 Quality Assurance

.1 Reference Standards: The following reference standards shall govern Work in this section, except where they are in conflict with the requirements imposed by this specification, in which case the latter shall govern. Standards referenced in CAN3-A23.1 shall apply but are not repeated in the following list.

1. CAN Standard CAN3-A23.1-M77, Concrete Materials and Methods of Concrete Construction.

.2 Design of Formwork: Assume full responsibility for complete structural design and construction of formwork in accordance with CSA Standard S269.1.

.3 Requirement of Regulatory Agencies: Conform to local and provincial regulations, including construction safety regulations.

.4 Tolerances:

.1 Conform to CSA-A23.1/A23.2 and as specified herein.

.2 Where drawings call for “architectural concrete” to be provided, construct formwork so that the hardened concrete surface will conform to the following tolerances:

Variation from plumb:

A. In lines and surfaces of columns, walls and in arises:

In any 3.0m (10’) of length	3mm (1/8”)
The greater of bay length or 6.0m (20’)	5mm (3/16”)
Maximum for entire length	12mm (1/2”)

B. For exposed corner columns and other conspicuous lines:

The greater of bay length or 6.0m (20’)	5mm (3/16”)
Maximum for entire length	12mm (1/2”)

C. Variation from level or from grades specified in Contract Documents:
In exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines:

The greater of bay length or 6.0m (20’)	5mm (3/16”)
Maximum for entire length	12mm (1/2”)

1.8 Product Delivery, Storage and Handling

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

PART 2 PRODUCTS

2.1 Materials

.1 Formwork materials: Use new plywood and wood formwork materials to CSA-O121.

.2 Plywood:

.1 Generally: Douglas fir, minimum thickness of 17mm (11/16”), to CSA O121, finished one side, fabricated specially for use as concrete form panels, with sealed edges.

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

.3 Where surfaces receive architectural finishes, such as sandblasting, use coated or overlaid form panels as indicated.

.3 Form Ties: Use removable or snap-off metal ties, fixed or adjustable length.

.1 At architectural concrete surfaces, snap ties with plastic cone, 25mm (1") break back and grey plastic plugs, to the Consultant's approval and to provide 6mm (1/4") reveal.

.2 At other surfaces use snap ties with spreader washer and 25mm (1") break back.

4. Chamfers:

.1 Cut chamfers from wood, smooth, with no open defects.

5. Form Liners

.1 Provide product literature or a sample of the proposed form liner for approval prior to placing in the form work.

PART 3 EXECUTION

3.1 Fabrication, Formwork and Construction

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

.2 Fabricate and erect in accordance with CSA S269.1 1975 (R2003)

.3 Build formwork with joints sufficiently tight to prevent leakage of grout or cement paste.

.4 Obtain the Consultant's approval before commencement of Work.

.5 Forms for concrete surfaces or surfaces which will be exposed or painted.

.6 Construction:

.1 Construct panels with continuous and level horizontal joints.

.2 Back all edges of plywood to prevent separation of plywood panels at joints.

.3 Construct corners so that concrete is not placed against panel edges.

.4 Where tie marks will show, place ties in regular pattern as approved by the Consultant or as indicated on the Contract Document drawings.

.5 Reuse forms only if their surfaces are not marred in any manner and where established patterns of holes can be maintained with no alterations to panels.

.6 Form footing sides unless footings are shown to be place against undisturbed soil.

.7 Set anchor bolts, templates. Steel connection units, hardware, or other insets into the forms and secure them rigidly so that they do not become displaced during concreting. Set and secure them items to the tolerances specified and required in the appropriate Sections.

.7 Sleeves, Chases and Formed Openings:

.1 Form sleeves, chases and opening except where such items are specified to be formed or sleeved by the appropriate trade.

.2 All openings, sleeves, chases are not necessarily shown on the drawings nor are their sizes or locations shown. Refer to mechanical and electrical drawings and specifications for openings and sleeving requirements not shown, located and dimensioned on the drawings.

.8 Exposed Concrete Forms:

.1 Make joints of forms sufficiently tight to prevent leakage of concrete fines at corners of exposed beams, walls and columns or at the corners of exposed edges or slabs, and other concrete.

.2 Provide chamfer strips at all exposed edges of concrete.

.3 Form panels for exposed concrete may be reused three (3) times, providing the tie holes are reused and panels are not damaged in a way that will cause visual defects.

.9 Advise the Consultant when an area of formwork will be ready for

review. Allow sufficient time for review before starting concrete placing.

.10 Clean formwork in accordance with CAN/CSA-A23.1/A23.2 before placing concrete. Clean forms of all loose debris and other deleterious materials prior to placement of the concrete.

.11 Finished concrete exhibiting excessive form displacement or excessive deflection shall be cause for rejection of the work and its removal and replacement at the Contractor's expense.

3.2 Built-In Work.

.1 Do not embed wood in concrete.

.2 Ensure that all fixtures and hardware have been properly placed before starting concrete placing.

3.3 Construction and Expansion Joints.

.1 Review with the Consultant the proposed location and details of joints in foundations, walls and columns.

.2 Construction Joints: shall present appearance of normal form panel joint.

.3 Expansion Joint: shall be installed in locations as detailed and noted on drawings.

3.4 Treatment of Formwork Surfaces.

.1 Form Release Agent: coat formwork with form release agent before reinforcement, anchors, accessories and other built-in items are installed.

.2 Use chemically active release agents containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing concrete from sticking to forms.

.3 Do not coat plywood forms pre-treated with release agent.

.4 Form release agent shall be non-toxic.

3.5 Stripping of Formwork

.1 Be responsible for the safety of the structure, both before and after

removal of forms, until concrete has reached its specified 28 day strength.

.2 Strip formwork for columns and piers not supporting weight of concrete only when no damage will result from stripping operations.

.3 Remove formwork at architectural surfaces after other formwork has been removed to prevent damage to surfaces.

.4 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.

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

.6 In hot weather, wood forms remaining in place should not be considered adequate for curing but should be removed or loosened so concrete surfaces may be kept moist or coated with curing agent.

.7 In cold weather, defer removal of formwork or insulate formwork, to avoid thermal shock and consequent cracking of concrete surface.

.8 When forms are stripped during curing process, cure and protect exposed concrete in accordance with Section **03300 Cast-In–Place Concrete**.

3.6 Replacement of Defective Work

.1 Movement and displacement of formwork during construction, variations in excess of specified tolerances and marked and disfigured surfaces that cannot be repaired by approved methods will be considered defective work performed by this Section.

.2 Reconstruct defective formwork and replace concrete and reinforcement placed in defective formwork at no additional cost to the Owner.

END OF SECTION - 03100

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 General Requirements

1. Supplementary Conditions, General Conditions, General Requirements, shall govern Work of this Section.

1.2 Related Work

.1 All Division 1 Specification Sections
.2 Section 02233 - Granular Base
.3 Section 02311 - Site Grading
.4 Section 03100 - Concrete Formwork
.5 Section 03200 - Concrete Reinforcement
.6 Section 03300 - Cast-In-Place Concrete

1.3 Description

.1 Before commencing of Work, review with the Consultant, sampling program for Work performed under this Section.

.2 Schedule Work to allow sufficient time and access for Consultant to carry out sampling program during regular Working hours.

1.4 Quality Assurance

.1 Reference Standards: The following reference standards shall govern Work in this Section, except where they are in conflict with requirements imposed by this specification, in which case the latter shall govern. Standards referenced in the Canadian Standards Association (CSA) Standard CAN3-A23.1 apply but are not repeated in the following list:

.1 CSA Standard A23.1-M77, Concrete Materials and Methods or Concrete Construction.

.2 CSA Standard A23.3-M84, Design of Concrete Structures for Buildings.

.3 CSA Standard G30.5-M1983, Welded Steel Wire Fabric for Concrete Reinforcement.

.4 CSA Standard G30.18-M1992, Billet Steel Bars for Concrete Reinforcement.

1.5 Submittals

.1 Shop Drawings:

.1 Submit shop drawings stamped and certified by a Professional Engineer licensed in the Province of Ontario.

.2 Submit placing drawings and bars lists sufficiently detailed and dimensioned, with complete information necessary for fabrication of reinforcement and placing of bars and accessories.

.3 Show height of support chairs. For vertical reinforcement, show dimension from bar to concrete surface.

.4 Show location of splice joints, all reinforcement to be continuous.

.5 Prior to submission to the Consultant, the Contractor shall review all shop drawings. By this review, the Contractor represents to have determined and verified all field measurements, site conditions, materials, and similar data and to have checked and coordinate each shop drawing with the requirements or the Work and of the contract documents. The Contractor's review of each shop drawing will be indicated by stamp, date and signature of an authorized and qualified person.

.6 At the time of submission, the Contractor shall advise the Consultant in writing of any deviations in shop drawings from the requirements of the Contract Documents.

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

.8 The Contractor shall make changes in shop drawings which the Consultant may require consistent with Contract Documents and resubmit unless otherwise directed by the Consultant. When resubmitting the Contractor shall notify the Consultant in writing of any revisions other than those

requested by the Consultants.

.9 Do not commence fabrication of reinforcement before drawings have been reviewed and the Consultant comments incorporated on drawings issued to fabrication shop.

.2 **As-Built Drawings:**

.1 Mark on a complete set of final reproducible drawings any changes, additions or deletions that occur during the construction as a result of the Contractor's Work, change orders, or for any other reasons.

.2 For all shop drawings marked "Reviewed as Noted" or "Revise and Resubmit", update and submit a record set of these drawings at the completion of the structural Work. Ensure that these drawings reflect the changes and are coordinated with the final reproducible drawings as noted above.

1.6 Delivery, Storage and Handling

.1 Deliver, store and handle reinforcement and accessories in a manner that prevents contamination which reduces bond, and damage to fabricated forms.

.2 Protect reinforcement from rust, dirt, grease, from oil and other bond breaking substances.

PART 2 PRODUCTS

2.1 Materials

.1 Reinforcing Steel: Canadian manufactured deformed steel to CSA Standards of G30 Series, 400 MPa min. yield strength, CAN/CSA-G30.18, unless otherwise indicated, and to the material specification shown on the drawings. For deformed steel manufactured outside Canada, provide test data from a Canadian Testing Laboratory proving that each size and grade of reinforcement proposed meets specification requirements.

.2 Welded Steel Wire Fabric: Conforming to ASTM A185/A185M, 152mm x152mm, 6/6 to CSAG 30.5 in flat sheets, **not rolls.**

.3 Cold-drawn annealed steel wire ties to ASTM-A497/A497M.

.4 Chairs, bolsters, bar supports, spacers to CSA-A23.1/A23.2.

.5 Glass Fiber Reinforced Concrete: High density concrete made of ASTM C 150 Portland cement, crushed stone, silica sand, and polymers reinforced with continuous filament glass fiber and structural reinforcing as stated on drawings.

.6 Epoxy Coating for Reinforcement (where specified). An electronic application of epoxy protective coating conforming to requirements of OPSS 1442 and 1443.

.7 Plain round bars: CSA-G40.20/G40.21.

PART 3 EXECUTION

3.1 Fabrication of Concrete and Masonry Reinforcement

.1 Fabricate reinforcement in accordance with CSA A23.1/A23.2 and the RSIC Manual of Standard Practice, in fabricating shop, unless otherwise approved.

.2 Replace bars which develop cracks or splits.

3.2 Placing of Concrete Reinforcement

.1 Set anchors bolts, wall dowels, etc., prior to concreting with wooden templates or other approved means.

.2 Do not drive or force reinforcement into fresh concrete.

.3 Secure reinforcement in columns, walls, slabs and curbs using sufficient spacers on each face to maintain the requisite distance between reinforcement and column or wall face and so that vertical bars are plumb.

.4 Provide splices only where indicated on the drawing.

.5 Coordinate placement of reinforcement with placement of servicing lines, equipment and materials.

3.3 Field Bending

.1 Do not field bend reinforcement except where indicated or authorized in writing by Consultant.

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

.3 Replace bars which develop cracks or splits.

3.4 Epoxy Coated Reinforcement

.1 Provide epoxy coated reinforcement where shown on the drawings.

.2 All systems for handling, transporting and storing coated bars shall be such that the coating shall not be damaged. Prevent bar to bar abrasion and excessive sagging. Do not drop and drag bars. Store on suitable non-metallic supports.

.3 During and after the installation of the bars into their location in the deck, repair all damaged portions of the coating with patching material conforming to OPSS 1443. Any damaged accessories shall also be repaired.

.4 Repair all damaged areas of the coated reinforcing steel and metallic accessories in accordance with Clause 12 of ASTM A775, before any rusting occurs. The Consultant may require that damaged bars be replaced instead of being repaired. If infrequent and small damaged areas do rust, completely remove the rust by an approved method before the areas are repaired.

3.5 Welded Wire Fabric

.1 Lap ends and sides of fabric not less than 300mm (12”).

3.6 Quality Control

.1 Provide a system of quality control to ensure that the minimum standards specified herein are attained.

.2 Bring to the attention of the Consultant any defects in the Work or departures from the Contract Documents which may occur during construction. The Consultant will decide upon corrective action and give recommendations in writing.

.3 The Consultant’s general review during construction, inspection and testing by Independent Inspection and Testing Companies reporting to the Consultant are both undertaken to inform the Owner of the Contractor’s performance and shall in no way augment the Contractor’s quality control or relieve the Contractor of contractual responsibility.

3.7 Notification

.1 Prior to commencing significant segments of the Work, give the Consultant and Independent Inspection and Testing Companies appropriate notification so as to afford them reasonable opportunity to review the Work. Failure to meet this requirement may be cause for the Consultant to classify the Work as defective.

3.8 Inspection and Testing

.1 The Consultant will appoint the Independent Inspection and Testing Company to make inspections or perform tests as the Consultants directs at the Contractors expense. The Independent Inspection and Testing Company shall be responsible only to the Consultant, and shall make only such inspections or tests as the Consultant may direct.

.2 If defects are revealed, the Consultant, at the Contractor's expense, may require additional inspection or testing to ascertain the full extent of the defect.

3.9 Defective Materials and Work

.1 Where evidence exists that defective Work has occurred or that Work has been carried out incorporating defective materials, the Consultant may have tests, inspections or surveys performed, analytical calculations of structural strength made, and the like, in order to help determine whether the Work must be replaced. Tests, inspections or surveys or calculations carried out under these circumstances will be made at the Contractor's expense, regardless of their results, which may be such that, in the Consultant's opinion, cause undue delay or give results not representative of the rejected material in place. In this case, the tests shall be acceptable.

.2 Where applicable, all testing shall be conducted in accordance with requirements of the Ontario Building Code, except where this would, in the Consultant's opinion, cause undue delay or give results not representative of the rejected material in place. In this case, the results shall be conducted in accordance with standards given by the Consultant.

.3 Materials or Work which fails to meet specified requirements may be rejected by the Consultant whenever found at any time prior to final acceptance of the Work regardless or previous inspection. If rejected, defective materials or Work shall be promptly removed and replaced or repaired to the satisfaction of the Consultant, at no expense to the Owner.

3.10 Adjusting and Cleaning.

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

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

END OF SECTION - 03200

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 Related Work

.1 All Division 1 Specification Sections
.2 Section 02233 - Granular Base
.3 Section 02311 - Site Grading
.4 Section 03100 - Concrete Formwork
.5 Section 03200 - Concrete Reinforcement

1.2 References

.1 Canadian Standards Association (CSA):

.1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Testing and Standard Practices for Concrete.

.2 CAN/CSA-A23.2, Methods of Test for Concrete.

.3 CSA-A266.4, Guidelines for the Use of Admixtures in Concrete.

.4 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.5 CSA-A3001, Cementitious Materials for Use in Concrete.

.2 American Society for Testing and Materials (ASTM)

.1 ASTM C260, Standard Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3 ASTM C494/C494M, Standard Specification for Chemical Admixtures for Concrete.

.4 ASTM D1751, Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.3 Construction of concrete curbs and gutters are to conform to the Corporation of the City of Brampton Standard Specification and Details.

1.3 Description

.1 Co-operation with the Consultant: Before commencing Work, review with the Consultant the sampling program for Work performed under this section. Schedule Work to allow for sufficient time and access for the Consultant to carry out sampling program during regular working hours.

.2 Architectural Concrete: Architectural concrete shall mean all exposed concrete surfaces designated as “architectural concrete” in contract documents. Smooth finished concrete surfaces shall be considered as architectural concrete.

1.4 Quality Assurance

.1 Reference Standards: The following reference standards shall govern Work of this section, except where they are in conflict with requirements imposed by this specification, in which case the latter shall govern. Standards of CAN3-A23.1 are not repeated in the following list:

.1 CSA Standard CAN3-A23.1, Concrete Materials and Methods of Concrete Construction.

.2 CSA Standard CAN3-A23.2, Methods of Test for Concrete.

.3 CSASTA – CAN A266.2 – Chemical Admixtures.

.2 Construction of concrete curbs and gutters are to conform to the Corporation of the City of Brampton Standard Specification and Details.

1.5 Tolerances

.1 Tolerances for formed concrete surfaces and thickness of slabs are specified in Section **03100**, **Concrete Formwork**. Finish slabs and other horizontal surfaces to conform to the following limits. All limits are plus or minus unless otherwise noted.

.1 Top of Walls and Caps:

A. Variation from finish elevation shown on drawings:
Maximum for entire length 12mm (1/2”)

B. Variation in surface finish:
Depression in surface shall not exceed 6mm (1/4”)

below a 3.0m (10') long straight edge.

.2 Horizontal slabs with a flat gradient: Maintain specified fall gradient so that no still water will be retained in any part of the surface.

1.6 Source Quality Control

.1 Both source quality control and field quality control specified elsewhere in this section will be performed by an Inspection and Testing Company appointed by the Consultant. All costs associated with the inspection or testing of any material or Work shall be borne by the contractor as per Section **01450 Quality Control & Inspection** or unless otherwise stated.

.2 Inspection and Testing Company shall be certified under CSA A283, Qualification Code for Concrete Testing laboratories, for Category 1 Certification.

.3 Perform Work of source quality control in acceptance with CSA-A23.2 and to include:

.1 Verification that ready-mix supplier is qualified to supply concrete in accordance with specification.

.2 Review of proposed concrete mix designs.

.3 Sampling, inspection and testing of materials as may be required.

1.7 Project Records

.1 Concrete Pour Records: Record time, date, weather conditions, delivery slip serial number and location of each concrete pour and identify related test cylinders. Keep these records on site until the project is completed.

.2 Delivery Records: File duplicate copies of the 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 the first mixing of aggregate, cementing materials and water.

1.8 Submittals

.1 Concrete Mix Designs: Submit all concrete mix designs for review as noted:

.2 Inspection Reports: Submit written reports of inspections and tests.

.1 Distribute as follows:
- .1 Two (2) copies to the Consultant.
- .2 One (1) copy to the Structural Engineer.
- .3 One (1) copy to the Contractor.

.2 On concrete cylinder test reports, 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.

.3 Samples:

1. Prepare a 1 x 1m sample of all proposed concrete finishes and colours and precast concrete components a minimum of two weeks prior to concrete installations.

1.9 Job Conditions

.1 Environmental Conditions:

In addition to Cold Weather and Hot Weather Requirements of CSA-A23.1, the following shall apply to Work of this section:

.2 Provide protection and or heat so that the temperature of the concrete at surface is maintained at not less than 21deg.C (70deg.F) for three days after placing, not less than 10deg. C (50deg.F) for the next two (2) days and above freezing for the next two days. Do not permit alternate freezing and thawing for fourteen days after placing.

.3 Provide protection to maintain concrete continuously moist during the curing period.

.4 Provide same specified hot and cold weather protection for storage of each concrete compression specimen as for the concrete from which it was taken, until it is sent to the laboratory.

.5 Protection: protect concrete surfaces exposed to view from grease,

oil and other soil which will affect the appearance of the concrete.

PART 2 PRODUCTS

2.1 Materials

.1 Water: CAN/CSA-A23.1

.2 Cementing Materials:
- .1 Portland Cement: CAN/CSA-A3001

.3 Coarse Aggregates, CSA-A23.1/A23.2:
- .1 For all concrete: 20mm (3/4") to 5mm (No. 4 sieve).

.4 Admixtures:
- .1 Air entraining admixture: ASTM-C260
- .2 Chemical admixtures: ASTM-C494
- .3 Provide only admixtures that are free of chlorides.

2.2 Concrete Mixes

.1 Concrete:

.1 Ready mix, with 28-day compressive strength as indicated on drawings and in specifications. Coloured concrete mixes and samples to be approved by the Consultant.

.2 Design concrete mixes in accordance with CSA-A23.1/A23.2, Clause 14, Table 11 (Alternative 1) and Tables 7 and 8. Class A exposure, with surface finish approved for sandblasting but not for curb and gutters. Provide air content in accordance with the first line of Table 8 of CSA-A23.1. Class C-1 exposure for other concrete.

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

.4 Concrete Weight: Air dry unit weight: minimum 2320 kg/m3 (145 lbs./cu.ft.) adjusted proportionally for maximum air content listed in Table 8, CSA –A23.1, Clause 14, Table 8.

.5 Coloured Concrete mixed at Ready Mix Plant; Mix Ratio in accordance with manufacturer/supplier's specifications. Integral Pigments by Interstar Ready Mix or Approved Equal.

.2 Admixtures:

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

.2 Air-Entraining Agent: Incorporate air entraining agent in addition to chemical admixture in concrete of A and C Class exposure in accordance with CSA-A23.1, Clause 14, Table 8.

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

.3 For sand and coloured aggregates for standard and type 'A' alternative concrete mixtures, source to be approved by the Consultant. Ratios of material will vary depending on concrete strength specified.

.4 Obtain aggregate, cement and sand from same source at same time, for entire project.

.5 Use tools and handling equipment that are absolutely clear of rust, salts, hardened concrete and other harmful and foreign materials.

PART 3 EXECUTION

3.1 Examination

.1 Confirm that the subgrade of compacted fill conforms to requirements specified for backfilling before placing slab underbed;

.2 That a surface on which concrete is to be placed is free of frost and water before placing;

.3 Confirm that reinforcement, dowels control joints, inserts and all other built in Work are in place and secured before placing concrete.

3.2 Placing Concrete

.1 Notification: Notify the Consultant at least twenty-four (24) hours before commencing to place concrete. Regardless of any requirement of reference standards to inspect all of the Work prior to placing concrete, field review of construction will be in accordance with sampling program.

3.3 Finishing Concrete

.1 Slab Surfaces:

1. Perform finishing operations on plastic concrete surfaces in accordance with CSA-A23.1, Clause 22 and as specified herein.

2. Refer to drawings, schedules and other sections of specifications for required finishes.

3. Verify with those responsible for Work of other sections that proposed finish is satisfactory.

.2 Formed Surfaces:

.1 Treat formed surfaces in accordance with CSA-A23.1, Clause 24.1 and 24.2 and as additionally specified herein. Obtain the Consultant approval of exposed concrete. Regrind or otherwise correct surfaces are not to the satisfaction of the Consultant.

.2 Edging: Finish external corners of curbs, walls and steps rounded and smooth, as detailed.

.3 Architectural Finishing (all exposed concrete):

.1 Concrete surfaces in accordance with material finish schedules and to match the finish and colour of samples approved by the Consultant.

.2 Protect other surfaces and equipment against damage resulting from operations.

.3 Use materials that will minimize environmental contamination.

.4 Take care to avoid breaking external corners of concrete.

.5 Remove debris from finishing operations.

3.4 Curing and Sealing

1. Cure concrete in accordance with CSA-A23.1, Clause 21 and as specified herein.

2. Plastic curing Method:
Where curing compound methods cannot be used, cure finished surfaces by covering with 0.102mm (4mil.) thick polyethylene sheets

as follows:

.1 Lap all edges 100mm (4") minimum and seal all laps.

.2 Leave in place seven days, minimum.

.3 Check that concrete is damp and apply water to maintain damp condition.

3.5 Field Quality Control

.1 The Contractor shall appoint an Inspections and Testing Company as specified for source quality control elsewhere in this section shall perform sampling, inspections and testing of concrete Work at site.

.2 Perform sampling, inspection and tests in accordance with CSA-A23-2 and to include:

.1 Making of standard slump tests.

.2 Obtaining three (3) standard specimens for strength test from each 100m3 (130 cu.yd.) of concrete or fraction thereof, of each design mix design of concrete placed in any one day. Verify that the test cylinders are stored in an enclosure, maintained at specified temperatures.

.3 Making compression tests of each set of three (3) specimens, one at seven (7) days and two at twenty-eight (28) days.

.4 Verification of air content of air-entrained concrete:

.1 For Class A exposure, test at frequency in accordance with CSA-A23.1, Clause 17.2.2.1. Make first test before placing any concrete. After stable air content has been established, frequency of tests will be determined by Structural Site representative.

.2 For Class C-1 exposure, test at time of obtaining strength test specimens.

.5 Inspections and Tolerances:

.1 Confirm that concrete Work meets the tolerance requirements specified herein.

3.6 Defective Work

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

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

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

.4 Testing and replacement of deficient Concrete-in-Place:

.1 The Contractor shall pay for additional testing and related expenses if concrete has proved to be deficient;

.2 Replace or strengthen deficient concrete Work as directed by Consultant and pay all testing and related expenses for replaced Work until approved by the Consultant.

3.7 Finishes

.1 All concrete or exposed concrete to be finished as indicated on the Contract Document drawings.

3.8 Clean Up

.1 Remove from site excess and waste materials, mock up panels, test areas and debris resulting from Work in this section. Leave premises in a condition acceptable to the Consultant before completion of the Work.

END OF SECTION - 03300

SITE FURNITURE

PART 1 GENERAL

1.1 Related Work

.1	All Division 1	Specification Sections
.2	Section 03100	Concrete Formwork
.3	Section 03200	Concrete Reinforcement
.4	Section 03300	Cast-In-Place Concrete

1.2 Source Quality Control

.1 Supply manufacturer's samples of finishes and anchoring systems and Shop Drawings for approval by the Consultant.

1.3 Inspection

.1 Refer to Section **01450 Quality Control & Inspection**

1.4 Shop Drawings and Product Literature

.1 Submit Shop Drawings and product data as requested by the Consultant.

.2 Indicate dimensions, sizes, assembly, anchorage and installation details for each furnishing specified

1.5 Maintenance Data

.1 Provide maintenance data for care and cleaning of site furnishings at the time of project close out as specified in Section **01700 Contract Closeout, Takeover & Warranties**.

PART 2 PRODUCTS

2.1 Site Furnishings

Trash Receptacle
200 Series - 250 Recycle Receptacle
Model: MRR-0250-00001
Manufacturer: Maglin Site Furniture
Colour: Cobalt Blue (RAL 5013)
Contact: (226) 796-8239

Bike Racks
100 Series – 100 Bike Rack
Model: MBR-0100-00003
Manufacturer: Maglin Site Furniture

Colour: Cobalt Blue (RAL 5013)
Contact: (226) 796-8239

Tactile Walking Attention Indicators (TAI)
Product: Access Tile
Manufacturer: Kinesik or approved equal

2.2 Sports Furniture and Equipment

Players Benches
21'-0" Portable Aluminium Players Bench Unit (no backrest)
Model: PB21AP(5)WO-PORT
Manufacturer: W.H. Reynolds (Cambridge) Ltd.
Contact: 1-888-653-9721

3-Row Bleachers
3 Row by 12'-0" Tip and Roll Aluminium Bleacher Unit
Model: 3R12AP(3)-T&R
Manufacturer: W.H. Reynolds (Cambridge) Ltd.
Contact: 1-888-653-9721

Field Hockey Goal
Kwik Goal Official Field Hockey Goal (Wheels Included)
Model: 2F501
Manufacturer: Marchants School Sport Ltd.
Contact: (519) 829-8648

Scoreboard
Multi-Sport Scoreboard
Model: M3010AUCV
Manufacturer: OES Scoreboards
Contact: (647) 408-9321

2.3 Batting Tunnel

Custom Batting Tunnel
(5) 13'H x 125'L, Side by Side, Ultra Cross Net
Model: BT-CUSTOM
Manufacturer: Sportsfield Specialties
Contact: (312) 933-9680

Game Mound
Portolite 10" One Piece Game Mound
Model: 330-595-179
Manufacturer: Beacon Athletics
Contact: (815) 721-4467

Home Plate
Throw Down Home Plate
Model: 301-905-049
Manufacturer: Beacon Athletics
Contact: (815) 721-4467

2.4 Artificial Turf

Field Hockey Artificial Turf
Polytan Poligras Paris GT Zero Field Hockey Turf (Dry Technology)
Manufacturer: Centaur Products Inc.
Contact: (416) 789-8873

Batting Cage Artificial Turf
Engineered Turf – BCM
Manufacturer: Centaur Products Inc.
Contact: (416) 789-8873

2.5 Running Track

Running Track Surfacing
BSS 2000 Hobart Blue and Line Marking
Manufacturer: PlayTeck Enterprises
Contact: (506) 850-9403

PART 3 – EXECUTION

3.1 Installation

.1 Install site furniture square and plumb as shown on the Contract Document drawings.

.2 Assemble furnishings in accordance with manufacturer's instructions.

.3 Touch up damaged finished to the satisfaction of the Consultant.

.4 Anchoring: All site furniture is to be surface mounted to concrete (as per manufacturer's specifications) or through unit paving into a concrete base (Contractor to use 300mm long threaded connecting rods). Anchoring system is to be drilled and secured with expansion epoxy grout as supplied by approved manufacturer.

.5 Use tamper-proof nuts.

END OF SECTION - 12500

ELECTRICAL GENERAL REQUIREMENTS

1.0 General Conditions

1. Information for tenderers, general conditions, supplementary conditions and the tender form, form an integral part of this Division of the specification.

2. Conform to General Instructions.

3. Unless specified otherwise, the following instructions will apply to all sections of Division 16.

2.0 Intent

1. Mention herein or indication on drawings of articles, materials, operations or methods requires: supply of each item mentioned or indicated, of quality, or subject to qualifications noted; installation according to conditions stated and; performance of each operation prescribed with furnishing of necessary labour, equipment and incidentals for Electrical Trades, Division 16000.

2. Supplementary to definitions established is:

   a) "Supply" will mean furnishing to site in location required or directed complete with accessory parts.

   b) "Install" will mean set in place and secured or affixed to building structure, wired and connect as required to be fully operational as noted or directed.

   c) "Provide" will mean supply and install as each is described above.

3. Where used, wordings such as "approved, to approval, as directed, permitted, permission, accepted, acceptance", will mean: approved, directed, permitted and accepted by authorized representative of the owner.

3.0 Standards and References

1. Equipment provided under this Division will conform to applicable standards and regulations of the following organizations:

   Canadian Standards Association
   Canadian Electrical Code
   Electrical Safety Authority
   Ontario Electrical Safety Code
   National Building Code
   Ontario Building Code

4.0 Materials

1. Materials will be new, of Canadian manufacture where available, first quality and uniform throughout. Submit tender based on the use of materials and equipment specified or on the listed acceptable alternate equipment as further detailed.

2. Electrical materials will be CSA or equal, approved and be so labeled. Materials not CSA approved will receive acceptance for installation by the Electrical Safety Authority Inspections Branch before delivery, and modifications and changes required for such acceptance will be included in work of this Section. Material will not be installed or connected to the source of electrical power until approval is obtained.

3. Confirm capacity, ratings and characteristics of equipment items being provided to supply power to equipment provided under other Divisions of the work. Resolve discrepancies before such items are purchased.

5.0 Material Acceptance

1. Acceptance of materials installed presumes that materials have not been damaged or exposed to conditions that would be considered to adversely affect performance and life expectancy.

2. If, in the opinion of the Consultants, materials have sustained damage, or have been exposed to abnormal conditions, it will be the responsibility of the contractor to have such tests performed as deemed necessary by the Consultants to establish condition and therefore, acceptability of installed materials.

3. Tests will be conducted by independent testing specialists acceptable to the Consultants who will provide written report of tests directly to the Consultants.

6.0 Examination of Site & Conditions

1. Examine the site, local conditions and the complete set of drawings affecting the work of this project. Examine carefully all Tender Documents and ensure the work can be satisfactorily carried out as shown. Before commencing work, examine the work of other sections and report at once any defect or interference affecting the work of this Section. No allowance will be made later for any expense incurred through failure to make this examination or to report any discrepancies in writing. The complete set of drawings and specifications are available through the purchasing department of the City of Brampton. Any item affecting the price is to be in writing with the Tender submission.

7.0 Workmanship

1. Workmanship and method of installation will conform to best standards and practice and will be performed to approval. Licensed electricians holding Ontario Ministry of Trades Certificates of Qualification (ICI Sector) employed by an electrical contractor holding a valid ECRA license for work at 750 volts and below will perform all work within this division of work. No sub-contracted labour will be permitted unless noted on the tender form. The scope of the work and the intended sub-contractor are to be clearly identified on the tender form.

8.0 Co-Operation and Responsibility

1. Work of this division will include full responsibility for laying out of work; and for any damage caused to other section of work by reason of improper location or installation; prompt installation of work in advance of concrete pouring or similar work; and responsibility for condition of all material and equipment supplied under this Section and responsibility for protection and maintenance of work completed and accepted until termination of contract.

2. Co-operate with the general contractor engaged on the work to ensure that items installed under this Section are located in proper relation to other materials. Co-operate fully with the preparation and maintenance of an accurate construction co-ordination schedule.

9.0 Temporary and Trial Usage

1. Temporary or trial usage of materials will not be construed as evidence of acceptance of same.

2. Permanent electrical services and equipment will not be used for construction purposes except as otherwise directed in writing by the Consultant.

10.0 Protection

1. Protect work from damage that would impair its efficiency or mar its appearance.

2. Securely plug or cap open ends of raceways to prevent obstruction using approved manufactured devices.

3. Protect factory-finished equipment from damage. Damaged finishes will be restored to original condition.

4. Return equipment to manufacturer for refinishing, if so directed.

11.0 Bylaws and Regulations

1. Work will conform to the latest rules, regulations and definitions of Canadian Electrical Code and applicable Municipal and Provincial Codes and Regulations, and to the requirements of other authorities having jurisdiction in the area where work is to be performed. Minor changes required by an authority having jurisdiction will be carried out without change to the contract amount. Standards established by drawings and specifications will not be reduced by applicable codes or regulations.

12.0 Permits and Fees

1. File the contract drawings with proper authorities and obtain their approval of installation and permits for the same before proceeding with work. Prepare and submit necessary detailed shop drawings as required by Authorities.
2. Pay all fees in connection with examination of drawings, permits, inspections and final certificate of approval.

13.0 Certificates

1. Furnish necessary certificates as evidence that work installed conforms to the laws and regulations of authorities having jurisdiction.

14.0 Warranty

1. Warranty materials and workmanship for period of twelve (12) months (except as otherwise noted) from date of final acceptance by the Consultants, and defects will be corrected and made good, except in case of defects occurring from misuse by occupants.

15.0 Construction Facilities

1. Provide job site office, workshop, tools, material storage, and the like, which are required to complete work.

16.0 Contract Drawings

1. Drawings are intended to serve as a guide showing quantities, and general arrangements, and are not necessarily working drawings from which measurements can be taken, except where dimension figures are specifically shown. Information involving accurate measurements will be taken from the consultant's site plan and detail drawings.

17.0 Shop Drawing Material and Lists

1. Prepare and electronically submit shop drawings in a pdf format of equipment required for review. (Refer to the General Conditions of the contract). All shop drawings submitted for review must be reviewed and stamped by the electrical subcontractor prior to the submission.

2. Prior to equipment fabrication, delivery or installation, submit complete lists of materials proposed, indicating manufacturer, catalogue numbers and complete performance data.

3. Review of shop drawings by the Consultant is for the sole purpose of ascertaining conformance with general design concept. This review will not mean that the Consultant approves detail design inherent in shop drawings, responsibility for which will remain with contractor and such review will not relieve contractor of his responsibility for meeting all requirements of contract documents. Contractor is responsible for dimensions to be confirmed and correlated at site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of work with all trades.

18.0 Record Drawings and Specification

1. Maintain record revisions and furnish record drawings for work of this Division. Obtain for this purpose at least two sets of white prints.

2. Show on record drawings, all deviations in the work; exact locations for all electrical services buried below pavement and soft landscaping; concealed junction or pull boxes; access panels. Locate exterior buried work by dimension from lighting poles and other fixed objects.

3. Obtain approval for all provisions for future extension, and establish verification before these are concealed.

4. Provide "As Built" Record Drawings together with other documents required upon completion of the work.

19.0 Interference Drawings

1. Prepare and submit composite interference drawings to avoid and/or resolve conflict of trades and to co-ordinate work of Electrical Division with all other trades.

2. Interference drawings will indicate exact arrangements, of all areas and equipment to scale with dimensions.

3. Co-operate with work of Mechanical Division and provide data requested and as required in the preparation of interference drawings for the work of Mechanical Division.

4. Make interference drawings in conjunction with all parties and trades concerned showing sleeves and openings and passage of electrical work through the site. Drawings will also show inserts, special hangers and other features to indicate routing through confined spaces, installation of equipment in such areas.

5. Provide detail drawings of pulling pits, equipment bases, anchors, etc. pertaining to electrical work.

20.0 Instructions to Operator

1. Instruct owners' representative in care, maintenance and operation of Electrical Systems and associated equipment.

2. Supply full Operating and Maintenance Instructions in triplicate, each in stiff cover, three-ring binder suitably separated and labeled. Operate each item of equipment in presence of owners to ensure understanding of working parts and function of each item of equipment. Supply one complete set of "Reviewed" Shop Drawings in separate hard cover binder suitably separated and labeled for owner's use.

21.0 Maintenance Data

1. Compile information and prepare two Maintenance Data manuals which will include:

a) Manufacturer's installation, operation and maintenance instructions, replacement parts and names and addresses of suppliers, for all movable apparatus and mechanically and electrically operated items, appliances and equipment.

b) Detailed instructions and recommended materials for cleaning, lubricating and maintenance.

c) Chart showing any necessary seasonal adjustments to electrical apparatus and recommended minimum and maximum time intervals for inspection of all items.

d) Lists of lamps used throughout the project indicating: wattage, voltage, ordering abbreviation and/or catalogue number.

e) List of fuses, overcurrent, overload protective relays, etc. Indicating type; size; quantity; and name of machine, motor, feeder, or device protected.

22.0 Cleaning, Lubrication and Adjustment

1. Immediately prior to completion of work:

a) Remove all dust, dirt, and other foreign matter from internal surfaces of enclosed electrical apparatus and equipment.

b) Remove all temporary protective coverings and coatings, temporary labels.

c) Clean, repair, lubricate and adjust all mechanism and movable parts of apparatus and equipment leaving it in new condition and operating properly.

d) Balance demand loads for service and distribution feeders within 5 percent upon completion of work and after the facility is in full operation.

23.0 Inspection and Testing

1. Systems, equipment, and all major items of material will be tested to the satisfaction of the Consultant, and as required to establish compliance with plans and specifications, and with the requirements for the Supply and Inspection Authorities.

2. Faulty and defective equipment will be replaced with new materials. Conductors which are found to be shorted or grounded, or have less than proper insulation resistance, will be replaced with new conductors.

3. Tests will include, but are not limited to, the following:
   a) Test of secondary voltage cables will include megger tests to establish proper insulation resistance, and phase-to-ground resistance of cables.

b) Test of all adjustable overload and overcurrent protective devices of secondary switchgear to establish calibration and operation in accordance with specifications and approved co-ordination curves.

c) Visual examination of switchgear to determine adherence to allowable manufacturing tolerance and compliance with manufacturer's recommended installation requirements.

d) Proper functioning of all systems.

e) Polarity tests - to establish proper polarity connections to all sockets and receptacles.

f) Test of system neutral to establish proper insulation resistance and isolation of neutral from ground except for required ground connection a Service.

24.0 Certification of Tests

1. When work is complete submit three copies of test results and a signed statement listing all tests that have been performed as required by specifications and manufacturer's instructions.

25.0 Completion

1. Provide receipts from designated representative of owner for portable and loose materials (e.g. spare fuses, keys, etc.)

2. Provide copy of final Certificate of Inspection from the Electrical Safety Authority.

3. Perform tests and provide documentation as further described herein.

4. Provide Record Drawings to approval.

5. Provide manufacturers corrected "as built" shop drawings for all major electrical items and systems, including all shop drawings returned for modifications.

26.0 Cutting and Patching

1. Provide openings and sleeves in walls and floors, as required for work of this Section.

2. Pay for cutting and patching and making good as required for the work of Division 16000. Before commencing, obtain Consultant's approval for extent and nature of cutting. Make good disturbed surfaces to the consultant's approval.

27.0 Schedule of Work

1. Electrical services and auxiliary services will be maintained continuously without interruption. Interruptions to services will be confined to periods of time to be designated by the Consultant, and/or owner's designated representative. Include in tender for temporary connections, overtime labour charges, and such related allowances in order to conform to these conditions.

28.0 Hydro Charges

1. There are no hydro servicing costs related to this project.

END OF SECTION

1.0 General

1. Conform to Section 16000 - Electrical - General Requirements.

2.0 Branch Circuit Wiring and Feeder Cables

1. Provide branch circuit wiring, conduits and feeders as required for Lighting, Power and auxiliary Systems. Separate conduit systems will be provided for feeder, lighting and power systems.

3.0 Holes and Drilling

1. Pneumatic hammers and percussion drills are prohibited.

2. Where not sleeved, make holes through concrete walls and floors by core-drill only.

3. Seal holes and sleeves through floors to serve as water dam.

4. Comply with requirements of CSA Standard No.A23.3 Paragraph 5-17.

4.0 Watertight Seal at Exterior Walls

1. Provide sleeve devices, cast into exterior walls below grade for conduits that pass into finished spaces. Convert non-metallic ducts to rigid steel conduits through such seals.

5.0 Fire Proofing and Sealing

1. Make watertight seal at sleeves at other openings through floors above grade. Sleeves to extend minimum 25 mm (1 inch) below finished floors.

2. Provide Fireproofing protection of openings through floors and fire rated walls.

3. Caulk spaces between conduit, cables and raceways with packing to Building Department approval. Pack and seal both sides of openings with putty, minimum thickness 25 mm (1 inch).

4. Cap unused sleeves through floors and walls.

6.0 Hangers and Inserts

1. Provide necessary hangers and inserts for work of this Division.

2. Erect hangers free of kinks and plumb; where plumb hangers are not possible install slanted hangers in pairs in a manner to balance the load. Secure to building structure by suitable means in a manner to develop full strength of hanger.

3. Fasten to cast-in place concrete by suitable drilled or cast-in inserts.

4. Fasten to structural steel using bolts or welded fasteners.

5. Use trapeze hangers consisting of rods and unistrut where several conduits run together.

6. Do not use wood, chain, wire lashings, strap or grappler bar hangers except where noted or detailed. Percussion type fastenings (fastenings set by an explosive charge) may be used only with written permission of the Consultant.

7. Support outlet and junction boxes independently of the conduits running to them where required by electrical code and where deemed necessary by the Consultant. Use steel angle brackets or steel rods to support outlets for fixtures, which due to weight, require attachment to the building structure.

8. Drilled fastening to concrete will be self-drilling concrete anchors, Phillips "Red-Head" or approved equal. The maximum weight per fastening will not exceed 25% of manufacturer's "pull-out" load data.

7.0 Painting

1. In general, equipment will be galvanized or painted in the factory before being shipped to site. Where painting is required, the material will be sanded and cleaned. The metal will have an approved prime rust resistant coat and will be finished in two coats of an approved exterior gloss enamel paint.

2. After installation, touch up all scratches, chips, other damage and defects in paint, using zinc chromate primer or paint or special enamels as necessary to match the original.

3. Finish and colour of all equipment will be coordinated to provide uniform appearance.

4. Painting of conduits and supports and other exposed surface work will not be required under this contract.

5. Install material in time to be painted together with mounting surfaces.

6. Do not paint over nameplates.

8.0 Nameplates and Schedules

1. Identify electrical equipment supplied under this Division with 3 mm thick black laminated plastic nameplate to indicate equipment controlled to provide instruction or warning. Lettering will be 6 mm high for small devices such as control stations and at least 13 mm high for all other equipment. Submit a list of proposed nameplates for approval before manufacture.

2. Provide panelboards with typewritten schedules identifying outlets and equipment controlled by each branch circuit. Protect schedules with non-inflammable clear plastic.

3. Identify junction boxes, pull boxes, cover plates, conduits and the like, provided for future extension, indicating their function.

9.0 Equipment Locations

1. Device plates will cover opening left for outlet box, and plates will be attached to boxes in an approved manner. Outlets and fixtures are to be located symmetrically.

2. The right is reserved to alter the location of equipment and outlets a distance of up to 3 metres without involving a change to the Contract amount, providing notice is given prior to installation.

10.0 Excavation and Backfill

1. Provide necessary excavating and backfilling required for work of this Division, performed as specified under another Division of the work, except as modified below.

2. Keep excavations free from water, pump as necessary. Provide and maintain adequate heat, shoring other necessary temporary protection.

3. Trench excavation will be carried out in strict conformity with the Trench Excavator Protection Act.

4. Excavation for underground services will be to required depths and dimension and will be prepared as required, so that no portion of any conduit or duct bank, bears directly against any rock or other hard surface.

5. Remove and dispose of all surplus excavated material.

6. Backfill trenches promptly after approval of work. Prevent damage to or displacement of walls, piping, conduits, waterproofing and other work.

7. For direct buried conduits installed in trenches excavated with a bucket backhoe; excavate to 150 mm below and a minimum of 100 mm either side of the conduit run. Fill back with a bedding of granular "A" gravel or sand. The additional depth trench with the sand or granular “A” backfill material is not required if the trench is excavated with a chain trencher. The material excavated with a chain trencher, all rocks and foreign materials removed is acceptable backfill material.

8. Refer to details on drawings and to utility company requirements for concrete encased duct installations.

9. Where excavation is necessary in proximity to and below the level of any footings, provide a sleeve at the proximity line and back fill with 20 mPa concrete to the level of the highest adjacent footing. Proximity is determined by the angle of repose as established by the Consultant.

10. Before backfilling, obtain approval. Remove all shoring during backfilling.

11. Backfill trenches outside buildings up to a compacted level of 600 mm above the conduit with individual layers of material up to 150 mm (6") thick, machine compacted to a density of 98% Standard Proctor, using sand or granular "A" gravel (refer to 16005.10.7 and detail #SKE-4 on the drawing).

12. Make good existing paving, curbs, lawns and other work where damaged by excavation and filling work of this Division. Repair any subsequent settlement of fill placed under this and pay all costs in replacement of other work damaged by such settlement and restoration.

11.0 Support for Underground Services

1. Provide suitable solid support to comply with requirements of authorities having jurisdiction, where solid, undisturbed earth stratum is not available for support of underground services. Minimum requirements where services pass through backfill or exterior foundation walls will be 20 mPa concrete fill, full depth to undisturbed earth.

2. Reinforced concrete duct banks will be keyed into sides of foundation walls. Extend and connect reinforcing steel of duct banks to reinforcing steel of foundation wall construction to prevent failure at the junction of the pipe support and wall.

12.0 Conduits, Raceways and Wireways

1. Wire and cable will be installed in conduit (or tubing) as follows:

   a) Rigid and galvanized steel conduit with threaded IPS fittings to be used:
   -Where noted and required by regulations
   -Surface mounted within 1200 mm of floor and where subject to mechanical damage
   -Where embedded in poured-in-place concrete
   -Where installed in concrete which is in contact with earth or grade

2. Electrical metallic tubing (EMT) may be used concealed in place of rigid conduit in dry locations subject to governing regulations.

3. Use flexible metallic conduit for connections to chain suspended and recessed fixture drops, motors, transformers and similar equipment to prevent transmission of vibration. A code-gauge green grounding conductor will be provided for all connections. Use "Sealtite" conduit with Hubbell-Kellum Sealtite conduit strain relief grips for all such connections at motors.

4. Conduit installed below grade and below concrete grade slabs will be rigid heavywall PVC type, with solvent weld joints and Electrical Safety Authority approved for use above grade. (CSA SPEC C22.2-No. 211.2). Rigid TYPE 2 PVC underground conduit, EBII, DBII and poly pipe are not acceptable.

5. Provide a separate code gauge supplementary green insulated, grounding conductor run in each conduit or duct, terminating a ground block at panelboards.

6. Fasten every conduit to structural members by means of approved conduit clamps or clips. Wire lashing is not acceptable.

7. Where conduit is installed in concrete slabs, obtain general approval, prior to commencing the work, on both maximum dimension and cross-over points, which may be used therein. Comply with requirements of CSA Standard No.A23.3 paragraph 5.17.

8. Install conduits in such a manner as to conserve head-room and interfere as little as possible with free use of space through which they pass. Obtain approval for routing of the same. Keep conduits at least 150 mm (6") clear of heating pipes, flues and other high temperature work.

13.0 Wiring and Cable

1. Wire and cable will comprise copper conductors, sized as noted, rated 90 deg. C., 1000 volt minimum and CSA approved for applications.

2. All wire and cable unless noted, will be Type RWU which cable will not be installed at temperatures below 20 deg. F.

3. Use X-Link insulated cables for circuits protected by ground fault circuit interrupters.

4. Include in each conduit, tubing and raceway, a code gauge green stranded supplementary grounding conductor which will be connected to suitable ground bus in equipment.

5. Minimum wire size for power wiring will be #6 AWG gauge unless specified otherwise. Control wiring will be #10 AWG red insulation. Maximum voltage drop between furthest outlet of any circuit, when fully energized, and panel to which it is connected will not exceed three percent.

6. Number of wires indicated for lighting and power, control, communication, and auxiliary systems is intended to show general scheme only. The required number and types of wires will be installed in accordance with equipment manufacturer's diagrams and requirements, and with requirements of the installation, except that specification standards will not be reduced.

7. Solderless connectors nylon-jacketed "Vibration-Proof" screw-on wire connectors "Ideal-Wing Nuts" rated 600 volts will be used for joints in Branch Wiring.

8. Wires or cables in feeders, sub-feeders and branch circuits will be colour-coded in accordance with Ontario Electrical Safety Code. Each end of feeder terminations (e.g. in Switchboard, Panelboards, switches, splitters and the like) Code Phase A-Red, Phase B-Black, Phase C-Blue, Neutral-White.

14.0 Outlet, Junction and Pull Boxes

1. Use suitable electrical boxes for termination and junctions on conduit work. Install pull-boxes where necessary to permit installation of conductors. Support pull-boxes, outlet boxes, panels and other cabinets independently of conduit.

2. Provide each light switch, wall receptacle and other device with an outlet box of suitable dimensions and a faceplate. Outlet boxes will be adapted to their respective locations. Use "Masonry Type" outlet boxes for flush installation in masonry walls as detailed on standard Detail Drawings attached hereto. (Standard sectional boxes, 1004, 1104 and the like, will not be used). Note: Special dimension requirements for 347 volt switches.

3. "Thruwall" and "Utility" type boxes will not be used.

4. Install surface mounted devices, in cast conduit fittings, with threaded hubs and galvanized steel faceplates. For 347 volt switches field modify cast fittings to reject 120 volt switches if factory modification not available.

5. Electrical boxes and panels will be CSA approved, code-gauge sheet metal, galvanized or with suitable protective treatment. Secure covers with screws or bolts.

15.0 Switches

1. Provide fusible and non-fusible switches of one manufacture EEMAC Type "HC" with quick-make, quick-break contacts, horsepower-rated where required to match the motor protected. Provide holders to accept specified fuses. Switches are to include mechanical cover interlocks and line side barriers.

2. Where applicable and available, switches will be CSA "Approved for High Service Factor."

3. Provide safety disconnect switches adjacent to motors and other equipment when required by regulations. Use switches of one manufacture throughout.

4. Acceptable manufacturers are:
   a) Schneider Square D
   b) Siemens
   c) Eaton Cutler-Hammer

16.0 Fuses

1. Fuse holders in fusible equipment generally will be provided with a complete set of proper size Form 1, HRC Nema J or L current limiting fuses, except as noted. Fusible equipment so provided will be adapted to reject CSA Standard C22.2 No. 59 fuses. Fuses will be one manufacture throughout.

2. Fuses for motor circuits will be class J Time Delay, HRC, (e.g.: Ferraz Shawmut Type AJT).

3. Select fuses for motor protection as recommended by the manufacturer.

4. Provide one complete set of spare fuses for each rating and type used, unless otherwise scheduled.

5. Apply Thomas and Betts "Kopr/Shield" conductive anti-seize compound to all fuse ferrules and holders.

6. Acceptable manufacturers are:
   a) Bussmann Limitron
   b) Littelfuse
   c) Ferraz Shawmut

17.0 Devices

1. Wiring devices unless otherwise specified herein, or noted, will be as manufactured by Hubbell, Leviton, or P & S.

2. All devices will be brown specification grade with 301 stainless steel covers unless otherwise noted.

18.0 Panel Boards

1. Provide panelboards as scheduled, which will include the following features:

   a) Flush or surface trim as noted
   b) Self-closing springs
   c) Concealed hinges
   d) Combination catch and lock semi flush tumbler type - all keyed combinations alike
   e) Adjustable self-positioning trims
   f) Sufficient wiring space for specified cables and conduits. Except as noted, panelboard depths will not be less that 4 1/4", for panelboards with feeder conduits up to 2 ips. Depths will be increased accordingly for larger feeders

g) Plain trims not displaying any names or symbols. "Vault" type handles will not be used except in unfinished areas

h) Typed schedules of circuits indicating equipment and area controlled on the backs of panel doors, in a steel trim pocket, covered with transparent non-inflammable plastic

2. "Branch" panelboards will be fixed bolted connection thermal-magnetic, quick-make, quick-break, 40 deg. C., calibrated ULC rated "SWD" switching duty, molded-case circuit breakers branches, except as noted. "Plug-in" breakers are not acceptable. Multi-pole breakers will be common trip type. Circuit breakers in 347/600 volt panelboards will be rated 350 volt single pole and 600 volt for two and three pole.

3. Power and Distribution type panelboards will be fusible Q.M.-Q.B. (quick-make, quick-break) switch type and/or circuit breaker type, as scheduled on the drawings.

4. Fusible switch type panelboards will be complete with suitable fuses as specified under "Fuses".

5. Circuit numbers on drawings do not necessarily correspond to the numbers on the lighting panels. Circuits sharing a common neutral will not be connected to the same main. Panel circuit breakers which are used directly for the switching of lighting fixtures will be grouped in consecutive numbers commencing at breaker number one.

6. Use T&B nylon ty-raps cable ties for panelboard branch wiring.

7. Panelboards of the types scheduled will comprise the following:

TYPE I

Branch panelboard circuit breaker type, 120/208 volt, three phase, 4 wire mains, minimum interrupting rating of 10,000 AMPS. RMS symmetrical.

TYPE II

Branch panelboard circuit breaker type 347/600 volt, 3 phase, 4 wire mains minimum interrupting rating of 14,000A. RMS symmetrical at 600 volts for 3 pole, and 10,000A. RMS symmetrical at 347 volts for single pole circuit breakers.

TYPE III

Power distribution panelboard, circuit breaker type 347/600 volt, 3 phase, 4 wire mains, minimum interrupting rating of 18,000A. RMS symmetrical at 600 volt.

Acceptable manufacturers are:

a) Schneider Square D
b) Siemens
c) Eaton Cutler-Hammer

8. Examine all plans and specifications to determine extent of electrical work in connection with these divisions which is to be done under the work of the Electrical Division.

9. Co-ordinate the exact location and verify characteristics of electrical provisions for the work of the Mechanical Division.

19.0 Dry Type Transformers

1. Dry type transformers will be single or three-phase indoor type, 60 cycle type ANS, natural draft, air-cooled, manufactured in accordance with NEMA Specifications L2, CSA C22.2 No. 47, CSA C9-1966, ASA C57.12 NEMA TRI, and the latest revisions thereof.

2. The transformers will be metal enclosed in ventilated code gauge steel enclosures, finished in ASA No. 61 grey paint and will incorporate a vibration isolation system within the case mounting assembly.

3. Winding of three-phase transformers will be 1.2 kV class, 110 kV B.I.L., high voltage winding delta-connected 600 volt; low voltage winding 208/120 volt wye connected.

4. Primary winding will include four 2½% taps arranged two above and two below the normal voltage.

5. The insulation to be rated Class B-80 C of Class “H” 150 degree C.

6. Single phase transformers will be as for three-phase except the primary winding taps will be three 2½% taps, one above and two below with 240/120 volt secondary winding.

7. Transformers will be as manufactured by:
    a) Hammond
    b) Square D/Sorgel
    c) Rex

END OF SECTION

LIGHTING SYSTEMS AND SCHEDULES

1.0 General

1. Conform to Section 16000-Electrical-General Requirements.

2. Provide electrical floodlights and systems scheduled, complete with LED arrays, drivers and necessary accessories required for their installation and performance.

2.0 Materials

1. Catalogue reference numbers given for individual luminaire types are to be supplied as specified.

2. All components will comply with CSA Spec. C22-2 No. 66 including amendments for outdoor operation where applicable, and will be compatible with fixture and lamp assembly which they serve

3.0 Shop Drawings

1. Conform to the requirements of Section 16000.

2. Prepare and electronically submit shop drawings in a pdf format of equipment required for review (Refer to the General Conditions of the contract). All shop drawings submitted for review must be reviewed and stamped by the electrical contractor prior to the submission. A copy is to be retained by the contractor on the site, to ensure co-ordination of installation requirements.

4.0 Alternates

1. The listing in this specification of any article, material operation or method requires that the contractor will provide each item listed of the quality and subject to the qualifications noted.

2. All materials, apparatus or equipment which are called for on the drawings or in the specifications by trade name or the name of a particular manufacturer, or by catalogue references, are the material, apparatus or equipment which are to be used by the contractor in the preparation of their bid.

3. Names are mentioned in the specifications to furnish a definite basis for the original bid to provide a balanced tender and to more clearly describe the quality in the tender price.

4. Any similar (equal) products may be offered as non-specified alternates, with the cost differential clearly delineated on the tender form. For a particular luminaire to be considered for review, the IESNA formatted performance data for the proposed alternate luminaire, produced in accordance with LM-79-19 testing procedures, will be provided as produced by an independent testing laboratory for each of the luminaires proposed and will be included with the tender submission.

5. The base tendered amount must include the specified products only.

6. The consultant will review the alternates with the tender review prior to the award of the contract. Failure to include the technical data with the tender submission will result in the alternative product not being considered

5.0 Type D Driveway Lighting Assembly

1. A complete lighting assembly consisting of a StressCrete direct buried, precast concrete pole with a Cooper Lighting “Talon Medium” arm mount LED luminaire.

2. The concrete pole will be StressCrete #E300-APO-G-E11c/w140-25/45 pre-stressed “Décor Series” tapered octagonal 30 foot long finished in #E11 Eclipse (black), etched aggregate.

3. Each pole will be supplied with a black cast metal handhole cover with tamper proof screws, a pole top tenon (2.5” O.D. X 4.5” long), a cast-in ground wire and an overall clear acrylic sealer.

4. The overall pole length is to be 30 feet, for a finished 24 foot luminaire mounting height. Refer to detail #SKE-4.

5. The luminaire will be Cooper Lighting “McGraw-Edison Talon Medium” #TLM-EO3-LED-347-T3-BK-MA1017-BK 75 watt, 347 volt, 4000K CCT LED with a #MA1017 round tenon adapter and an 8” long arm.

6. The luminaire will have an IES Type III LED optical distribution, an integral electronic driver, 10kV surge protection and the luminaire housing will be finished in Cooper Lighting standard black polyester powder coat paint to match the pole.

7. The luminaire is to be wired with #10 RWU stranded cables from the pole hand hole.

6.0 Type D1 Driveway Lighting Assembly

1. A complete lighting assembly consisting of a StressCrete direct buried, precast concrete pole with a Cooper Lighting “Talon Medium” arm mount LED luminaire.

2. The concrete pole will be StressCrete #E300-APO-G-2HH-E11c/w140-25/45 pre-stressed “Décor Series” tapered octagonal 30 foot long finished in #E11 Eclipse (black), etched aggregate.

3. Each pole will be supplied with a black cast metal handhole cover with tamper proof screws, a pole top tenon (2.5” O.D. X 4.5” long), a cast-in ground wire and an overall clear acrylic sealer. An additional black metal hand hole cover will be located 22 feet above grade for the installation of a wind sensor.

4. The overall pole length is to be 30 feet, for a finished 24 foot luminaire mounting height. Refer to detail #SKE-4.

5. The luminaire will be Cooper Lighting “McGraw-Edison Talon Medium” #TLM-EO3-LED-347-T3-BK-MA1017-BK 75 watt, 347 volt, 4000K CCT LED with a #MA1017 round tenon adapter and an 8” long arm.

6. The luminaire will have an IES Type III LED optical distribution, an integral electronic driver, 10kV surge protection and the luminaire housing will be finished in Cooper Lighting standard black polyester powder coat paint to match the pole.

7. The luminaire is to be wired with #10 RWU stranded cables from the pole hand hole.

7.0 Type F Feature Lighting Assembly

1. A complete lighting assembly consisting of a poured-in-place concrete base, a painted straight square steel pole and a Signify Lighting Color Kinetics "ReachElite High Output IntelliHue" RGBW LED floodlight.

2. The luminaire will be a Signify Lighting Color Kinetics "ReachElite High Output IntelliHue" #423-000303-05 300 watt, 240 volt, RGBW LED floodlight with a #120-000197-09 40 degree spread lens, a #108-000055-00 50' leader cable and a #120-000197-04 slipfitter mount, an adjustable mounting arm, an integral electronic addressable driver, a die-cast aluminum IP66 rated black powder-coated paint finish housing and a clear tempered glass lens.

3. The base mounted pole will be Spina #SSS-5525-AB-BLK-TP 5" straight square steel, 25 feet long for base plate mounting to a poured-in-place concrete base. The pole will be supplied with a 2-3/8" O.D. x 4" long top tenon, a tamper proof hand hole cover and a tamper proof square standard base cover. Refer to #SKE-6 for the concrete base details.

5. The pole will be finished in black powder coat polyester paint to match the luminaire and will be supplied with four (4) 1" diameter x 36" long hot dipped galvanized anchor bolts and all related hardware as required.

6. The luminaire is to be wired back to the appropriate power/data supply with 3-#8 RWU +GRD in 2" rigid PVC conduit. Install the leader cable from the pole hand hole to the luminaire and cut to length.

7. Allow for the required labour and equipment to precisely night time aim the luminaire in the presence of the Consultant to provide the intended floodlighting of the air supported structure exterior.

8.0 Type F1 Feature Lighting Assembly

1. A complete lighting assembly consisting of a poured-in-place concrete base, a painted straight square steel pole and a Signify Lighting Color Kinetics "ReachElite High Output IntelliHue" RGBW LED floodlight similar to the Type 'F' lighting assembly but with a curved lid junction box located within the concrete base.

2. The base mounted pole will be Spina #SSS-5525-AB-BLK-TP 5" straight square steel, 25 feet long for base plate mounting to a poured-in-place concrete base. The pole will be supplied with a 2-3/8" O.D. x 4" long top tenon, a tamper proof hand hole cover and a tamper proof square standard base cover. The concrete base will be provided with a Carlon #E1212C24 curved lid junction box formed within the concrete base to house the power/data supply. Refer to #SKE-6 for the concrete base details.

3. All other aspects of the Type 'F1' lighting assembly will be identical to the Type 'F' lighting assembly.

9.0 Feature Lighting Components & Services

1. Supply and install five (5) Signify Lighting Color Kinetics "Data Enabler Pro" #106-000004-00 power/data supplies, 16 amp 100-277 VAC output, 100-277 VAC input housed in a cast aluminum IP66 enclosure. One (1) of the power/data supplies are to be mounted in the Fieldhouse Mechanical/Electrical Room adjacent to the controller and one (1) is to be located within the base of each Type 'F1' lighting assembly. Ethernet cables will be supplied and terminated between power/data supplies and the PoE switch.

2. Supply and install a Signify Lighting Color Kinetics "iPlayer 4" #103-000042-21 controller, 500 node, 100-240 VAC housed in an aluminum enclosure and a #120-000084-01 PoE switch. The controller and switch are to be mounted in the Fieldhouse Mechanical/Electrical Room in a Hammond #VPB194UBK vertical mounting wall rack and plugged into a 15 amp 120 volt duplex receptacle supplied from a dedicated circuit breaker in panel 'LP-B'. Provide an Ethernet cable between the controller and switch

3. Provide factory certified commissioning and programming of the entire floodlighting system. Program the new Light System Composer light show authoring software provided with the controller to the parameters provided by the City of Brampton representative.

4. Include for the supply and installation of a one (1) year subscription to Signify Lighting's 'Interact Landmark' Scene Management software to allow for the remote programming and monitoring of the new floodlighting system. The City of Brampton will provide the required LAN connection to the iPlayer 4 controller.

5. Coordinate with the City of Brampton representative to provide their designate(s) with eight (8) hours of on-site training for the new Light System Composer light show authoring software. All training to be provided by a factory trained and authorized representative at City of Brampton offices following substantial completion.

CASSIE CAMPBELL AIR SUPPORTED STRUCTURE
PANEL DP-A

600 Amp 347/600 Volt 3-Phase 4-Wire surface 54 circuit panelboard with bolt-on branch circuit breakers. Siemens Type 'P2' or equal.

Dome Emerg. Ltg.	20A	*	**1**	**2**		20A	Dome Lighting
Dome Lighting	20A		**3**	**4**		20A	Dome Lighting
Dome Lighting	20A		**5**	**6**		20A	Dome Lighting
Dome Lighting	20A		**7**	**8**		20A	Dome Lighting
Dome Lighting	20A		**9**	**10**		20A	Dome Lighting
Dome Lighting	20A		**11**	**12**		20A	Spare
Primary Heat/ Inflation Unit #1	40A	{	**13**	**14**	}	50A	Transfer Switch #1/ Standby/Low Pressure Inflation Unit
			15	**16**			
			17	**18**			
75 kVA Transformer	90A	{	**19**	**20**	}	30A	Transfer Switch #2/ Panel LP-E
			21	**22**			
			23	**24**			
Primary Heat/ Inflation Unit #2	40A	{	**25**	**26**	}	150A	Air Conditioning Recirculation Unit #1
			27	**28**			
			29	**30**			
Air Conditioning Recirculation Unit #2	150A	{	**31**	**32**	}	40A	Spare
			33	**34**			
			35	**36**			
Driveway Lighting	15A		**37**	**38**			
Spare	20A		**39**	**40**			
			41	**42**			
			43	**44**			
			45	**46**			
			47	**48**			
			49	**50**			
			51	**52**			
			53	**54**			

*** CIRCUIT BREAKER LOCK-OFF REQUIRED**

CASSIE CAMPBELL AIR SUPPORTED STRUCTURE
PANEL LP-B

400 Amp 120/208 Volt 3-Phase 4-Wire surface 78 circuit panelboard with bolt-on branch circuit breakers. Siemens Type 'P2' or equal.

Control Power	15A		**1**	**2**		15A	Air Lock O/H Doors
Air Lock Door Operators	15A	*	**3**	**4**	*	15A	Air Lock Lighting
Air Lock Lighting	15A	*	**5**	**6**		15AGFI	J.B. Receptacle
J.B. Receptacle	15AGFI		**7**	**8**		15AGFI	J.B. Receptacle
J.B. Receptacle	15AGFI		**9**	**10**		15AGFI	J.B. Receptacle
J.B. Receptacle	15AGFI		**11**	**12**		15AGFI	J.B. Receptacle
J.B. Receptacle	15AGFI		**13**	**14**		15AGFI	J.B. Receptacle
Spare	15AGFI		**15**	**16**		15AGFI	Spare
Type 'F/F1' Lighting	15A	{	**17**	**18**	}	15A	Type 'F/F1' Lighting
		{	**19**	**20**	}		
Type 'F/F1' Lighting	15A	{	**21**	**22**	}	15A	Type 'F/F1' Lighting
		{	**23**	**24**	}		
Comm. Receptacle	15A		**25**	**26**		15A	Sump Pit
Lighting Controller	15A		**27**	**28**		15A	Sump Pit
Pri. Unit #1 Rec./Ltg.	15A		**25**	**26**		15A	Spare
Pri. Unit #2 Rec./Ltg.	15A		**27**	**28**		15A	Spare
	15A		**29**	**30**		15A	Spare
	15A		**31**	**32**		15A	
	15A		**33**	**34**		15A	
	15A		**35**	**36**		15A	
	20A		**37**	**38**		20A	
	20A		**39**	**40**		20A	
	20A		**41**	**42**		20A	
	20A		**43**	**44**		20A	
	20A		**45**	**46**		20A	
	20A		**47**	**48**		20A	
	20A		**49**	**50**		20A	
	20A		**51**	**52**		20A	
	20A		**53**	**54**		20A	
	20A		**55**	**56**		20A	

Spare	20A		**57**	**58**	20A	Spare
	20A		**59**	**60**	20A	
	15A		**61**	**62**	15A	
	50A	{	**63**	**64**		
			65	**66**		
			67	**68**		
			69	**70**		
			71	**72**		
			73	**74**		
Spare	15A	{	**75**	**76**	} 60A	Generator Enclosure Panel
			77	**78**		

*** CIRCUIT BREAKER LOCK-OFF REQUIRED**

PANEL LP-E

125 Amp 347/600 Volt 3 Phase 4 Wire surface 18 circuit panelboard with bolt-on branch circuit breakers. Siemens Type 'P1' or equal.

Dome Emerg. Ltg.	15A	*	**1**	**2**	*	15A	Dome Emerg. Ltg.
			3	**4**		15A	Spare
			5	**6**			
			7	**8**			
			9	**10**			
			11	**12**			
			13	**14**			
			15	**16**			
			17	**18**			

*** CIRCUIT BREAKER LOCK-OFF REQUIRED**

125 Amp 347/600 Volt 3 Phase 4 Wire surface 18 circuit panelboard with bolt-on branch circuit breakers. Siemens Type 'P1' or equal.

Transfer Switch #2/ Life Safety Panel LP-E	30A	{	**1**	**2**	}	50A	Transfer Switch #1/ Standby/Low Inflation Unit
			3	**4**			
			5	**6**			
			7	**8**			
			9	**10**			
			11	**12**			
			13	**14**			
			15	**16**			
			17	**18**			

CASSIE CAMPBELL AIR SUPPORTED STRUCTURE
Schedule of Lighting Contactors

Designation	**Qty.**	**Contact Rating**	**No. of Poles**	**Type**	**Coil Volt**	**Aux. Conts.**	**Select Switch**
Contactor Enclosure #1 Dome Interior (Circuits DPA-2 to 11)	4	30A 600V	3	EO/EH	120	1 - N/O 1 - N/C	H-O-A
Contactor Enclosure #2 Driveway	1	30A 600V	3	EO/EH	120	1 - N/O 1 - N/C	H-O-A
Contactor Enclosure #3 Dome Emergency (Circuits LPE-1 & 2)	1 **1**	30A 600V **30A 600V**	3 **3**	EO/EH **EO/EH** ***Normally-Closed***	120 **120**	None	None

Lighting Contactors

Provide where shown on the drawings and further detailed in the above schedule all definite use IEC lighting contactors as required. All contactors are to be 600 volt rated, normally-open, electrically operated, electrically held with 120 volt coils and are to be housed in CSA approved EEMAC 1 enclosures with “Hand-Off-Auto” selector switches mounted in the covers unless otherwise noted. Provide a red lamicoid label on the cover of the enclosure to read “CAUTION-TWO SOURCES OF SUPPLY”.

Contactors will be manufactured by:

Schneider Square D Class 8903
Allen-Bradley Bulletin 100C
Siemens Class LCE
S & S CAL7
Eaton Cutler Hammer Type C30CNE

END OF SECTION

PART 2
ARCHITECTURAL

Specifications
For:

CASSIE CAMPBELL COMFORT STATION

Contract No.

1060 Sandalwood Parkway W.
Brampton, ON

(Architectural)
Issued for Tender

November 15, 2024

Pylons Architecture Inc.
20 Rivermede Rd., Unit 101
Concord, ON L4K 3N3
Tel: 289-637-1375
Email: info@pylonsai.ca

ARCHITECTURAL SPECIFICATIONS
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ALTERNATES

1.0 CONTRACTOR'S OPTION

.1 For products specified only by reference standards, select any product meeting standards.

.2 For products specified by naming several products or manufacturers, select any product and manufacturer named.

.3 For products specified by naming one or more products but indicating the option of selecting equivalent products by stating "or equal" after specified product, submit a request for approval of any product not specifically named.

.4 For products specified by naming only one product and manufacturer, there is no option and substitution will not be allowed.

2.0 SUBSTITUTIONS

.1 The project Consultant may consider requests for substitutions providing that requests are submitted in time to allow for adequate review and describe such substitutions in full detail, the type of material, equipment or method and reasons for substitutions. Requests may be made for substitutions as an equal or as an alternate. In the case of an alternate, submit any increase or decrease in price for the substitution.

.2 In making requests for substitution, ensure that:

.1 The proposed product and method have been investigated and it is equal or superior in all respects to that specified.

.2 At least the same guarantee is given for the substitution as for the product and method originally specified.

.3 The installation of the accepted substitution is coordinated into the work and make such changes as may be required for the work to be complete in all respects.

.3 Do not substitute materials, equipment, or methods into the work unless such substitutions have been specifically approved by the Consultant.

.4 Substitutions will not be considered if:

.1 They are indicated or implied on shop drawings or project data without formal request submitted in accordance with these specifications.

.2 Acceptance will require substantial revision of the Contract Documents.

.3 They are not submitted in accordance with these specifications.

END OF SECTION

PART 1 - GENERAL

1.1 General Requirements

.1 Submittals as requested by the Contract Documents, as specified herein, and in accordance with the conditions of the Contract.

.2 In addition to submittals specifically requested by the Contract Documents, submit other submittals as may be reasonably requested by the Consultant, or as are required to coordinate the Work and to provide the Owner with choices available, within the scope of Contract Documents.

.3 Procedures and requirements for Contract closeout submittals shall be in accordance with the following sections:

Contract Closeout	Section 01700
As-Built Records	Section 01720
Maintenance Manuals	Section 01730
Warranties	Section 01780

.4 Contractor's review of submittals:

.1 Review submittals for conformity to Contract Documents before submitting to consultant. Submittals shall bear stamp of Contractor and signature of a responsible official in Contractor's organization indicating in writing that such submittals have been checked and coordinated by Contractor. Contractor's review shall be performed by qualified personnel who have detailed understanding of those elements being reviewed and of the conditions at the Place of the Work proposed for installation.

.2 Check and sign each submittal and make notations considered necessary before submitting to consultant for review. Where submittal is substantially and obviously in conflict with requirements of Contract Documents, reject submittal without submitting to Consultant and request resubmission. Note limited number of reviews of each submittal covered under Consultant's services as specified below.

.3 Contractor shall assume sole responsibility for any conflicts occurring in the Work that result from lack of comparison and coordination of submittals required for the Work.

.4 Submittals that have not been reviewed, checked, and coordinated by Contractor prior to submission to consultant, will be rejected.

.5 Notify Consultant in writing of changes made on submittals from Contract Documents. Consultant's review of submittals shall not relieve Contractor of responsibility for changes made from Contract Documents not covered by Contractor's written notification to consultant.

.6 Consultant’s review of submittals:

.1 Review of submittals by Consultant is for the sole purpose of ascertaining conformance with the general design concepts and the general intent of the Contract Documents. This review shall not mean that Consultant approves the detail design inherent in the submittals, responsibility for which shall remain with the Contractor. Such review shall not relieve the Contractor of responsibility for errors or omissions in the submittals, or responsibility for meeting requirements of Contract Documents. Be responsible for dimensions to be confirmed and correlated at the Place of the Work for information that pertains solely to fabrication processes or to techniques of construction and installation, and for coordination of the Work.

.2 As part of their scope of work, Consultant shall review shop drawings no more than twice. Should three or more reviews be required due to reasons of Contractor omissions causing resubmission requests, then Contractor shall reimburse the Consultant for time

expended in these extra reviews. Time shall be invoiced to the Owner (to be deducted from monies due to the Contractor and paid to Consultant by Owner) at rates recommended by Consultant's professional association and disbursements shall be invoiced at Consultant's cost. The Contractor shall cover directly costs and administration associated with courier services and the like for these extra shop drawing reviews.

.3 Consultant's review and markings on submittals do not authorize changes in the Work or the Contract Time and will be accommodated at no increase in the Contract Price.

.4 Submittals received but not required by the Contract Documents or requested by the Consultant will not be reviewed by the Consultant and will be marked 'NOT REVIEWED' by the Consultant and returned to the Contractor.

.7 Make submittals with reasonable promptness and in an orderly sequence so as to cause no delay in the Work. Be responsible for delays, make up time lost and pay added costs, at no increase in the Contract Price, incurred because of not making submittals in due time to permit proper review by consultant.

.8 Submittals that contain substitutions will be rejected. Substitutions are permitted only on substitution submittals as specified in Section 01230.

.9 Do not proceed with work affected by a submittal, including ordering of Products, until relevant submittal has been reviewed by consultant.

.10 Prepare submittals using SI (metric) units.

.11 Contractor's responsibility for errors and omissions in submittals is not relieved by Consultant's review of submittals.

.12 Contractor's responsibility for deviations in submittal from requirements of Contract Documents is not relieved by Consultant's review of submittal, unless Consultant gives written acceptance of specific deviations.

.13 Make any changes in submittal that Consultant may require, consistent with Contract Documents, and resubmit as directed by consultant.

.14 Notify Consultant, in writing, when resubmitting, of any revisions other than those requested by consultant.

.15 Engineered submittals:

.1 Submittals for items required to be sealed by professional engineer (or as otherwise indicated as engineered), shall be prepared under the direct control and supervision of a qualified professional engineer registered in the Place of the Work, and having minimum of $1,000,000 professional liability insurance.

.2 A certificate of insurance indicating that the professional engineer under whose direct control and supervision the submittal has been prepared has the required professional liability insurance is to be submitted with submittals required to be sealed by professional engineer (or as otherwise indicated as engineered).

.3 Design includes life safety, sizing of supports, anchors, framing, connections, spans, and as additionally required to meet or exceed requirements of applicable codes, standards, regulations, and authorities having jurisdiction.

.4 The engineer responsible for the preparation of engineered submittals shall undertake periodic field review, at locations wherever the work of described by the engineered submittal is in progress, during fabrication and installation of such work, and shall submit a field review report after each visit. Field review reports shall be submitted to the Consultant, to authorities having jurisdiction as required, and in accordance with the building code.

.5 Field reviews shall be at intervals as necessary and appropriate to the progress of the work described by the submittal to allow the engineer to be familiar with the progress and quality of such work and to determine if the work is proceeding in general conformity with the Contract Documents, including reviewed shop drawings and design calculations.

.6 Costs for such field reviews and field review reports are included in the Contract Price.

.16 Keep copies of reviewed submittals at the Place of the Work in a neat, orderly condition. Only submittals that have been reviewed by the Consultant and are marked with Consultant's review stamp, as applicable, are permitted at the Place of the Work.

.17 The Work shall conform with reviewed submittals subject to the requirements of this section. Remove and replace materials or assemblies not matching reviewed submittals at no increase in the Contract Time and at no increase in the Contract Price.

1.2 Schedule of Submittals

.1 Before commencement of the Work, submit to the Consultant a detailed schedule of submittals required by the Contract Documents.

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

.3 Consultant will review submittal schedule and advise Contractor if volume and timing of submittals will permit timely review and response. Consultant may require modifications to submittals schedule in order to allow adequate time for review of submittals. Adjust submittals schedule and construction schedule as required to comply with Consultant’s needs.

.4 Make provisions in schedule for at least 10 Working Days for Consultant's review of submittals. When submittals have to be reviewed by one or more of Consultant's subconsultants, add 5 more Working Days for a 15 Working Day review period.

.5 If the Consultant requires resubmission of submittals, allow for an additional 10 Working Days review for each resubmission.

.6 If, at any time, the Contractor submits a large enough number of submittals such that the Consultant cannot process these drawings within 10 Working Days, the Consultant, within 3 Working Days of receipt of such shop drawings, will provide the Contractor with an estimate of the time necessary for processing same. The Contractor shall accommodate such necessary time at no increase to the Contract Time and at no increase in the Contract Price.

.7 The Contractor shall periodically resubmit the submittal schedule to correspond to changes in the construction schedule. Such resubmissions shall maintain the minimum 10 Working Days period for the Consultant's review.

.8 Schedule submissions of submittals well in advance of scheduled dates for installation, to provide lead time for reviews and possible resubmissions and for placing orders and securing delivery so as to avoid delays in the Work

1.3 Submission Procedures

.1 Coordinate each submittal with requirements of the Work and Contract Documents. Individual submittals will not be reviewed until related information is available.

.2 Distribute copies of submittals to parties whose work is affected by submittals except Consultant and Owner before final submission for review by Consultant.

.3 Accompany submittals with transmittal letter, in duplicate, containing:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Identification and quantity of each submittal.

.5 Other pertinent data.

.4 Each submittal shall be identified numerically by relevant specification section number with a numeric indicator for multiple submittals by that section followed by revisions number, for example 04080-01-R0.

.5 After Consultant's review, distribute copies to affected parties.

1.4 Schedules

.1 Schedules required in addition to the schedule of submittals specified above:

.1 Construction schedule.

.2 Product delivery schedule.

.3 Inspection and testing schedule.

.2 Format:

.1 Prepare schedules in the form of a PERT or GANTT or Microsoft Project chart method.

.2 Include a separate bar for each trade or operation.

.3 Include horizontal time scale identifying the first Working Day of each week.

.4 Format for listings: The chronological order of the start of each item or part of the Work.

.5 Identification of listings: By systems description.

.3 Construction schedule:

.1 Include the complete sequence of construction activities, including provision for climate and weather.

.2 Include the dates for the commencement and completion of each major element of the Work parallel to the sections of the specifications.

.3 Show projected percentage of completion for each item as of the first Working Day of each week.

.4 Submit a draft schedule for review, and incorporate responses to comments identified by Consultant and/or Owner.

.5 Show dates for the commencement and completion of inspection and testing

.6 At each date of submission of schedule, indicate progress of each activity.

.1 Show changes occurring since previous submission of the construction schedule:

.1 Major changes in scope.

.2 Activities modified since previous submission.

.3 Revised projections of progress and completion.

.4 Other identifiable changes.

.2 Include a narrative report to define:

.1 Problem areas, anticipated delays, and the impact on the schedule.

.2 Corrective action recommended and its impact on the schedule.

.7 Submit revised construction schedules with each application for payment.

.4 Product delivery schedule:

.1 Include dates for delivery of Products, equipment, finish items, factory-finished manufactured items. Show last dates for order, shipment, and delivery in order to meet construction schedule.

.5 Inspection and testing schedule:

.1 Prepare schedule for inspection and testing by advance discussion with the selected inspection and testing company to determine the time required for the inspection and testing company to perform its tests and to issue each of its findings, and allow for required time in the construction schedule.

.2 Refer to Section 01400 for additional requirements for inspection and testing scheduling.

1.5 Shop Drawings and Product Data Sheets

.1 Submit shop drawings and Product data sheets on 3 prints.

.2 Submit Product data sheets for requirements requested in the Contract Documents and as the Consultant may reasonably request where shop drawings will not be prepared due to a standardized manufacture of a Product. Manufacturers' catalogue cuts will be acceptable in such cases, providing that they are 213 mm x 275 mm (8-1/2" x 11") originals, and that they indicate choices including sizes, colours, model numbers, options and other pertinent data. Submissions showing only general information are not acceptable.

.3 Lettering on shop drawings shall be not less than 3mm (1/8") high.

.4 Where requirements of Contract Documents are more stringent than design proposed on shop drawings, the requirements of the Contract Documents take priority.

.5 Consultant markings and resulting action required:

.1 Shop drawings requiring no changes will be marked 'REVIEWED', and shall be submitted for as-built drawings purposes.

.2 Shop drawings requiring several changes will be marked 'REVIEWED as NOTED' and shall be revised and submitted for as-built drawings purposes.

.3 Shop drawings requiring substantial changes will be marked 'REVISE AND RE-SUBMIT' and shall be revised and resubmitted until Consultant stamps drawings with 'REVIEWED' or 'REVIEWED as NOTED'.

.6 Shop drawing size shall be multiple of 213mm (8-1/2") and 275mm (11") excluding 38mm (1-1/2") binding margin and not larger than 838 x 1117mm(33" x 44"). Leave minimum 150x100mm (6" x 4") clear space for Consultant's comments.

.7 Upon completion of review by Consultant, (1) marked set prints will be returned to Contractor for reproduction and distribution.

.8 Retain (1) complete set of prints of reviewed shop drawings for issuance to Owner immediately prior to Substantial Performance of the Work, in an acceptable, bound manner and in accordance with Section 01700.

.9 Submit copies of reviewed shop drawings to authorities having jurisdiction as required.

.10 Shop drawings shall show:

.1 Fabrication and erection dimensions;

.2 Plans, sections, elevations, arrangements and sufficient full-size details which indicate complete construction, components, methods of assembly as well as interconnections with other parts of the Work;

.3 Design calculations prepared by professional engineer, as required, substantiating sizes for members and connections based on design loads;

.4 Clear definition of the division of responsibilities between related Subcontractors and items shown on shop drawings, and with cross references to the Contract Documents;

.5 Location and type of exposed anchors, attachments and locations and types of fasteners, including concealed reinforcements to accept mounted fasteners;

.6 Adhesives, joinery methods and bonding agents;

.7 Kinds and grades of materials, their characteristics relative to their purpose, detailed description of finishes and other fabrication information;

.8 Configurations, types and sizes required; identify each unit type on drawing and on Product;

.9 Descriptive names of equipment and mechanical and electrical characteristics when applicable;

.10 Data verifying that superimposed loads will not affect function, appearance and safety or work shown on shop drawings, as well as other interconnected work;

.11 Assumed design loadings, dimensions of elements and material specifications for load-bearing members;

.12 Proposed chases, sleeves, cuts and holes in structural members;

.13 Wall thicknesses of extrusions, shapes and dimensions.

.14 Location and types of welds. For structural welds use AWS symbols and clearly show net weld lengths and sizes.

.15 Materials, gauges, and sizes being supplied including connections, attachments, reinforcement, anchorage and locations of exposed fastenings.

.16 Installation instructions and details for Products to be installed by separate Subcontractors, including function of each part.

.17 A list of Products covered by, or included on, the shop drawing. List of Products shall be complete and show manufacturer's name, Product name, generic description, standard certification where specified, manufacturer's complete installation data and precautions against wrong installation, operation and maintenance.

.18 Refer to individual sections of the specifications for more particular requirements for shop drawings.

.11 Compatibility statement: include with each shop drawing a statement that each Product and material indicated on the shop drawing is compatible with each other Product and material with which it comes into contact, including sealants and adhesives. Compatibility statement to be co-signed by each Product and material manufacturer whose Product or material is affected.

1.6 Samples

.1 Deliver 3 samples to Consultant's office with expenses, including carrying costs, prepaid, unless

otherwise instructed.

.2 Identify samples or assemblies by Project number and name, name of Consultant, Contractor and Subcontractor, and date of submission. Identify location, specified material reference and any other pertinent information. Show construction by layered method if necessary, clearly displaying textures and patterns.

.3 Resubmit samples until acceptance by Consultant and Owner, as applicable, is achieved.

1.7 Mock-Ups

.1 Provide field or shop erected example of work complete with specified materials and workmanship.

.2 Erect mock-ups at locations as specified and as acceptable to consultant. Do not proceed with work for which mock-ups are required prior to Consultant's review of mock-ups.

.3 Protect and maintain mock-ups until directed to be removed. Commence work demonstrated in mock-up only after review and acceptance of workmanship. If possible, mock-up may become part of finished work, at sole discretion of consultant.

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

.5 Remove and replace materials or assemblies not matching reviewed mock-ups.

1.8 Coordination and Interference Drawings

.1 Prepare and circulate coordination and interference drawings and details for coordination of the Work. As a minimum, prepare coordination and interference drawings and details in connection with location of mechanical, plumbing, fire protection and electrical work in areas of the building where services are exposed including mechanical rooms, public areas, multi-purpose rooms, and control rooms.

.2 Divisions 15 and 16 shall submit interference drawings in uniform scale on clear mylar to allow overlays to be assembled. Upon incorporation of details, drawings shall be submitted jointly to consultant for review. Areas of conflict or interference shall be resolved in a mutually agreed manner between affected parties and resubmitted on said interference drawings until such time as accepted by consultant.

.3 Prepare sleeve drawings for work of Division 15 and 16, showing size and location of penetrations through load bearing elements. Submit sleeving drawings in the form of one transparency and 4 prints to consultant for review not less than 10 Working Days prior to construction of affected work.

.4 Prepare embedded conduit drawings, showing size and location of penetrations through load bearing elements. Submit embedded conduit drawings in the form of one transparency and 4 prints to consultant for review not less than 10 Working Days prior to construction of affected work.

.5 Prepare insert setting drawings for work to be cast into concrete and/or mortared into masonry elements. Submit insert setting drawings in the form of a transparency and 4 prints to Consultant for review not less than 10 Working Days prior to construction of affected work.

.6 Coordinate placement of equipment to ensure that components will be properly accommodated within spaces Provided prior to commencement of Work. In areas where equipment and services are exposed care shall be taken to organize and layout services in an organized and orderly manner. Where possible services are to run parallel or at right angles to one another as required. Consultant may request that service layout be reconfigured to suit sightline concerns during the coordination drawings review phase. These drawing changes are to be executed at no additional cost to the Owner.

.7 Take complete responsibility for remedial work that results from failure to coordinate the Work prior to fabrication and installation.

.8 Ensure that accesses and clearance required by jurisdictional authorities and/or for easy maintenance of equipment are Provided in layout of equipment and services.

.9 Prepare and circulate coordination, interference and sleeving drawings prior to placing orders for equipment and materials.

.10 Coordination and interference drawings shall be circulated for mark-ups by Subcontractors responsible for work of Divisions 3, 5, 9, 14, 15, and 16.

.11 Coordinate preparation and submission of coordination and interference drawings with shop drawings.

.12 Show cross sections in key areas, as required, and as defined by consultant. Show re-bar, structural elements, piping, air handling and heating systems distribution, sprinkler system distribution, lighting, gypsum board wall and ceiling assemblies, acoustical isolation, Products and systems involving life safety, conveying systems, electrical distribution.

.13 Show ductwork as 2 lines. Show cross sections in key areas, as required, and as directed by the consultant. Show re-bar, structural elements, air handling and heating systems distribution, gypsum board wall and ceiling assemblies, acoustical isolation, Products and systems involving life safety, conveying systems, and electrical distribution.

.14 Coordination and interference drawings shall be produced in uniform scale on clear mylar to allow overlays to be assembled. Upon incorporation of details, drawings shall be submitted to consultant for review. Areas of conflict or interference shall be resolved in a mutually agreed manner between Subcontractors and resubmitted on coordination and interference drawings until accepted by consultant.

1.9 List of Subcontractors and Subcontractor Qualification Statements

.1 Submit complete list of Subcontractors and Suppliers as required to complete the Work, for review by consultant, immediately after award of Contract.

.2 Submit completed CCDC 11 Contractor's Qualification Statement for Subcontractors and Suppliers, where qualifications are requested by consultant, including but not limited to mechanical work, electrical work, building envelope work, and building finish work.

END OF SECTION

GENERAL REQUIREMENTS FOR BUILDING ENVELOPE

1.1 General

.1 The contractor is fully responsible for continuous examination and inspection of work related to the exterior building envelope assemblies to ensure compliance with Contract Documents.

.2 Materials and workmanship shall be subject to inspection and testing. Cooperate in permitting access for inspection and testing to places where Work is being done or stock is being stored.

.3 Owner's quality control inspection and testing is specified in Contract Documents and will be paid in accordance with Section 01400. Pay for inspections and retesting to verify acceptability of corrected work.

.4 Allow sufficient time for testing, evaluation, alterations and retesting so as not to affect the construction schedule.

.5 Consultant may require testing of connections and special prefabricated inserts, as part of the work of this section.

.6 This section shall apply to those parts of the Contract Documents pertaining to the building envelope.

1.2 Building Envelope Performance Requirements

.1 General requirements for building envelope include parts of Work related to the following:

.1 Control of condensation in and on, and transfer of heat, air and moisture through building elements and interfaces between building elements that separate

.1 Interior space from exterior space.

.2 Interior space from ground.

.3 Environmentally dissimilar interior spaces.

.2 Conditions at the Place of the Work that may affect moisture loading on building elements that separate interior space from exterior space, and interior space from the ground.

.2 Provide building envelope in compliance with building code, other regulations and requirements of authorities having jurisdiction, with the most stringent requirements to govern.

.3 Building envelope components to withstand own dead load, snow, ice and wind loads and combination thereof, as calculated in accordance with OBC, to allowable deflection, using 1 in 30 year return.

.4 Take into account tolerance limitations of structure, creep, deflection and other movements of structure, both during Work and in service.

.5 Allow for expansion and contraction of components caused by ambient, temperature range and surface temperature variation of components, and structural movements, without causing distortion, failure of fastening, joints and/or air barrier seals, undue stress or other defects detrimental to appearance and/or performance.

.6 Accommodate, by means of expansion and contraction provisions, any movements in building assemblies themselves and between assemblies and building structure, caused by structural movements, both deflection and racking; and/or thermal expansion and contraction, without distortion, damage, misalignment of joints, breakage of air barriers, water and air penetration through assembly, or glass breakage.

.7 Method of attachment to structure shall take into account conditions at the Place of the Work such that there shall be no possibility of site and air vibrations or normal temperature movements of building to loosen, weaken and/or fracture connection between building envelope assembly components and structure or between the components themselves.

.8 Reinforce building envelope assembly components, as required, so that members can safely sustain design loads.

.9 Assemble and secure assemblies in manner that will keep stresses on sealants within sealant manufacturers' recommended maximum.

.10 Comply with requirements specified in building code, with most stringent requirements to govern, and as specified herein, including the following principles:

.1 Drain to exterior face of wall or window assembly, any water entering at joints and any condensation occurring within building envelope assembly.

.2 Fabricate and install assembly to minimize specified materials' ability to transmit moisture through capillary action

.3 Fabricate and install assembly to be watertight to interior under interior and exterior design conditions in combination with movements occurring due to loads imposed.

.11 The requirements for an air barrier are intended to be provided at same plane in the building envelope design unless otherwise indicated or specified. In such cases, Contract Documents refer to "air barrier". The definition of air barrier for purpose of these Contract Documents is "a continuous system including joints of materials between components and to adjacent construction which prevents or retards passage of air".

.12 Sealants used for various building envelope assemblies shall be selected from those specified in respective assembly section and shall be coordinated with sealant being provided under other building envelope sections of specifications. Preferably, one sealant of same manufacturer shall be used throughout. If different sealants are selected from those specified, it is the responsibility of Contractor to ensure compatibility between selected sealant, substrates, and sealants of other sections of specifications that come in contact with selected sealant.

.13 Provide sealant joints with strict regard for sizing of joint and parallel orientation of contact surfaces. Ensure support for both sealant and backer rod.

.14 Provide building envelope assemblies and components with sufficient isolation to prevent galvanic or corrosive reactions of discoloration. Ensure separation of dissimilar metals with neoprene or other suitable material at points of contact.

.15 Provide completed installations free from vibrations, wind whistles, and noise due to thermal and structural movement and wind pressure.

.16 The Work incorporates design principles of positive air and vapour leakage control at building enclosure line. Air barrier extends to encompass the entire building envelope.

.17 In order to maintain continuity of the building envelope, the interfacing of various building elements requires close coordination of exterior building materials. Positive mechanical connections and seal of transition medium extending from primary wall air barriers to insulation line of glazing and door frames, or from primary roof air barrier to insulation line of glazing frames shall be made with proper construction sequencing established by Contractor to ensure such interfacing. Provide written request for consultant review of air barrier transition installation prior to concealing with subsequent covering construction.

1.3 Air Leakage and Water Penetration Performance Requirements

.1 Air leakage: Air infiltration and exfiltration through completed cladding system shall not exceed 0.1 L/s/m (0.02 cfm/ft) at 300 Pa (6.24 psf) pressure difference. This rate and criteria apply to building envelope systems, including interfaces between adjacent assemblies.

.2 Water penetration: Water penetration testing shall occur at a pressure difference of 300 Pa pressure difference. Water penetration shall not occur to the interior face of assembly. There shall be no infiltration through assembly into an adjacent system. There shall be no water

trapped in the assembly after pressure has been released.

1.4 Thermographic Inspection, Air Leakage Tests

.1 On completion of building envelope installations, thermographic inspection and air leakage testing may be done to evaluate continuity of installed work.

.2 Testing, if required, will be done by an independent testing and inspection company in accordance with Section 01400 – Quality Control.

END OF SECTION

EXCAVATING, TRENCHING & BACKFILLING

PART 1 - GENERAL

1.1 Scope

This Section includes all labour, material and equipment to complete excavation, trenching, and backfilling for building areas, buried pipes and drain-lines. Also included is removal and disposal of excavated and surplus materials which cannot be used for backfilling.

1.2 Related Work Specified Elsewhere

Cast-In-Place Concrete	Section 03300

1.3 Work Included

.1 Clearing and grubbing of site area.

.2 Excavation for footings, foundation walls, spoils from caisson drilling operations and basement and other floor slabs.

.3 Design, installation permanent shoring, and installation and removal of temporary shoring and bracing.

.4 Supply, backfill and compaction of fill materials, as specified.

.5 Excavation of unsuitable materials under excavated areas: all organic or deleterious material as determined by the Geotechnical Consultant. Such materials include topsoil, weak and compressible materials under excavated areas, and frost-susceptible materials under excavated areas.

.6 Pumping and drainage to keep excavated areas free from water until concrete is poured.

.7 Rough-grading site and backfilled areas to levels, profiles and contours, allowing for surface treatments as indicated on drawings.

.8 Removal from site of excess excavated material, excavated material unsuitable for backfill, and unused topsoil.

.9 Excavation, bedding and backfill for Mechanical and Electrical underground services shall be by Division 15 Mechanical and 16 Electrical, respectively – to these Specification standards (Section 02220), as a minimum.

1.4 Experience

.1 Work shall be performed by a firm who has adequate plant, equipment, and skilled workers to execute work expeditiously, and is known to have been responsible for satisfactory installations similar to that specified during the immediate past five (5) years.

1.5 **Regulatory Requirements**

.1 Generally, comply with all Provincial, local, and other applicable laws, by-laws, codes, fire regulations, health and safety regulations.

.2 Apply, prepare any necessary drawings and documentation, obtain, and pay for all permits required for this work. Give required notices to relevant authorities.

.3 Give adequate notice to Utility and Service Authorities controlling services and appurtenances, which will be affected by work of this Section.

1.6 **References**

.1 Where there are in existence CGSB, CSA or ASTM Standards applicable to this work, the recommendations and requirements of such Standards shall be considered a minimum for the work described and must be complied with.

.2 Nothing in Clause 1.6 shall relieve the Contractor of the responsibility of providing a higher standard than the relevant Code or Standard, in order to comply with this Specification.

.3 Comply with:

1. Ontario Provincial Standard Drawings (OPSD) and Specifications (OPSS).

2. ASTM D698-91 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600kN-m/m n).

3. CAN/CGSB-148.1 Methods of Testing Goetextiles and Geomembranes.

4. ASTM D4491-89 Test Methods for Water Permeability of Goetextiles by Permitivity.

.4 Comply with Ontario Ministry of Labour's safety requirements and safety standards, as well as all requirements prescribed by the Occupational Health and Safety Act (OHSA).

1.7 **Inspection and Testing**

.1 Inform Consultant at least 4 weeks prior to commencing work, of proposed source of any imported fill material and provide access for sampling.

.2 Owner will employ an approved Inspection and Testing company to test proposed fill materials and inspect, test and approve bearing capacity of soil and compaction of fill. Cost of inspection and testing shall be borne by Owner, but not including any costs of inspection and retesting for unacceptable material or compaction, which will be borne by this Section.

.3 Cooperate with Inspection and Testing company and give adequate notice of any changes in sources of supply, changes in work shifts and other proposed changes.

1.8 **Soil Conditions**

.1 Refer to the Geotechnical Report prepared for this Project by Geotechnical Consultant. Copies of the Reports and supplement letters can be obtained from the Consultant.

.2 The Geotechnical Report is furnished in good faith for the information of the Contractor, but the possibility of deviation from reported conditions must be recognized. It is not represented as a complete description of site conditions, but only as to what was found in borings at indicated locations. The Owner, Consultant and Structural Engineer assume no responsibility for any interpretation or deduction that the Contractor may make from the data. The Contactor shall establish the nature of observable conditions to his own satisfaction and has the right to obtain additional information, if necessary, in his judgment.

.3 Note that unexpected obstructions may be encountered during excavation. Have all the equipment required for removal of obstructions readily available for the duration of the excavation operations. Delay of the Project, resulting from not having the required equipment readily available, or from breakdown of the equipment, will be at the cost of the Contractor. Repair and replacement costs for damaged equipment shall not be considered extras. The time required to remove obstructions cannot be claimed to extend the overall Construction Schedule.

.4 Notify the Consultant, in accordance with the requirements of the Contract, if during the execution of the work, subsurface conditions are found to differ materially form those indicated in the Contract Documents or Geotechnical Report.

.5 Extras will not be paid because of other conditions within the control of the Trade Contractor.

1.9 **Site Conditions**

.1 Visit the site and be satisfied that the work can be carried out in accordance with Contract Documents.

.2 Determine any potential interference with existing services and protect from disruption and damage.

.3 Take all necessary health and safety measures required by site conditions and such situations as may present themselves, including, but not limited to, all health and safety requirements of authorities having jurisdiction.

1.10 **Protection of Existing Features**

1. Protect, maintain, cap or re-route existing buried utilities and structures, as well as surface structures in strict accordance with all health, safety and other applicable regulations of authorities having jurisdiction.

2. Size, depth and location of existing utilities and structures, above and below ground, as indicated on the drawings are for guidance only. Completeness and accuracy are not guaranteed.

3. Prior to commencing excavation work, notify Owner or authorities having jurisdiction, establish location and state of use of buried utilities and structures. Owners or authorities having jurisdiction to clearly mark such locations to prevent disturbance during work.

4. Where utility lines or structures exist in areas to be excavated, costs of removals are to be paid by the Contractor unless otherwise noted on the drawings.

5. Confirm locations of buried utilities by careful test excavations. Make allowances for utility's forces and other contractors that may be working in the area.

6. Promptly notify Consultant if uncharted services are uncovered during excavation.

7. Maintain and protect from damage, water, sewer, gas, electric, telephone, TTC and other utilities and structures encountered.

8. Record location of maintained, re-routed and abandoned underground lines.

9. In general, prevent dust, debris, or slurry from entering or blocking surface drainage systems, or Mechanical, Electrical and Communications systems.

.2 Protect existing buildings, subsurface and surface features from damage while work is in progress.

1. In addition to Condition Survey conducted by the Owner, the Contractor shall inform himself of the state of existing buildings, trees, plants, lawns, fencing, service poles, wires, pavements, survey benchmarks and monuments which may be affected by work of this Section.

2. Protect all adjacent utilities from the effects of Construction and weather throughout the work.

3. At first sign of cracks or damage, cease excavation operations, notify Consultant, assess the situation, and propose damage control, as well as alternate means and procedures for excavation.

4. Immediately repair damage to approval of consultant, and at no additional cost to the Owner.

.3 Monitoring of existing construction

1. The Owner will retain an Inspection Agency to carry out a Condition survey of the adjacent building prior to start of construction and to monitor the existing building during construction.

2. The Condition Survey will be limited to those portions of the building close to the new construction. A copy of the condition survey will be made available to the Trade Contractor.

3. The Inspection Agency will monitor the existing building on a continuous basis during excavation, shoring and installation of caissons, and on a weekly basis during the construction grade.

4. After that, the monitoring will be at the discretion of the Inspection Agency, with a final inspection on completion of the Work.

5. The Inspection Agency will notify the Owner, Consultant and Trade Contractor as soon as possible of any observations or information that may indicate movement or damage to the building since the Condition Survey was done.

PART 2 – PRODUCTS

2.1 Materials

.1 Granular materials to conform to OPSS 1010. For Fill Types and fill depths and locations, consult Structural and Architectural Drawings.

.2 General fill shall be selected material from excavation or other sources, approved by the Geotechnical Consultant for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, organic matter, refuse or other deleterious materials.

.3 Unshrinkable fill to OPSS 1359, weak mixture of Portland Cement, concrete aggregates, and water, resistant to settlement after placing and capable of being readily excavated. Heat all concrete fill and deliver at a temperature between 15° C and 27° C, whenever outdoor temperature is less than 5° C.

.4 Geotextiles: woven or non-woven synthetic fibre fabric to Consultant's approval, as required to prevent dust and debris from entering drains and to stabilize sloping surfaces – by Terrafix Geosynthetics Inc. or approved equal.

.5 Perforated (HDPD Tubing) 150 mm weeping tiles complete with fabric filter and accessories as required. Refer to architectural and mechanical drawings for locations.

PART 3 – EXECUTION

3.1 Preparation

.1 Provide four (4) independent and suitably located concrete benchmarks for elevation control and grid line reference. Benchmarks may be part of existing structures.

.2 Provide detailed line and grade staking for earthwork.

.3 Remove obstructions, ice, and snow, from surfaces to be excavated within limits indicated.

.4 Cut pavement or sidewalk neatly along limits of proposed excavation.

.5 Stockpile fill materials in areas designated by Consultant. Stockpile granular fill materials in manner to prevent segregation of particle sizes. Protect all fill materials from contamination.

.6 Do not obstruct flow of surface drainage.

.7 Dispose of surplus and unsuitable excavated material off site.

.8 Do not load vehicles employed in cartage of materials beyond capacity, nor in such a manner as to cause spillage. Promptly remove spillage and tire tracks from public property.

.9 No vehicle traffic will be permitted directly on geotextile.

.10 Contractor shall assume complete responsibility maintaining right-of-way and safety of pedestrians and other vehicular traffic at exit from site.

3.2 **Shoring, Bracing and Underpinning**

.1 Coordinate excavation with shoring and caisson work.

3.3 **Pumping, Drainage, Dewatering**

.1 Dewatering, if required, shall be carried out.

.2 In general, keep excavations free of water while work is in progress and until concrete is poured. Pump out and remove any free water, and do not allow water to accumulate.

.3 Protect open excavations against flooding and damage due to surface run-off.

.4 Dispose of water in a manner not detrimental to public and private property, or any portion of work completed or under construction. Make good damage to the satisfaction of consultant and at no additional costs to the Owner.

.5 Coordinate excavation work with dewatering operations.

3.4 **Excavation**

.1 Excavate to lines, grades, elevations, and dimensions as required or as indicated.

.2 Remove concrete, masonry, paving, walks, demolished foundations and rubble and other obstructions encountered during excavation.

.3 Unless otherwise indicated, excavation must not interfere with normal 45° downward splay of bearing from bottom of any footing.

.4 Reduce grade to top of shoring and provide level working surface suitable for shoring equipment.

.5 Excavate in stages, to suit shoring work.

.6 Excavate to neat faces for lagging and at caisson work.

.7 Do not use mechanical excavation equipment or percussion tools, such as jackhammers, in such a manner as to present danger to structural or other building features which are to remain. If necessary, use hand tools only within one meter of existing walls to remain.

.8 Unless otherwise indicated, do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots is permitted, excavate by hand, and cut roots with sharp axe or saw.

.9 For trench excavation, unless otherwise authorized by the Consultant in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

.10 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter. Hand trim bottom and sides of excavations and remove loose material and debris.

.11 Notify and obtain approval from consultant and authorities having jurisdiction when bottom of excavation is reached, and before placing concrete or granular material.

.12 Remove unsuitable material from trench bottom to extent and depth as directly by consultant.

.13 Do no place concrete on frozen surface. Protect surfaces and bottom of excavations to prevent freezing by the use of suitable insulation materials.

.14 If ground is frozen when concrete is about to be placed, defrost or extend new construction down to new approved foundation level, at no additional cost to Owner. Frozen ground shall not delay overall progress of work.

.15 Should soil depth shown prove to be unsatisfactory, in Consultant's opinion, for the placing of structural work (except for reasons specified in Art. 3.5.14 above), then upon Consultant's written order, excavate to greater depth until a satisfactory bottom is reached.

.16 Install geotextiles as required, in strict accordance with manufacturer's recommendations and to Consultant's approval.

3.5 **Backfilling and Compaction**

.1 For Fill Type, fill locations, fill depths and required compaction density, consult relevant drawings.

.2 Do not proceed with backfilling operations until Consultants have inspected and approved sub-grade, footings, foundation walls, drainage installations and other affected installations.

.3 Areas to be backfilled to be free from debris, snow, ice, water, and frozen ground.

.4 Do not sue backfill material which is frozen or contains ice, snow, or debris.

.5 Do not backfill at ambient temperatures below 0° C, without Structural Consultant's approval.

.6 Temporary backfilling is not permitted.

.7 Be responsible for any damage to buried services, due to backfilling operations.

.8 Place backfill material in uniform layers not exceeding 150 mm uncompacted depth, up to grades indicated. Compact each layer before placing succeeding layer. Prevent segregation of particle sizes during backfill operations.

.9 Place concrete fill in areas as required. Consolidate and level concrete fill with internal vibrators.

.10 Do not backfill around or over cast-in-place concrete within 24 hours after placing concrete.

.11 Where applicable, place layers simultaneously on both sides of installed walls to equalize loading.

.12 Where walls are to be backfilled on one side only or where temporary unbalanced earth pressures are liable to develop on walls or other structures:

1. Permit concrete to cure for minimum 14 days, or until it has sufficient strength to withstand earth compaction pressure, and approval obtained from Structural Consultant.
   OR
2. If approved by Structural Consultant, erect bracing or shoring for top and bottom of walls and structures, to counteract unbalanced pressures. Bracing and shoring to be left in place until removal is approved by Structural Consultant.

.13 Roll, tamp or otherwise consolidate each layer of backfill to required density. Compact means vibratory equipment, capable of achieving the indicated degree of compaction. Maintain fill within 2% of its optimum moisture content for compaction. If fill is too dry, dampen with water to obtain water content required. If fill is too wet, aerate it. Compact until required density is achieved.

.14 Do not compact material containing frost.

.15 Fill depressions which develop under compaction with matching backfill material. If a base layer becomes rutted or displaced due to any cause, re-grade surface before proceeding with compaction.

.16 Use manually operated vibratory equipment in the proximity of foundations and in areas not accessible to roller equipment.

.17 Promptly report to Structural Consultant any damage to structure, due to compaction operations or settlement of fill. Obtain approval in writing of remedial measures and make good all damage to Structural Consultant's satisfaction, and at no additional cost to Owner.

.18 Make good any damage caused by uncompacted backfill, at no cost to Owner.

.19 In laneways, sidewalk, curbs, and street areas backfill to levels, profiles and contours allowing for construction depths and surface treatments indicated on Drawings.

.20 In paved areas, the sub-grade should be proof rolled by heavy compaction equipment, achieving 98% of Standard Proctor Maximum Dry Density (SPMDD) within the top 1.0 m zone, prior to placement of sub-base material. As part of the sub-grade preparation remove all organic or soft soils and replace with selected fill material compacted to 98% of SPMDD, as directed by the Consultant.

3.6 **Grading**

.1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.

.2 Depths of excavation and sub grade preparation shall be as indicated on the structural and Architectural drawings.

.3 All organic material shall be stripped before placement of fill.

.4 Fill types and degree of compaction shall be as indicated on relevant drawings.

.5 Unless otherwise indicated, slope rough grade away from building 1:50 (2%) minimum.

.6 Prior to placing non-structural fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

3.7 **Restoration**

.1 Upon completion of excavation, backfilling and rough-grading, remove waste materials and debris, trim slopes, and correct defects as directed by Consultant.

.2 Replace topsoil as indicated or as directed by consultant.

.3 Clean and reinstate areas affected by work, as directed by consultant.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

Concrete Floor Finishes Section 03345

1.2 References

.1 American Society for Testing and Materials (ASTM)

- .1 ASTM C260/C260M, Standard Specification for Air-Entraining Admixtures for Concrete.
- .2 ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .3 ASTM C494/C494M, Standard Specification for Chemical Admixtures for Concrete.
- .4 ASTM D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
- .5 ASTM D624, Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
- .6 ASTM D1751, Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 Canadian Standards Association (CSA)

- .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSA A283, Qualification Code for Concrete Testing Laboratories.
- .3 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .4 CSA-A3001, Cementitious Materials for Use in Concrete.

1.3 Submittals

.1 At least 4 weeks prior to commencing work, inform Owner’s Representative of proposed source of aggregates and provide access for sampling.

.2 Submit testing results and reports for review by Owner’s Representative and do not proceed without written approval when deviations from mix design or parameters are found.

.3 Certificates:

- .1 Minimum 4 weeks prior to starting concrete work submit to Owner’s Representative manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:
  - .1 Portland cement.

.2 Blended hydraulic cement.
.3 Supplementary cementing materials.
.4 Grout.
.5 Admixtures.
.6 Aggregates.
.7 Water.
.8 Waterstops.
.9 Waterstop joints.
.10 Joint filler.

.2 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CSA-A23.1/A23.2.

.3 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA-A23.1/A23.2.

1.4 Source Quality Control

.1 Have all concrete produced and delivered by a ready-mix plant that is a member of the Atlantic Provinces Ready Mixed Concrete Association (APRMCA) and holds a current “Certificate of Ready Mixed Concrete Production Facilities” issued by the Association. Submit a copy of this certificate to the Owner’s Representative for approval.

1.5 Quality Assurance

.1 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures in accordance with Section 01 45 00 - Quality Control for Owner’s Representative approval for following items:

.1 Falsework erection.
.2 Hot weather concrete.
.3 Cold weather concrete.
.4 Curing.
.5 Finishes.
.6 Formwork removal.
.7 Joints.

1.6 Delivery, Storage and Handling

.1 Concrete hauling time: maximum allowable time for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.

.1 Modifications to maximum time limit must be agreed to Owner’s Representative and concrete producer as described in CSA A23.1/A23.2.

.2 Deviations to be submitted for review by Owner’s Representative.

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

.3 Waste Management and Disposal:

.1 Divert unused concrete materials from landfill to local facility approved by Owner’s Representative.

.2 Provide an appropriate area on the job site where concrete trucks can be safely washed.

.3 Divert unused admixtures and additive materials (pigments, fibers) from landfill to official hazardous material collections site as approved by the Owner's Representative.

.4 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

.5 Prevent admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal. Dispose of waste in accordance with applicable local, Provincial and National regulations.

1.7 Site Conditions

.1 Placing concrete during rain or weather events that could damage concrete is prohibited.

.2 Protect newly placed concrete from rain or weather events in accordance with CSA A23.1/A23.2.

.3 Cold weather protection:

.1 Maintain protection equipment, in readiness on Site.

.2 Use such equipment when ambient temperature below 5°C, or when temperature may fall below 5°C before concrete cured.

.3 Placing concrete upon or against surface at temperature below 5°C is prohibited.

.4 Hot weather protection:

.1 Protect concrete from direct sunlight when ambient temperature above 27°C.

.2 Prevent forms of getting too hot before concrete placed. Apply accepted methods of cooling not to affect concrete adversely.

.5 Protect from drying.

PART 2 PRODUCTS

2.1 Materials

.1 Portland cement: to CAN/CSA-A3001, Type GU.

.2 Water: to CAN/CSA-A23.1.

.3 Aggregates: to CSA-A23.1/A23.2.

.4 Coarse aggregates to be normal density to CSA-A23.1/A23.2.

.5 Admixtures:

.1 Air entraining admixture: to ASTM C260.

.2 Chemical admixtures: to ASTM C494, Owner's Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.6 Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for the mixture to retain its shape when made into a ball by hand and capable of developing compressive strength of 50 MPa at 28 days.

.7 Ribbed waterstops: extruded PVC of sizes indicated shop welded corner and intersecting pieces.

.1 Tensile strength: to ASTM D412, method A, Die "C".
.2 Elongation: to ASTM D412, method A, Die "C", minimum 275%.
.3 Tear resistance: to ASTM D624, method A, Die "B".

.8 Premoulded joint fillers:

.1 Bituminous impregnated fiber board: to ASTM D1751.

.9 Polyethylene film: minimum 0.25 mm thickness to ASTM C171.

.10 Bonding adhesive: as approved by Owner's Representative.

2.2 Mixes

.1 Proportion normal density concrete in accordance with CSA-A23.1/A23.2, Alternative 1 to give following quality and yield for all concrete.

.1 Cement:
.1 Type GU Portland cement.
.2 Minimum compressive strength at 28 days: for structural design.
.3 Minimum cement content: 300 kg/m^3 of concrete.
.4 Class of exposure: N.
.5 Nominal size of coarse aggregate: 20 mm.
.6 Slump at time and point of discharge: 75 to 100 mm.
.7 Air content: 5 to 8 %.
.8 Chemical admixtures: admixtures in accordance with ASTM C494.

PART 3 EXECUTION

3.1 Preparation

.1 Obtain Owner's Representative approval before placing concrete. Provide two (2) working days notice prior to placing of concrete.

.2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.

.3 During concreting operations:

.1 Development of cold joints not allowed.
.2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

.4 Pumping of concrete is permitted only after approval of equipment and mix.

.5 Ensure reinforcement and inserts are not disturbed during concrete placement.

.6 Prior to placing of concrete obtain Owner's Representative approval of proposed method for protection of concrete during placing and curing in adverse weather.

.7 Protect previous Work from staining.

.8 Clean and remove stains prior to application for concrete finishes.

.9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.10 Do not place load upon new concrete until authorized by Owner's Representative.

3.2 Construction

.1 Do cast-in-place concrete work in accordance with CSA-A23.1/A23.2.

.2 Sleeves and inserts.

.1 No sleeves, ducts, pipes or other openings shall pass through joists, beams, column capitals or columns, except where indicated or approved by Owner's Representative.

.2 Where approved by Owner's Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 100 x 100 mm not indicated, must be approved by Owner's Representative.

.3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Owner's Representative before placing of concrete.

.4 Check locations and sizes of sleeves and openings shown on drawings.

.5 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.

.3 Anchor bolts.

.1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.

.2 With approval of Owner's Representative, grout anchor bolts in preformed holes or holes drilled after concrete has set. Formed holes to be minimum 100 mm diameter. Drilled holes to be manufacturers's recommendations.

.3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.

.4 Set bolts and fill holes with shrinkage compensating grout.

.5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.

.4 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.

.5 Finishing.

.1 Finish concrete in accordance with CSA-A23.1/A23.2.

.2 Use procedures acceptable to Owner's Representative or those noted in CSA-A23.1/A23.2, to remove excess bleed water. Ensure surface is not damaged.

.3 Wet cure using polyethylene sheets placed over sufficiently hardened concrete to prevent damage. Overlap adjacent edges 150 mm and tightly

seal with sand on wood planks. Weigh sheets down to maintain close contact with concrete during the entire curing period.

.4 Where burlap is used for moist curing, place two prewetted layers on concrete surface and keep continuously wet during curing period.

.5 Finish concrete floor to meet requirements of CSA-A23.1/A23.2.

.6 Concrete floor to have finish hardness equal or greater than Mohs hardness in accordance with CSA-A23.1/A23.2.

.7 Provide swirl-trowelled finish for exterior walks, ramps, pads.

.8 Provide float finish for interior floor slabs.

.9 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.

.6 Waterstops.

.1 Install waterstops to provide continuous water seal.

.2 Do not distort or pierce waterstop in such a way as to hamper performance.

.3 Do not displace reinforcement when installing waterstops.

.4 Use equipment to manufacturer's requirements to field splice waterstops.

.5 Tie waterstops rigidly in place.

.6 Use only straight heat-sealed butt joints in field.

.7 Use factory welded corners and intersections unless otherwise approved by Owner’s Representative.

.7 Joint fillers.

.1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Owner’s Representative.

.2 When more than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.

.3 Locate and form, isolation, construction and expansion joints as indicated. Install joint filler.

.4 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.

.8 Dampproof membrane.

.1 Install dampproof membrane under concrete slabs-on-grade inside building.

.2 Lap dampproof membrane minimum 150 mm at joints and seal.

.3 Seal punctures in dampproof membrane before placing concrete. Use patching material at least 150 mm larger than puncture and seal.

3.3 Site Tolerance

.1 Concrete slab tolerances in accordance with CSA-A23.1/A23.2, F-number Method, F_F =25, F_L = 20.

.2 Finish all interior exposed concrete slabs to a tight consistent steel trowel appearance without burnishing the surface.

3.4 Field Quality Control

.1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Owner's Representative in accordance with CSA-A23.1/A23.2, and Section 01 45 00 - Quality Control.

.2 For compressive strength testing of concrete a minimum of four (4) cylinders and three (3) field cured cylinders are required for:

.1 Each day's pour.

.2 Each type of grade of concrete.

.3 Each change of supplier.

.4 Each 50 cubic meters or fraction thereof for footings and foundation walls, requirements of CAN/CSA A 23.1.

.5 Conduct at least one (1) slump and one (1) air entrainment test with each compressive strength test.

.3 Take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

.4 Non-destructive Methods for Testing Concrete shall be in accordance with CSA-A23.1/A23.2.

.5 Provide Certificate of Field Quality Inspection and Testing to Owner's Representative for inclusion in Commissioning Manual.

.6 Inspection or testing by Owner's Representative will not augment or replace Contractor quality control nor relieve the Contractor of his contractual responsibility.

3.5 Defective Work

.1 Repairs and classification of unacceptable concrete to be in accordance with CAN/CSA-A23.1.

.2 Remove defective concrete and embedded debris and repair as directed by Owner's Representative.

.3 Remove to bare concrete curing compounds detrimental to application of specified finishes.

.4 Concrete to be supplied at the minimum strength requirement at 28 days. Tests indicating strengths lower than specified will necessitate further testing as required by the Owner's Representative. Cost for such testing to be at the Contractor's expense. Should further tests confirm low values, the Owner's Representative has the right to require strengthening of the affected area or removal and replacing of the weak concrete all to the Contractor's expense.

.5 Repair all shrinkage cracks in the completed slab-on-grade to remain exposed employing a suitable epoxy injection technique acceptable to Owner's Representative to completely seal all such cracks, all to the Contractor's expense.

END OF SECTION

ARCHITECTURAL SPECIFICATIONS
CONCRETE FLOOR FINISHES

PART 1 – GENERAL

1.1 Scope

.1 Work under this section consists of the furnishing of all labour, materials, equipment, and services necessary for, and incidental to, the complete and proper application of concrete floor finishes and related work as shown on the drawings or specified herein, and in accordance with all applicable requirements of the contract documents.

.2 Verify with Sections applying finishes to slabs to ensure that respective material manufacturer's requirements are met. Notify Consultant prior to start of work should any finish specified herein be considered unsuitable.

1.2 Related Work

Cast-in-Place Concrete	Section 03300

1.3 References

.1 ACI 302 - Recommended Practice for Concrete Floor and Slab Construction.

.2 ASTM C171 - Sheet Materials for Curing Concrete.

.3 CAN/CSA-A23.1/A23.2-94, Concrete Materials and Methods of Concrete Construction

1.4 Submittals

.1 Provide submittals specified and as required to assess conformance with the Contract Documents, in accordance with the General Conditions and Division 01 of the Specifications.

.2 Submit product data to consultant for review.

.3 Provide list of Products proposed for use on project where such products are not specified by trade name or where specification permits choice or alternatives. Include descriptive manufacturer or supplier literature.

.4 Include application instructions for concrete hardener and sealer.

1.5 Quality Assurance

.1 Applicator: Company specializing in commercial floor finishing with three (3) years documented experience, approved by the Consultant. Company must be a member of the Concrete Floor Contractor's Association (CFCA).

.2 Submit references two (2) months before installation.

.3 Workmanship Standards: Unless otherwise specified meet requirements of CSA A23.1-94 and recommendations of Concrete Floor Contractors' Association.

.4 Ensure that concrete supplied for slabs contains no admixtures which would be incompatible with floor finishing materials.

1.6 **Delivery, Storage and Handling**

.1 Deliver Products to site, handle/store and protect same in accordance with the manufacturer's recommendations.

.2 Take delivery of and store packaged materials on site in original undamaged condition with manufacturer's packing, labels, and seals intact.

1.7 **Project/ Site Conditions**

.1 Perform work only when environmental conditions are as specified in Section 03300.

.2 Temporary Lighting: Minimum one 200 W light source, placed 2.5 m above the floor surface, for each 40 sq. m of floor being finished.

.3 Temporary Heat: Ambient temperature of 10 degrees C minimum.

.4 Ventilation: Sufficient to prevent carbon monoxide or high levels of carbon dioxide and other injurious gases from affecting concrete.

.5 Electrical Power: Sufficient to operate equipment normally used.

.6 Work Area: Watertight protection against rain and detrimental weather conditions.

.7 Provide adequate moisture, sunshades and wind barriers to prevent too rapid drying of concrete during hot weather.

PART 2 – PRODUCTS

2.1 **Materials**

.1 Unless specified otherwise, materials shall meet specified requirements of Section 03300.

.2 Curing Sheet: 2 mil polyethylene sheet conforming to CGSB 51-GP-51M or laminated waterproof kraft paper.

.3 Floor Sealer: For use on suspended slabs - U.S.E. Hickson's low odour clear concrete acrylic base sealer type "Stone Mason, Concrete & Paving Stone Sealer".

.4 Slab-on-Grade Sealer: clear penetrating water repellant silane base system - Chem-Trete BSM40 or Sternson's Evniroseal 40.

.5 Joint Sealant: Two component, pourable, self levelling poly-sulphide type with minimum shore durometer hardness of 40 and conforms to CAN/CGSB-19.24-M90.

.6 Cleaner, thinners and accessories: type recommended by sealer manufacturer, to suit each specific condition encountered on this project.

PART 3 – EXECUTION

2.2 **Examination**

.1 Before commencing work, ensure that surfaces are acceptable to receive and maintain concrete finishing, and that specified installation will be achieved.

22 **Finishing**

.1 Provide steel trowel, float and scratched slab finishes where required. Meet workmanship standards and tolerances specified in CSA-A23.1-94. Meet flatness tolerance □Flat□ where steel trowel finish is required.

.2 Finish concrete to CAN3-A23.1M.

.3 Roll or tamp concrete to force coarse aggregate into concrete mix and then screed.

.4 Bring surface to true grade by floating.

.5 Steel trowel to a true and even surface.

.6 Follow with second steel trowelling to produce a smooth burnished surface.

.7 Sprinkling of dry cement or dry cement and sand mixture over concrete surfaces is not acceptable.

.8 Where floor drains occur, floors to be level around walls with a minimum 5 mm / m uniform pitch to drains, unless indicated otherwise.

.9 Cure concrete as specified in CAN/CSA-A23.1/A23.2-94, and by methods specified in concrete floor finishing schedule. Ensure that no curing compound is used which is detrimental to bond of bedding for finish flooring or finish flooring materials.

2.3 **Curing**

.1 Curing shall begin immediately after finishing has been completed.

.2 Unless otherwise specified cure all surfaces by one of the following methods:

.1 Coat surfaces with clear liquid curing or curing and sealing compound in accordance with manufacturer's directions.

.2 Moist cure in accordance with CSA A23.1-94.

.3 Cure exposed concrete slabs by coating with clear liquid curing compound.

.4 Do not use curing compound in locations where curing compound might adversely affect finish flooring installation. Moist cure instead as specified above.

2.4 **Sealing**

.1 Apply test patch to confirm compatibility with substrate.

.2 Apply 2 coats of sealer to concrete slabs scheduled to remain exposed, including hardened surfaces.

.3 Apply sealer in accordance with manufacturer's application directions and generally as follows:

.1 Immediately following completion of final trowelling apply first coat of sealer.

.2 Prior to Substantial Performance thoroughly clean surfaces and allow to dry; apply second coat of sealer; mask control joints prior to application of sealer.

.4 Seal all exposed concrete floors. Apply sealer as recommended by manufacturer. Install bond breaker of silica sand, polyethylene film strip or foam filler in bottom of joints.

2.5 **Control Joints**

.1 Except where control joint inserts are cast into slabs provide sawcuts at slabs on grade to pattern indicated and as follows:

.1 Commence sawing as soon as concrete has hardened sufficiently to prevent excessive ravelling. Ensure that saw does not touch or disturb reinforcing steel. Sawcuts shall not vary more than 200 mm from true joint alignment.

.2 Sawcut 5 mm wide x 25 mm deep joints along centre line of construction joints and at maximum 6 m o.c. in between.

.3 Clean joints after cutting and fill with sealant.

.2 As soon as concrete surface is firm enough not to be torn or damaged by cutting, cut 4.5 mm wide control joints into surface of concrete with abrasive blade power saw.

.3 Locate control joints on centre lines of columns, and at maximum spacing of 6 m in both directions unless noted.

.4 Cut joints in slabs on grade 38 mm deep.

.5 Within four (4) weeks of cutting joints, fill them with joint sealant. Completely clean side joint surfaces of dirt, oil, grease, and similar contaminants. Mask floor surfaces at joints while pouring. Prime side joint surfaces with compatible primer if surfaces are not completely dry.

2.6 **Protection**

.1 Ensure that finished concrete floor areas are protected from abrasion from foot or wheeled traffic, and from damage caused by spillage of oil or other harmful materials.

END OF SECTION

ARCHITECTURAL SPECIFICATIONS
MASONRY PROCEDURES

PART 1 – GENERAL

1.1 Scope

.1 This section includes procedures to be used for all concrete block in sizes and configurations required. Work at this section also includes building in of loose steel angles, anchor bolts, shelf angles and wall plates.

1.2 Related Work Specified Elsewhere

Cast-In-Place Concrete	Section 03300
Mortar and Accessories	Section 04100
Unit Masonry	Section 04200
Metal Fabrication	Section 05500
Air/Vapour Barrier	Section 07196
Thermal Insulation	Section 07210
Joint Sealants	Section 07900

1.3 Product Delivery, Storage and Handling

.1 Deliver materials to job site in original containers with seals and labels intact.

.2 Keep materials dry until use, except where wetting of bricks is specified.

.3 Stack masonry units and store under waterproof cover on pallets or plank platforms held off the ground.

.4 Stained or chipped masonry units and other materials affected by inadequate protection shall be replaced.

1.4 Cold Weather Requirements

.1 Do not use frozen materials.

.2 Do not use calcium chloride or other anti-freeze additive.

.3 Maintain dry beds for masonry and use dry masonry units only. Do not wet masonry units in cold weather.

.4 When air temperature is below 10° C take the following precautions:

- Heat sand and water evenly to between 20° C and 70° C
- After combining ingredients for mortar maintain temperature of mortar between 5° C and 50° C until used.
- Protect mortar from rain and snow.

.5 When air temperature is below minus 4° C, protect and heat the work to maintain temperature at work area above 0° C on both sides of the walls during operations and for 24 hours after.

.6 When air temperature is below minus 18° C no work should be attempted by this section except for emergency work.

.7 When air temperature is above minus 4° C but below 10° C, erect windbreaks to prevent differential freezing of walls.

1.5 **Hot Weather Requirements**

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

1.6 **Protection**

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

.2 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings.

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

PART 2 - PRODUCTS

2.1 **Materials**

.1 Masonry materials are specified in related sections as indicated in 1.2 above.

PART 3 - EXECUTION

3.1 **Workmanship**

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

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

.3 Lay in running bond unless otherwise shown on drawings.

.4 Bevel all bed joints, sloping towards the centre of the wall so that the bed joints will be filled when the masonry is brought into line.

.5 If fins of bed joints protrude into air space leave in place if not projecting more than thickness of the joint. **Do not** in any case, cut off and drop into air space.

.6 Where masonry units are moved or shifted, removed and lay again in fresh mortar.

3.2 **Tolerances**

.1 Deviation in joint thickness: +3 mm (1/8").

3.3 **Exposed Masonry**

.1 Do not use chipped or broken units. If such units are discovered in finished walls, the Architect will require their removal and replacement at no additional cost to the Owner.

.2 In locations where new masonry is to abut existing, carefully cut out units as necessary to fully tooth and continue bond pattern.

.3 Add lampblack or colouring pigments to mortar at new work abutting existing, to make joints identical in colour. Prepare samples to architect's approval.

3.4 **Jointing**

.1 Allow joints to set just enough to remove excess water, then tool with round jointer to provide smooth, compressed, uniformly concave joints where concave joints are indicated.

.2 Strike flush all joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating.

3.5 **Support of Loads**

.1 Use 20 MPa concrete to requirements of Section 03300, where concrete fill is used in lieu of solid units.

.2 Use grout to CSA A179-M1976 where grout is used in lieu of solid units.

.3 Install building paper below voids to be filled with concrete or grout; keep paper 25mm (1") back from faces of units.

3.6 **Provision for Movement**

.1 Leave 12 mm (½") space between surfaces of non-load bearing walls and partitions and structural elements. Do not use wedges. Fill space with suitable compressible material at non-fire rated partition.

3.7 **Loose Steel Lintels**

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

3.8 **Control and Expansion Joints**

.1 Provide continuous pre-formed control and expansion joint filler at intervals not to exceed 8 meters (25 feet) or as indicated on the drawings.

3.9 **Wetting of Bricks**

.1 Except in cold weather, wet clay bricks having an initial rate of absorption exceeding 1g/min/1000 mm2. Wet to uniform degree or saturation, 3 to 24 hours before laying, and do not lay until surface dry.

.2 Wet tops of walls built of bricks qualifying for wetting, when recommencing work on such walls.

3.10 **Build-in, Cutting and Fittings**

.1 Install hollow metal door frames, by building lugs securely into joints and filling voids with mortar. Refer to Section 08110 for number of lugs and locations.

.2 Install items supplied by others to be built into masonry including miscellaneous metal work, bearing plates, sleeves, anchor bolts, access panels, and other similar items.

.3 Do cutting, fitting and making good to receive work of other trades.

END OF SECTION

ARCHITECTURAL SPECIFICATIONS
MORTAR AND ACCESSORIES

PART 1 - GENERAL

1.1 Scope

.1 This Section includes masonry and grout work, flashing, vents, inserts, joint fillers, reinforcing ties, and other items to be incorporated into the work.

1.2 Related Work Specified Elsewhere

Masonry Procedures	Section 04050
Unit Masonry	Section 04200
Joint Sealants	Section 07900

1.3 Reference Standards

.1 Do masonry mortar and grout work in accordance with CSA A179-M 1976.

.2 Do masonry reinforcing and tying in accordance with CSA A371-M 1980.

1.4 Samples

.1 Provide two samples of coloured mortar in accordance with Section 01340. Provide mortar colours to architect for colour selection.

PART 2 - PRODUCTS

2.1 Mortar Materials

.1 Use sand which is sharp, durable, clean and free of contaminants, uniform in colour.

.2 Where 6 mm (¼") joints are indicated, use aggregate which will pass 1.18 mm (1/16") sieve.

.3 Use metal oxide pigments for coloured mortar as manufactured by Northern Pigment Ltd. or approved equal. Two colours to be selected by the Architect.

.4 Use same brands of materials and source of aggregate for the entire project.

2.2 Mortar Mixes

.1 For loadbearing masonry use Type S mortar; 1 part cement, 1/2 part lime, 4 1/2 parts sand; or 1 part cement, 2 parts masonry cement, 9 parts sand; or mixed to suit strength specifications on drawings.

.2 For non-loadbearing use Type N mortar; 1 part cement, 1 part lime, 6 parts sand; or 1 part masonry cement, 3 parts sand or mixed to suit strength specifications on drawings.

.3 For repointing use Type R mortar; 1 part cement, 2 parts lime to 8 parts sand.

.4 Use non-staining masonry cement for cementitious portion of specified mortar type.

.5 For coloured mortar use colouring admixture not exceeding 10% of cement content by mass to match approved sample.

.6 Use mortar within 2 1/2 hours of mixing when air temperature is above 27ºC, use within 3 1/2 hours when air temperature is below 27ºC.

.7 Provide RainBloc for Mortar liquid admixture for all concrete and clay masonry units in wall construction.

2.3 **Grout and Parging**

.1 Use grout which complies with CSA A179-M1976 Table 3.

.2 For parging mortar, use Type S throughout.

2.4 **Masonry Accessories**

- Control Joint Filler shall be: Purpose-made rubber type by Block-Lok Ltd., Dur-O-Wall Ltd., or Debro Products Ltd.
- Weep Hole Vents shall be: Purpose-made PVC plastic type conforming to CSA A93 designed to drain cavities to the exterior and equal to Goodco Brick Vents.
- Nailing Inserts shall be: 0.6 mm (1/32") thick galvanised steel inserts for setting in mortar joints.
- Masonry flashing shall be: Laminated-type 7 kg/m² (15 lb/square yard) copper sheet bonded to two layers of crepe paper bonded together with asphalt and reinforced with glass fibre scrim.
- Provide RainBloc liquid admixture for all mortar according to ASTM 1348 – 'Standard Specifications for Admixtures for Masonry Mortar'. Provide a test prior to full application for consultant's review and confirmation.

2.5 **Masonry Reinforcement**

Unless specified otherwise by the structural consultant:

.1 Horizontal Joint Reinforcement shall be: 4.76 mm (3/16") wire, truss type, hot dipped galvanised after fabrication to CAN3-A370-M84, similar to Wire Blok Truss BL32 by Blok-Lok Ltd. or approved equal.

.2 Dovetail Anchors shall be: hot dipped galvanized with wire tie by Blok-Lok Ltd. or approved equal.

.3 Wall ties shall be provided to this section by Section 09110 for building-in.

PART 3 - EXECUTION

3.1 **Weep Holes**

.1 Install weep holes in accordance with CAN3-A371-M84 in vertical joints immediately over flashings, at door and window heads and other locations where cavity is closed, in exterior wythes of cavity wall and masonry veneer wall construction at maximum horizontal spacing of 600 mm (24") on centre.

.2 Keep cavity clear of mortar droppings as work progresses.

3.2 **Nailing Inserts**

.1 Install nailing inserts in mortar joints at 400 mm (16") o.c. each way for attachment of wall strapping and ply backer boards, where indicated on the drawings.

3.3 **Masonry Flashing**

.1 Install flashings in masonry in accordance with CAN3-A371-M84.

.2 Install flashings under exterior masonry bearing on foundation walls, slabs, shelf angles, and steel lintels over openings. Install flashings under weep hole courses and as indicated.

.3 In veneered walls, carry flashings from the front edge of masonry, under outer wythe, then up backing not less than 150mm (6”). At gypsum board backing, bond flashing to wall using manufacturer’s recommended adhesive.

.4 Lap joints 150 mm (6") and seal with adhesive.

3.4 **Horizontal Joint Reinforcing**

.1 Install horizontal joint reinforcement in each following wythe of masonry elements at vertical intervals of 500 mm (18") maximum, each rod 20 mm (3/4") from outer face and lapped 150 mm (6") at each splice and at corners of walls.

3.5 **Engineered Masonry**

.1 Grout and reinforce engineered masonry in accordance with CAN3-S304-M84 and as indicated.

3.6 **Reinforced Lintels and Bond Beams**

.1 Reinforce masonry lintels and bond beams as indicated. Make joints in lintels and bond beams to match adjacent walls.

.2 Place and grout reinforcing in accordance with CAN3-S304-M84. Use grout conforming to requirements of CSA A179-M1976.

3.7 **Metal Anchors**

.1 Embed metal anchors solidly in mortar or grout to develop maximum resistance to design forces.

.2 Anchor masonry walls to abutting columns beams and joists by adjustable anchors at 400 mm (16") o/c vertically and 800 mm (32") o/c horizontally unless noted otherwise.

3.8 **Control Joints**

.1 Stop reinforcing 25 mm (1") short of each side of control joints unless otherwise indicated.

3.9 **Lateral Support and Anchorage**

.1 Provide lateral support and anchorage in accordance with CAN3-S304-M84 and as indicated.

END OF SECTION

ARCHITECTURAL SPECIFICATIONS

UNIT MASONRY

PART 1 - GENERAL

1.1 Scope

The work of this Section includes supply and installation of all concrete block, in sizes and configurations required as well as installation of precast concrete units.

1.2 Related Work Specified Elsewhere

Mortar and Accessories	Section 04100
Masonry Procedures	Section 04050
Unit Masonry	Section 04200
Air/ Vapour Barrier	Section 07196

PART 2 - PRODUCTS

2.1 Concrete Block

.1 Standard Concrete Masonry Units shall:

- Conform to CSA A165.1-M1977.
- Be of minimum compression strength of 7MPa for hollow block and 12.5 MPa for solid block.
- Be of standard metric sizes and shapes by Primo Argo Block or approved equal.
- Include additional special shapes as indicated or as required including single or double bullnose at all openings and partitions.

2.2 Masonry

.1 Manufactured Stone Cladding – CL-01 shall be similar to:
Artiste 2 – Brampton Brick, size 590 L x 257 H x 90 D, colour: Dover, distributed by Brampton Brick, or approved equal.
Mortar Colour: Light Grey

Refer to Building Elevations for locations.

PART 3 - EXECUTION

3.1 Preparation

.1 Examine work on which work of this section is supported or comes into contact and do not proceed unless surfaces and conditions are acceptable.

.2 Establish lines, levels and coursing and protect from disturbances.

.3 Prepare for building-in of all items whether supplied and installed by others or installed by this section.

3.2 Tolerances

.1 Construct walls as true planes with maximum tolerances of 3 mm (1/8") in 3 metres (10 ft) in any direction.

.2 Variation from plumb shall be 6 mm (¼") in 10 metres (30 ft) or 4 mm (1/8") in 6 metres (20 ft) at corners.

.3 Wall openings shall be 6 mm (¼") maximum from designated opening sizes.

3.3 **Laying Concrete Masonry Units**

.1 Use running bond except where indicated otherwise on the drawings.

.2 Coursing heights for block shall be 200 mm (8") for one block and one joint as indicated.

.3 Tool exposed joints concave or strike joints flush as noted in Section 04050.

.4 At ends of walls and at openings provide rounded edge corner blocks.

3.5 **Cleaning**

.1 Surplus mortar shall be removed immediately from floors, walls, and other locations.

.2 Protect windows, sills, doors, trim and other work.

.3 Remove large particles with wood paddles without damaging surface. Flush off loose mortar and dirt with clean water.

.4 Scrub with solution of 25 ml trisodium phosphate and 25 ml household detergent dissolved in 1 L of clean water using stiff fibre brushes, then clean off immediately with clean water using hoses. Alternatively, use proprietary compound recommended by brick masonry manufacturer in accordance with manufacturer's directions.

.5 Repeat cleaning process as often as necessary to remove mortar and other stains.

.6 If required, use acid solution treatment for difficult to clean masonry as described in Technical Note No. 20 published by Brick Institute of America dated Sept./Oct. 1977.

.7 Test acid cleaning method on mock-up panel at designated area of wall for Architect's approval, followed by waiting period of at least one week, before proceeding with cleaning of all surfaces.

.8 Ensure all masonry work is clean and free of any excess mortar.

END OF SECTION

ARCHITECTURAL SPECIFICATIONS
METAL FABRICATION

PART 1 – GENERAL

1.1 Scope

.1 Provide all labour and material required to fabricate and install all miscellaneous metal fabrications including loose angles, channels, HSS, anchors, plates and, metal components shown on the drawings or required for completion of the work.
Items shall also include metal gratings, bollards, supports for the vanities, and plumbing fixture supports.

1.2 Related Work Specified Elsewhere

Cast-in-Place Concrete	Section 03300
Masonry Procedures	Section 04050
Miscellaneous Specialities	Section 10200

1.3 Shop Drawings

Submit shop drawings in accordance with Section 01340 for vanity supports, galvanized steel posts and galvanized steel beams.

PART 2 – PRODUCTS

2.1 Materials

.1 Steel sections and plates to CAN3-G40.2l-M81, Grade 260W, 300W or 350W.

.2 Structural wide flange shapes (W) to conform to CAN/CSA-G40.20/G40.21 grade 350W or ASTM A992/A992M grade 50 (ksi).

.3 Structural welded wide flange shapes (WWF) to conform to CAN/CSA-G40.20/G40.21 grade 350W.

.4 Steel pipe to ASTM A53-82, standard weight, seamless black.

.5 Welding materials to CSA W59-1982.

.6 Angles, plates and channels (L, C) to conform to CAN/CSA-G40.20/G40.21 grade 300W.

.7 Hollow structural sections (HSS) to conform to ASTM A500 GRADE C.

.8 Anchor Rods: Conform to ASTM F1554 grade 55 weldable steel or 300W threaded rod conforming to CSA G40.21-M, unless otherwise noted or shown.

.9 Bolts and anchor bolts: to ASTM A307-82a, or ASTM A325M-82.

.10 Galvanising: hot dipped galvanising with zinc coating 600 g/M2 to CSA G164-M1981.

.11 Concrete Anchors: Shall be Nelson, flux filled deformed bar anchors, type D2L, or approved alternative. Headed studs shall be manufactured by Nelson (or approved alternative) and shall be made from mild steel conforming to ASTM A108 grade 1010 through 1020. Headed studs shall be welded per manufacturer's recommendations, mechanical properties of headed studs shall be in accordance with AWS D1.1.

.12 Shop coat primer to CGSB 1-GP-40M.

.13 Zinc primer: zinc rich, ready mix to CGSB.

.14 Sulphur: commercial grade for setting metal posts.

.15 Grout: non-shrink, non-metallic, flowable, 24h, MPa 15, pull-out strength 7.9 MPa.

.16 Stainless Steel: plate material to be solid thickness as shown 304 stainless, finish 4 brushed all exposed sides.

2.2 **Fabrication**

.1 Build work square, true, straight, and accurate to required size, with joints closely fitted and properly secured.

.2 Weld connections where possible otherwise bolt connections.

.3 Fabricate items from steel unless otherwise noted.

.4 Use self-tapping shake-proof screws on items requiring assembly by screws as indicated.

.5 Where possible, fit and shop assemble work, ready for erection.

.6 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 **Shop Painting**

.1 Apply one shop coat of primer to metal items, with exception of stainless steel, aluminium, galvanised or concrete encased items and interior surface of pans.

.2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7° C.

.3 Clean surfaces to be field welded; do not paint.

.4 The metal grates shall have a mill finish, shop prime, hot dip galvanized and colour to be “Brushed Stainless Steel”. Colour sample to be approved by Architect.

.5 Ensure that the shop primer or paint is compatible with spray fireproofing and/or the top coat paint system specified, where applicable.

.6 Shop Paint: to CISC/CPMA 1-73a or SSPC Paint 15.

.7 Shop Primer: to CISC/CPMA Standard 2-75.

.8 Hot Dip Galvanizing: to CSA G164, minimum zinc coating of 600 g/m2.

.9 Zinc-Rich Primer: Catha-Coat 302 as supplied by Devoe Coating Company (3 mils dry film thickness) or Carbozinc 11 as supplied by Carboline Company (2 to 3 mils dry film thickness) or approved alternative.

.10 Zinc-Rich Touch-up Paint: Galvafroid as supplied by W. R. Meadows Limited or approved alternative.

PART 3 – EXECUTION

.1 Examination

.1 Prior to work of this Section, carefully inspect the installed work of other Subcontractors and verify that such work is complete to the point where fabrication and installation of the work of this Section may properly commence.

.2 Take all required measurements in the field to ensure proper and adequate fit of miscellaneous metal items.

.3 Verify that miscellaneous metal may be fabricated and installed in strict accordance with the original design and the reviewed shop drawings.

3.2 Erection

.1 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.2 Provide suitable means of anchorage acceptable to Consultant such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.3 Make field connections with bolts to CSA S16-1969 and CSA S1653-1981, or weld.

.4 Hand items over for casting into concrete or building into masonry or wood frame to appropriate trades together with setting templates.

.5 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.

.6 Touch-up galvanised surfaces with zinc primer where burned by field welding.

.7 Adjust hangers and lock set nuts.

END OF SECTION

PART 1 – GENERAL

1.1 Scope

.1 Work under this section consists of the furnishing of all labour, materials, equipment, and services necessary for, and incidental to, the complete and proper installation of rough carpentry and related work as shown on the drawings or specified herein, and in accordance with all applicable requirements of the contract documents including but not limited to:

.1 Wood blocking and grounds for other Trades where indicated on the drawings or as required;

.2 Nailing and furring strips for equipment indicated on the drawings and as required;

.3 Rough hardware such as nails, spikes, bolts, nuts, washers, screws, etc., required for the completion of all work;

.4 Built-up curbs, cants, caps for roof work;

.5 Plywood Sheathing;

.6 Backer boards for electrical equipment;

.7 The responsibility as to which Sub-Contractor provides the required labour, materials or equipment to be built in or provided rests entirely with the Contractor except where explicitly noted. Extras will not be considered based on grounds of difference in interpretation of Specifications or drawings as to which Sub-Contractor provides certain specialties or materials.

1.2 Related Work Specified Elsewhere

Unit Masonry	Section 04200
Metal Fabrications	Section 05500
Thermal Insulation	Section 07210
Gypsum Wallboard	Section 09250
Painting	Section 09900

1.3 References

.1 CSA B111, Wire Nails, Spikes and Staples.

.2 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA 0112 Series CSA Standards for Wood Adhesives.

.4 CSA O121, Duglas Fir plywood.

.5 CAN/CSA-O141, Softwood Lumber.

.6 CAN 0151 Canadian Softwood Plywood.

.7 CAN/CSA-0325.0 Construction Sheathing.

.8 National Lumber Grades Authority (NLGA), Standard Grading Rules for Canadian Lumber.

1.4 **Quality Assurance**

.1 Lumber Identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood Identification: by grade mark in accordance with applicable CSA standards.

1.5 **Delivery, Storage and Handling**

.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 Do not expose fire retardant pressure treated material to dampness between the time the material is treated and the time the finish is applied. Carefully sand surfaces which show surface salt deposits to remove such deposits before finish is applied.

PART 2 – PRODUCTS

2.1 **Lumber Materials**

.1 Framing Lumber: unless specified or indicated otherwise, softwood, S4S, moisture content 19% or less in accordance with the following standards:

.1 CAN/CSA-0141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

.3 Non-structural framing, furring, nailers, blocking, cants, etc., to be Western Spruce construction grade, pressure treated.

.4 Lumber for interior framing: No. 1 grade white pine, KD to 8%.

2.2 **Panel Materials**

.1 Plywood Sheathing: unless specified or indicated otherwise, 19 mm thick, exterior grade at exterior locations, Douglas Fir plywood, veneer core, Select Sheathing - Tight Face, unsanded, "B" faces and conforming to CSA 0121.

2.3 **Accessories**

.1 Rough Hardware: nails, spikes, bolts, nuts, washers, screws, clips, strap iron and including hardware for temporary enclosures. Nails for plywood shall be annular

or spiral type; other nails shall be spiral type. All nails, spikes and staples shall conform to CSA B111-1974. All rough hardware shall be galvanized unless otherwise noted. Galvanizing shall conform to CAN/CSA-G164-M92.

.2 Fasteners: to hollow masonry - use sieve adhesive anchors, to solid masonry or concrete-use "sleeve" anchors or "wedge" anchors; to steel, use bolts or power actuated fasteners. Use self-drilling fasteners where screws specified into concrete, masonry or steel.

.3 All Other Materials and Hardware: As required to provide complete installation and as noted on drawings.

PART 3 – EXECUTION

3.1 Installation

.1 Supply all labour, materials, equipment, services and perform all operations required to complete all rough carpentry work to the full intent of the Drawings and as herein specified.

.2 Consult with and co-operate with other Sections in advance and build-in or make provisions for installation of other work.

.3 Provide and fit in place all furring, strapping, battens, nailers, sleepers, grounds and blocking required to provide adequate properly placed fixing for all wood finishes, fitments and as required for the work of others trades.

.4 Blocking, strapping and other rough carpentry indicated shall not be regarded as complete or exact. Provide all rough carpentry work required, whether specifically shown or not. Grounds shall be of a thickness to provide for application of finishes. Room side surfaces of grounds shall be plumb and in true plane throughout.

.5 All nails shall be long enough so that at least half their length penetrate in to 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.

.6 Blocking shall be through-bolted to structure.

.7 Anchor rough bucks to concrete or masonry with 3/8" diameter expansion bolts and shields or Drummond and Reeves security buck anchors, minimum three per jamb.

3.2 Wood Preservative

.1 Use preservative pressure treated lumber and plywood for exterior walls and roof systems and for all components in contact with concrete and masonry.

.2 Where it is necessary to cut, bore or otherwise alter pressure treated components in the field, treat cut surfaces with heavy coat of wood preservative, prior to installation of components.

3.3 **Wood Blocking and Nailers**

.1 Provide wood blocking and nailers, where shown to be required as detailed. Bolt securely in place. Blocking shall be same thickness as installed roof insulation.

.2 Check mechanical, electrical, architectural drawings and provide all blocking, nailers etc. required. Leave work ready for roofing and prefinished sheet metal flashings.

3.4 **Plywood Panels**

.1 Provide plywood panels required for electrical mounting of equipment and in other locations as indicated on drawings.

END OF SECTION

FINISH CARPENTRY

PART 1 – GENERAL

1.1 **Scope**

.1 Supply and install reception desk and office desk and other carpentry required for the proper execution of the work.

1.2 **Related Work Specified Elsewhere:**

Rough Carpentry	Section 06100

1.3 **Source Quality Control**

.1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood identification: by grade mark in accordance with applicable CSA standards.

1.4 **Co-ordination**

.1 Co-ordinate this Section with Section 06100-Rough Carpentry.

1.5 **Shop Drawings**

Submit shop drawings in accordance with Section 01340 for reception desk and related millwork as shown on the drawings.

PART 2 – PRODUCTS

2.1 **Material**

.1 Reception desk to be Plastic laminate finish for all surfaces as shown, with solid surface desktop.
- Plastic Laminate: to be Formica or approved equal; Colour: Blond Cedasr, Matte (58) finish; Size: per drawings. Samples to be approved by architect.
- Solid surface desktop: to be Corian or approved equal; Colour: Glacier White; Size: per the drawings. Samples to be approved by architect.

.2 Office desk to be built-in solid surface desktop, fixed to the walls with metal angles as per drawings.
- Solid surface desktop: to be Corian or approved equal; Colour: Glacier White; Size: per drawings. Samples to be approved by architect.

PART 3 – EXECUTION

3.1 **Examination**

.1 Examine surface and conditions upon which work of this Section depends and do not proceed unless such surfaces and conditions are acceptable.

.2 Verify all dimensions on-site before commencement of shop drawings. Commencement of work will denote acceptance of surfaces and conditions.

3.4 **Fasteners**

.1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.2 Countersink bolts where necessary to provide clearance to other work.

3.5 **Equipment Backboard**

.1 Provide backboards for mounting electrical and telephone equipment in each Mechanical/ Electrical Room. Use 19 mm thick plywood on 19 x 38 mm furring around perimeter and at maximum 300 mm intermediate spacing, one full sheet of plywood per Room.

3.6 **Reception and Office Millwork**

.1 Provide millwork as shown on the drawings, complete with supports as required. Plywood core with P. Lam finish for all sides.

.2 Millwork to be complete with all drawers, shelves, doors and necessary stainless-steel hardware and accessories. GC to supply and install all necessary hardware. Samples for materials, colours and hardware to be approved by architect.

END OF SECTION

ARCHITECTURAL SPECIFICATIONS

AIR/VAPOUR BARRIER

PART 1 – GENERAL

1.1 **Scope**

.1 Provide labour, material, and equipment required to install air barriers behind brick/ stone cladding, metal siding, and at soffits including sealants, tape and fasteners required for the execution of the work.

1.2 **Related Work Specified Elsewhere:**

Rough Carpentry	Section 06100
Masonry	Section 04200
Gypsum Wall Board	Section 09250

1.3 **References**

.1 ASTM E-96-90 Standard test Methods for Water Transmission of Materials.

.2 ASTM E-1677-95 Standard specification for an Air Retarder material or system for Low-Rise Framed Building Walls.

1.4 **Co-ordination**

.1 Co-ordinate this Section with Section 06100-Rough Carpentry, Section 04200 – Masonry.

PART 2 – PRODUCTS

2.1 **Material**

.1 At concrete masonry units, self adhering water-resistant air/vapour barrier to be rubberized asphalt compound bonded to a cross laminated polyethylene film, to meet air leakage rate at 75Pa of less than 0.003L/s/m², equal to Blueskin SA, by Henry Company.

.2 Sealing tape, Fasteners
- Sealing tape to be sheathing type tape, compatible with sheet membrane material
- Galvanizing to CSA G164-M1981, use galvanized fasteners for all locations.

PART 3 – EXECUTION

3.1 **Examination**

.1 Examine surface and conditions upon which work of this Section depends and do not proceed unless such surfaces and conditions are acceptable.

.2 Commencement of work will denote acceptance of surfaces and conditions.

3.2 **Air Barrier Membrane**

1. Install in accordance with manufacturer's instructions continuously over the entire surface of the wall sheathing board. Overlap adjacent barrier sheets by 150mm (6"). Extend to the top of roof parapets and over the back side of the parapet to the level of the roof deck so that continuity can be maintained with the roof membrane, and to the inside face of all wall openings so that continuity can be maintained with vapour barrier.

2. Ensure that membrane is airtight, free from holes, tears and punctures.

3. Tape at all window and door penetrations.

4. Seal joints and all penetrations with specified tape and fasteners.

5. Poly-vapour barrier as specified for various wall types.

3.3 **Protection**

.1 Protect finished work and do not permit adjacent work to damage work of this section.

END OF SECTION

ARCHITECTURAL SPECIFICATIONS
THERMAL INSULATION

PART 1 – GENERAL

1.1 Scope

.1 Work under this section consists of the furnishing of all labour, materials, equipment, and services necessary for, and incidental to, the complete and proper supply and installation of thermal insulation and related work as shown on the drawings or specified herein, and in accordance with all applicable requirements of the contract documents. Refer to Wall Types for insulation requirements.

.2 Review other Sections of the Specifications for extent of thermal insulation work specified in those Sections. Provide all other thermal insulation materials, equipment and labour necessary to complete the work of this Section as indicated on the drawings, specified herein, or as required by job conditions and normally considered as work covered by this Section.

1.2 Related Work Specified Elsewhere

Unit Masonry	Section 04200
Air/Vapour Barrier	Section 07196
Modified Bitumen Roofing and Sheet Metal	Section 07550
Gypsum Wallboard	Section 09250

1.3 References

.1 CSA A101, Thermal Insulation, Mineral Fibre, for Buildings.

1.4 Submittals

.1 Provide submittals specified and as required to assess conformance with the Contract Documents, in accordance with the General Conditions and Section 01340.

.2 Affidavits: 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: 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 Delivery, Storage and Handling

.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 flammable materials outside the building and protect from all weather hazards and open flame. Abide by all fire protection regulations imposed by the authorities having jurisdiction, and take precautionary measures to avoid fire.

.4 Do not store insulation in direct contact with the earth, road surface, or floors. Place suitable forms or skids under the insulation upon delivery to protect the insulation from absorbing dampness from the surrounding terrain or floor. Cover material with approved tarpaulins and secure.

.5 In cold weather, provide warm storage for adhesives such that their consistency is suitable for ease of application.

PART 2 – PRODUCTS

2.1 Insulation

.1 Low Density (LD) Extruded Polystyrene Board: extruded, expanded polystyrene with minimum compressive strength of 140 kPa (20 psi) and shiplapped edges, thickness, thickness as indicated on drawings, conforming to CAN/CGSB-51.20-M87, Type III, Cavitymate Ultra by Dow, or Celfort 200 by Owens-Corning Canada Inc..

.2 Medium Density (MD) Extruded Polystyrene Board: extruded, expanded polystyrene with minimum compressive strength of 210 kPa (30 psi) and shiplapped edges, thickness, thickness as indicated on drawings, conforming to CAN/CGSB-51.20-M87, Type IV, Styrofoam SM by Dow, or Celfort 300 by Owens-Corning Canada Inc..

.3 High Density (HD) Extruded Polystyrene Board: extruded, expanded polystyrene with minimum compressive strength of 275 kPa (40 psi) and shiplapped edges, thickness, thickness as indicated on drawings, conforming to CAN/CGSB-51.20-M87, Type IV, Styrofoam HI-40 by Dow, or Foamular 400 by Owens-Corning Canada Inc..

.4 Semi-Rigid Fibre Board: glass fibre or mineral wool insulation board with minimum density of 48 kg/m2 (3.0 lbs./cu.ft.), minimum RSI of 0.73 per 25 mm, thickness, thickness as indicated on drawings, conforming to CAN/CGSB-51.10, `AF 530' by Owens-Corning Canada, or `RXL 40' by Roxul Inc., or `Paroc Wall Board Insulation (WB)' by Partek Insulations Ltd., or OFI 48 by Ottawa Fibre Inc. or approved equal.

.5 Fibre Batt: standard batt or blanket, mineral or glass fibre insulation, friction fit, thickness as indicated on drawings, unfaced to CSA A101-M1983.

.6 Loose Fibre: loose glass fibre or mineral wool insulation, conforming to CSA A101-M1983, Type II.

.7 Foamed in Place: two-component polyurethane: froth/spray kit, ULC Class 1 (flame spread 25 or less): Froth-Pak by Insta-Foam Products, Inc. or equivalent product by other manufacturer approved by Consultant.

2.2 Fasteners, Adhesives

.1 Adhesive for polystyrene insulation: Bakor 230-21; adhesive for securement of insulation to waterproofing / dampproofing membrane shall be compatible with such membranes.

.2 Insulation Adhesive: Bakor "Air Bloc 21FR" or equivalent, fire retardant, compatible with fibrous glass and foam plastic.

.3 Impaling clips: zinc coated Stic-Klip with perforated base and cadmium plated speed washer by Eckel Industries of Canada Ltd., or Insul-Anchors "Spindle" by Continental Studwelding Ltd.; adhesive and mechanical fasteners as recommended by clip manufacturer.

.4 Impale Clip Fasteners: Adhesive bonded pin and disc impale type insulation fasteners to suit insulation thickness, `Stic-Klip' by Eckel Industries of Canada Ltd., or `Kelty' by Dewar Insulations Ltd.

.5 Cavity insulation securement: supplied by Section 04200.

.6 Mechanical securement system:

.1 Metal securement members: 41 x 13 x 0.5 mm galvanized channels: Insulok by Reach Plastics; or 48 x 13 x 0.5 mm galvanized tee: Retainer Tee by Bailey.

.2 Concrete/masonry anchors: Tapcon anchors of length to provide minimum 25 mm embedment of anchor.

.3 Fasteners to metal framing: self-drilling, self-tapping plated screws.

.7 Insulation Support System: `Insul-Hold' by Insulhold, or `Bat-Rak' by Carold Pichette & Fils Ltee, or approved equal.

.8 Tee Stud Retainers: "T" shaped 25 gauge galvanized sheet steel stud retainer with 5/16" diameter fastening holes at 6" O.C., `D-1005 Retainer Tee Stud' by Bailey Metal Products Limited, or approved equal.

.9 Angle Framing Trim: "L" shaped, 1" x 2" x 25 gauge galvanized sheet steel angle framing trim, `D-700 Angle Framing Trim' by Bailey Metal Products Limited, or approved equal.

.10 Zee Trim: "Z" shaped, 25 gauge galvanized sheet steel zee trim designed to hold rigid insulation in place and provide surface for fastening finishing material, widths to suit thicknesses of insulation, `D-900 Z Trim' by Bailey Metal Products Limited, or approved equal.

.11 Mechanical Fasteners: Hot-dip galvanized mechanical `Tapcon' or `Gripcon' type fasteners sized to suit applications.

2.3 **Cavity Compartment Seals**

.1 Sheet metal: minimum 0.9 mm thick sheet steel formed to profiles required, hot dip galvanized ASTM A525, Zinc coating designation Z275.

PART 3 – EXECUTION

3.1 **Preparation**

.1 Substrates shall be sound, dry and free of dirt, oil, grease and other foreign substances.

.2 Clean substrates as required. Remove surface ridges at concrete walls and mortar protrusions at masonry walls.

.3 Clean all surfaces of dust, dirt and projecting surfaces prior to the application of insulation.

.4 All materials and methods used in application shall be in strict accordance with the printed instructions of the manufacturer.

.5 Remove stains, defective work or materials when directed by the Consultant and replace with approved work and materials at no cost to Owner.

.6 Do not install insulation when ambient air and surface temperatures are below 40□F or more than 100□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 - General**

.1 Install insulation to provide a continuous and uniform thermal barrier, minimizing thermal bridges, minimum thicknesses as indicated and/or scheduled. Use largest practicable insulation board size, to minimize number of joints.

.2 Where insulation is interrupted by construction elements, neatly fit insulation around such elements and pack spaces around elements with same insulation.

.3 Moderately butt insulation boards against each other so that there are no gaps.

.4 Stagger joints at multiple layer installations.

3.3 **Low Density (Ld) Extruded Polystyrene Board**

.1 Place insulation against air barrier, tightly fitted at joints, at perimeter of insulated areas, around ties and at other penetrations; leave no gaps or voids.

.2 Secure insulation boards mechanically and with adhesive at all locations. Butter all edges of insulation boards with adhesive.

.3 Provide continuous 12 mm beads of Type 2 insulation adhesive applied in serpentine pattern, side to side, at back of insulation board; space beads at 150 mm o.c. Press board against air barrier and mechanically secure at each cavity wall tie, with insulation securement.

.4 Near wall corners, at perimeter of openings, and at other locations where cavity wall ties are not available in required location, use tapcon anchors and plastic washers for mechanical securement of insulation boards; ensure that fastener is within 150 mm of corner or jamb.

.5 Do not install insulation until air barrier and membrane flashings are complete and have been approved by Consultant.

.6 Provide cavity wall compartment seals at masonry exterior wythe control joints and at locations indicated. Securely fasten compartment seals through air barrier to interior wythe.

3.4 **Medium Density (Md) Extruded Polystyrene Board**

.1 Provide perimeter insulation at inside or outside of foundation walls, as indicated, to minimum 600 mm below finished grade or lower where shown on Drawings. Unless otherwise indicated provide 50 mm thick insulation bonded to substrate with spot adhesive application.

.2 Provide rigid board insulation below slabs on grade where indicated. Place insulation board on prepared, level subgrade, with joints tightly butted. Unless noted, use 50 mm thick insulation.

3.5 **High Density (Hd) Extruded Polystyrene Board**

.1 Provide high density rigid board insulation below extended washroom entrance and garage door entrance see Structural Drawings. Place insulation board on prepared, level subgrade, with joints tightly butted. Unless noted, use 50 mm thick insulation.

3.6 **Semi-rigid Fibre Board**

.1 Provide semi-rigid board at cavity wall expansion joints (mechanically fastened impale clip method); at expansion joints below floor cover / firestopping and at wall joints; between curtainwall and concrete beams; below roof slabs and at inside of beams where shown; where fibrous insulation is required, but not provided by another Section.

.2 Secure insulation board to supporting work with adhesive bonded and mechanically fastened impale clips spaced at maximum 500 mm in each direction, unless otherwise indicated.

.3 Heat lower surface of impale clip base and press into air barrier, in manner providing positive adhesion upon cooling, and mechanically fasten. At locations without air barrier, use adhesive bonded and mechanically fastened impale clips.

3.7 **Fibre Batt**

.1 Provide fibrous batt insulation where indicated on Drawings.

.2 Completely fill spaces with insulation, leaving no gaps or voids. Do not pack insulation tighter than manufactured density of materials.

3.8 **Foamed in Place**

.1 Provide foamed in place insulation at jambs of window and door openings, around penetrations through exterior walls (inner wythe) between curtain wall / door frames and wall; where indicated.

.2 Apply insulation with suitable equipment, in accordance with manufacturer's directions.

.3 Fill designated spaces completely, leaving no voids or gaps; trim excess material.

3.9 **Mechanical Securement**

.1 Space securement members at maximum 600 mm o.c. Provide additional members at openings, penetrations, corners, changes of directions and terminations to ensure firm securement and adequate support for gypsum board in all locations.

.2 Fasten members to supporting elements maximum 150 mm from end of furring members and at maximum 600 mm at walls and at maximum 400 mm o.c. at horizontal applications.

.3 Provide mechanical securement of insulation at exterior gypsum board/cementitious board soffits and at other locations indicated.

3.10 **Protection**

.1 Temporarily protect installed insulation from damage and action of the elements until it is permanently concealed or protected.

.2 Protect polystyrene insulation from sunlight.

.3 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.

.4 Protect surfaces, and in particular the building cladding finish, from being marred or contaminated by the materials, by means of protective covers, boards, tapes and other approved means.

.5 Thoroughly ventilate spaces where adhesives containing volatile solvents are being used.

END OF SECTION

SHEET METAL ROOFING

Part 1 GENERAL

1.1 Scope

.1 Provide all labour and material required to install sheet metal roofing and related components shown on the drawings or required for completion of the work.

1.2 Related work

Cast-In-Place Concrete	Section 03300
Metal Fabrication	Section 05500
Rough Carpentry	Section 06100
Joint sealant	Section 07900

1.3 References

.1 ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2001a.

.2 ASTM A792 / A792M - Standard Specification for Steel Sheet, 55 percent Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.3 ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2001.

.4 ASTM E 283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 1991 (Reapproved 1999).

.5 ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000.

.6 ASTM E 408/C - 1371: "Standard Test Method for Total Normal Emittance of Surfaces Using inspection - Meter Techniques.

.7 ASTM E 903/C - 1549: Standard Test Method for Solar Absorbtance, using Integrating Spheres.

.8 ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference; 1995.

.9 ASTM E 1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems; 1995.

.10 SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors National Association; 1993.

1.4 Performance Requirements

.1 Maximum deflection not to exceed L/180 under system's own weight plus wind load (positive and negative) loads acting normal to the plane in accordance with the Building Code Climatic Data, wind load 1:30 years.

.2 Design sheet cladding to span continuously over at least four structural supports (three spans) and design fastening to structural supports to sustain factored loads in accordance with authority having jurisdiction.

.3 Calculate live load deflections in accordance with authority having jurisdiction and as modified by the requirements of this Section.

.4 Provide for movement of components without causing buckling, failure of joint seals, undue stress on fasteners when subject to seasonal temperature range from -40°C (-40°F) to +50°C (120°F), and wind loads noted above.

.5 Include expansion joints to accommodate movement in wall system and between wall system and building structure, where these movements are caused by deflection of building structure, and accommodate these movements, without permanent distortion, damage to infills, racking of joints, breakage of seals, or water penetration.

.6 Provide for positive drainage to the exterior of all water entering or condensation occurring within the system.

.7 Final review and acceptance of work completed by this Section shall be carried out by the manufacturer's representative, the Consultant, Contractor and the Subcontractor.

1.5 Submittals

.1 Submit product data in accordance with Section 01 33 00 – Submittals:

.1 Submit manufacturer's printed product literature, specifications and datasheet.

.2 Submit WHMIS MSDS - Material Safety Data Sheets acceptable to Labour Canada, and Health and Welfare Canada. Indicate VOC's:

.1 Caulking and sealant materials during application and curing.

.2 Finishing materials.

.3 Insulation adhesives.

.4 Paints.

.5 Isolation coatings.

.2 Product Data: Submit manufacturer's product data, standard drawing details, and installation instructions for system and individual components.

.1 Indicate arrangement of cladding system including dimensions, wall openings, location of joints, profiles of inner and outer skin, types and locations of supports, fasteners, flashing, closures, compliance with design criteria and requirements of related work.

.3 Submit samples in accordance with Section 01 33 00 – Submittals:

.1 Submit duplicate 300 x 300 mm samples of ceiling and wall systems, representative of materials, finishes and colours.

.2 Prior to ordering materials, provide to consultant the following for verification purposes: three samples of colour of finish specified.

.4 Colour Charts: Submit cladding manufacturer's colour charts showing full range of standard colours and finishes.

.5 Close-out Submittals: Upon project completion, submit manufacturer's warranties, including limitations and conditions.

.6 Warrantees: Submit manufacturer's product warranties.

1.6 Quality Assurance

.1 Coordinate requirements with Section 01 45 00 - Quality Control.

.2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.3 Installer Qualifications: Engage experienced installer, with a minimum of 5 years experience, who has completed systems similar in material, design, and extent to that indicated for Project and with record of successful performance.

.4 Pre-installation Meeting: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions, and manufacturer's warranty requirements.

.1 Participants: General Contractor, installation subcontractor, Owner, and Architect.

.2 Verify project requirements.

.3 Review installation and substrate conditions.

.4 Co-ordination with other building subtrades.

.5 Review manufacturer's installation instructions and warranty requirements.

1.7 Delivery, Storage and Handling

.1 Ordering: Conform to manufacturer's ordering instructions and lead time requirements to avoid construction delays.

.2 Deliver materials and components in manufacturers' unopened containers or bundles, fully identified by name, brand, type and grade. Prevent damage during unloading, storing and installation.

.3 Store, protect and handle materials and components in accordance with manufacturer's recommendations to prevent twisting, bending, mechanical damage, contamination and deterioration.

.4 Store materials off ground and keep clean, dry, and free of dirt and other foreign matter.

1.8 Project/Site Conditions

.1 Field Measurements: Verify location of structural members and openings in substrates by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work

.2 Undertake installation work only when weather conditions meet manufacturers' specific environmental requirements and when conditions will permit work to be performed in accordance with manufacturer recommendations and warranty requirements.

.3 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.

1.9 Waste Management and Disposal

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

.2 Divert reusable materials for reuse at nearest used building materials facility.

.3 Divert unused caulking, sealants, and adhesive materials from landfill through disposal at hazardous material depot.

1.10 Warranty

.1 Manufacturer's Product Warranties:

.1 Finish Coating: 25-Year Limited Finish Warranty against the following:

.1 Peeling and checking of finish, except slight crazing or cracking as may occur on tightly roll-formed edges or brake bends at time of forming.

.2 Chalking of exterior paint in excess of 8 when measured in accordance with ASTM D4214.

.3 Fading or colour change in excess of 5 colour difference units when measured in accordance with ASTM D2244 on exposed painted surfaces.

.2 Contractor's Labour Warranty: 2-year labour warranty, starting from the date of Substantial Performance, to cover repair of materials found to be defective as a result of installation errors.

Part 2 Products

2.1 Manufacturer

.1 Standing Seam Metal Roofing Panel as manufactured by VICWEST or approved equal.

.1 MT-03: VICWEST Prestige Commercial Profile, Size: 400 Wide x 38 High, Hidden Fastener Cladding, Colour: Black.

2.2 Accessories

.1 Underlayment: ASTM D 226, Type II No. 30 asphalt saturated organic roofing felt.

.2 Plywood Deck: 5/8 inch (16 mm) nominal thickness; as specified in Section 06 10 00 - Rough Carpentry.

.3 Nailable Insulation: 1 inch (25 mm) minimum to 3-1/2 inch (89 mm) maximum nominal thickness classified polyisocyanurate foamed plastic, 2 pcf (32 kg/cu m) density, factory laminated to 7/16 inch (11 mm) thick APA rated oriented strand board (OSB).

.4 Sealant: Elastomeric.

.5 Girts: Fabricated from minimum 1.27 mm (0.05") thickness galvanized steel to ASTM A653, Grade 230 with Z275 coating; finish material visible after assembly of wall system to match aluminum cladding.

.6 Sub-Girts: Structural quality steel to ASTM A653, with Z275 zinc coating to ASTM A792, adjustable double-angle profile as indicated to accept panel with structural attachment to building frame.

.7 Extrusions: 3658 mm (144") long, corners and caps to profile for application.

.8 Clips: 102 mm (4") long system clips

.9 Fasteners:

.1 Attachment of Cladding to Steel Substrate: Number 10-16 self-drilling, self-tapping screws with corrosion-resistant coating to withstand 3000 hours of salt spray protection.

.1 Acceptable Materials:

.1 #10 Hex Head Tredecim, coated with drill-point.

.2 Attachment of Cladding to Wood Substrate: Number 12 drill-point fasteners with EPDM washers and corrosion-resistant coating to withstand 3000 hours of salt spray protection.

.1 Acceptable Materials:

.1 #12 Hex Head Tredecim coated with drill point.

.3 Attachment of Cladding to Concrete Walls: 4.7 mm (3/16 inch) with corrosion-resistant coating to withstand 3000 hours of salt spray protection, minimum 2000 psi.

.1 Acceptable Materials:

.1 4.7 mm (3/16”) Hex Head Tredecim coated with matched tolerance drill bit.

.10 Isolation Tape: Manufacturers standard material for separating dissimilar metals from direct contact.

.11 Insulation Fastenings: Corrosion resistant, galvanized bugle head screws with 38 mm (1.5 inch) diameter washer, 25 mm (1 inch) minimum penetration into framing.

.12 Insulation: Rigid type [4] [3] [2] as specified in Section 07 21 13.

.13 Air/Vapour Retarder: Self-adhering membrane as specified in Section 07 27 13.

.14 Sealant: as indicated in Section 07 92 00 and as recommended by manufacturer. Colour of exposed sealant to match adjacent cladding.

.15 Gaskets: Santoprene or EPDM as recommended by manufacturer.

.16 Accessories: cap flashings, drip flashings, internal corner flashings, copings and closures for head, jamb, sill and corners, of same material, thickness and finish as exterior cladding, brake formed to shape.

.17 Bituminous Coating: Cold-applied asphalt mastic, in accordance with CGSB 1.108, compounded for 0.40 mm (15 mil) dry film thickness per coat with inert type non-corrosive compound free of asbestos fibres, sulphur components, and other deleterious impurities.

.18 Expansion joints: as recommended by Manufacturers Instructions.

2.3 FABRICATION

.1 Fabricate and finish cladding, and accessories at the factory to greatest extent possible using manufacturer's standard procedures and processes, and conforming to indicated profiles and with dimensional and structural requirements.

.2 Fabricate cladding true, plumb and square, with no oil-canning or deformity that detracts from aesthetic appearance, matching quality and installation of accepted mock-up specified above.

.3 Apply bituminous coating or other permanent separation materials on concealed panel surfaces where cladding will be in direct contact with substrate materials that are not compatible or could result in corrosion or deterioration of either materials or finishes.

Part 3 EXECUTION

3.1 Manufacturer’s Instructions

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

3.2 Preparation

.1 Obtain dimensions from job site before fabricating wall system.

.2 Ensure structural support is aligned and condition is acceptable.

.3 Building surfaces shall be smooth, clean and dry, and free from defects detrimental to the installation of the system. Notify Contractor of conditions not acceptable for installation of system.

.4 Inspect wall system and components before installation and verify that there is no shipping damage.

.5 Do not install damaged planks; repair or replace as required for smooth and consistent finished appearance.

3.3 Installation

.1 Install in accordance with manufacturer's instructions.

.2 Coordinate metal roofing with other work, including but not limited to drainage, flashing and trim, deck substrates, parapets, copings, walls, and other adjoining work.

.3 Install metal roofing panels to profiles, patterns and drainage indicated, in accordance with manufacturer's instructions, and as necessary to achieve specified performance and a leak-free Installation. Allow for structural and thermal movement.

.4 Use fasteners recommended by panel manufacturer; conceal fasteners wherever possible; cover and seal exposed fasteners.

.5 Provide uniform, neat seams; provide sealant-type joint where indicated and form joints to conceal sealant.

.6 Caulk junctions with adjoining work with sealant. Do work in accordance with Section 07 92 00 - Joint Sealing.

.7 Apply isolation coating to areas of contact between dissimilar metals.

.8 Touch-Up Painting: Inspect completed wall system and apply matching touch-up paint as needed to correct minor paint flaws.

3.4 Control/Expansion Joints

.1 Construct control and expansion joints as indicated.

.2 Use mechanical fasteners to secure sheet materials.

.3 Assemble and secure wall system to structural frame so stresses on sealants are within manufacturers' recommended limits.

3.5 Construction

.1 Installation Tolerances: Shim and align cladding within installed tolerance of 6 mm (¼”) in 6100 mm (20’-0”) on level, plumb, and location lines as indicated, and within 3 mm (1/8") offset of adjoining faces and of alignment of matching profiles.

3.6 Field Quality Control

.1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.

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

.3 Schedule site visits to review Work at stages listed:

.1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.

.2 Twice during progress of Work at 25% and 60% complete.

.3 Upon completion of Work, after cleaning is carried out.

.4 Submit reports to Consultant within three days of review and submit.

3.7 Cleaning

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Wash down exposed interior and exterior surfaces using solution of mild domestic detergent in warm water, applied with soft, clean wiping cloths. Wipe interior surfaces clean as part of final clean-up.

.3 Remove excess sealant with recommended solvent.

.4 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

PRE-FORMED METAL CLADDING

Part 1 GENERAL

1.1 Scope

.1 Supply and installation of profiled prefinished aluminum ceiling, wall cladding and soffit forming a part of an exterior wall rainscreen system with girts, flashings and trims using prefinished sheet materials and concealed fasteners.

1.2 Related work

Cast-In-Place Concrete	Section 03300
Metal Fabrication	Section 05500
Rough Carpentry	Section 06100
Joint sealant	Section 07900

1.3 References

.1 American Architectural Manufacturers Association (AAMA)

- .1 AAMA 2604-13, Voluntary Specification Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
- .2 AAMA 2605-11, Specification for Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- .3 AAMA 508-14, Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems.

.2 American Association Inc. (AAI)

- .1 DAF-45-03, Designation System for Aluminum Finishes.

.3 American Society for Testing and Materials International, (ASTM)

- .1 ASTM E84-11a, Test Method for Surface Burning Characteristics of Building Materials.
- .2 ASTM E136-16, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750^{o}C.
- .3 ASTM F1667-15, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.4 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-93.2-M91, Prefinished Aluminum Siding, Soffits and Fascia, for Residential Use.
- .2 CGSB 93.5-92, Installation of Metal Residential Siding, Soffits and Fascia.

.5 Canada Green Building Council (CaGBC)

- .1 LEED V4 Building Design and Construction (2016)
- .2 LEED Canada 2009 Rating System, LEED Canada for New Construction and Major Renovations. LEED Canada for Core and Shell Development.

.6 European Standard (EN)

.1 UNI EN 13523-4:2001, Coil Coated Metals – Test Methods – Part 4: Pencil Hardness.

.7 Underwriters Laboratories Canada (ULC)

.1 CAN/ULC S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC S114-05, Standard Method of Test for Determination of Non-Combustibility in Building Materials.

.3 CAN/ULC S157-05, Strength Design in Aluminum.

1.4 Performance Requirements

.1 Maximum deflection not to exceed L/180 under system's own weight plus wind load (positive and negative) loads acting normal to the plane in accordance with the Building Code Climatic Data, wind load 1:30 years.

.2 Design sheet cladding to span continuously over at least four structural supports (three spans) and design fastening to structural supports to sustain factored loads in accordance with authority having jurisdiction.

.3 Calculate live load deflections in accordance with authority having jurisdiction and as modified by the requirements of this Section.

.4 Provide for movement of components without causing buckling, failure of joint seals, undue stress on fasteners when subject to seasonal temperature range from -40°C (-40°F) to +50°C (120°F), and wind loads noted above.

.5 Include expansion joints to accommodate movement in wall system and between wall system and building structure, where these movements are caused by deflection of building structure, and accommodate these movements, without permanent distortion, damage to infills, racking of joints, breakage of seals, or water penetration.

.6 Provide for positive drainage to the exterior of all water entering or condensation occurring within the system.

.7 Final review and acceptance of work completed by this Section shall be carried out by the manufacturer's representative, the Consultant, Contractor and the Subcontractor.

1.5 Submittals

.1 Submit product data in accordance with Section 01 33 00 – Submittals:

.1 Submit manufacturer's printed product literature, specifications and datasheet.

.2 Submit WHMIS MSDS - Material Safety Data Sheets acceptable to Labour Canada, and Health and Welfare Canada. Indicate VOC's:

.1 Caulking and sealant materials during application and curing.

.2 Finishing materials.

.3 Insulation adhesives.

.4 Paints.

.5 Isolation coatings.

.2 Product Data: Submit manufacturer's product data, standard drawing details, and installation instructions for system and individual components.

.1 Indicate arrangement of cladding system including dimensions, wall openings, location of joints, profiles of inner and outer skin, types and locations of supports, fasteners, flashing, closures, compliance with design criteria and requirements of related work.

.3 Submit samples in accordance with Section 01 33 00 – Submittals:

.1 Submit duplicate 300 x 300 mm samples of ceiling and wall systems, representative of materials, finishes and colours.

.2 Prior to ordering materials, provide to consultant the following for verification purposes: three samples of colour of finish specified.

.4 Colour Charts: Submit cladding manufacturer's colour charts showing full range of standard colours and finishes.

.5 Close-out Submittals: Upon project completion, submit manufacturer's warranties, including limitations and conditions.

.6 Warrantees: Submit manufacturer's product warranties.

1.6 Quality Assurance

.1 Coordinate requirements with Section 01 45 00 - Quality Control.

.2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.3 Installer Qualifications: Engage experienced installer, with a minimum of 5 years experience, who has completed systems similar in material, design, and extent to that indicated for Project and with record of successful performance.

.4 Pre-installation Meeting: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions, and manufacturer's warranty requirements.

.1 Participants: General Contractor, installation subcontractor, Owner, and Architect.

.2 Verify project requirements.

.3 Review installation and substrate conditions.

.4 Co-ordination with other building subtrades.

.5 Review manufacturer's installation instructions and warranty requirements.

.5 Mock-Ups: Mock up complete system at location as directed by Architect.

.1 Construct a [portion of one exterior wall in location agreed upon by Consultant to establish a standard of construction, workmanship, and appearance.

.2 Construct mock-up indicating relationship between wall cladding, air spaces, air/vapour retarder membrane, windows, and doors.

.3 Do not continue with work of this Section until Consultant has approved mock-up.

.4 Remove free-standing mock-up upon completion of all cladding work or when otherwise directed by Consultant].

.5 Accepted mock-ups may be incorporated into the work of this Section.

1.7 Delivery, Storage and Handling

.1 Ordering: Conform to manufacturer's ordering instructions and lead time requirements to avoid construction delays.

.2 Deliver materials and components in manufacturers' unopened containers or bundles, fully identified by name, brand, type and grade. Prevent damage during unloading, storing and installation.

.3 Store, protect and handle materials and components in accordance with manufacturer's recommendations to prevent twisting, bending, mechanical damage, contamination and deterioration.

.4 Store materials off ground and keep clean, dry, and free of dirt and other foreign matter.

1.8 Project/Site Conditions

.1 Field Measurements: Verify location of structural members and openings in substrates by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work

.2 Undertake installation work only when weather conditions meet manufacturers' specific environmental requirements and when conditions will permit work to be performed in accordance with manufacturer recommendations and warranty requirements.

1.9 Waste Management and Disposal

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

.2 Divert reusable materials for reuse at nearest used building materials facility.

.3 Divert unused caulking, sealants, and adhesive materials from landfill through disposal at hazardous material depot.

1.10 Warranty

.1 Manufacturer's Product Warranties:

.1 Ceiling Panels and Wall Cladding Systems: 15-Year Limited Product Warranty against physical defects of systems and products that are properly installed and maintained according to the manufacturer's published application instruction.

.2 Finish Coating: 25-Year Limited Finish Warranty against the following:

.1 Peeling and checking of finish, except slight crazing or cracking as may occur on tightly roll-formed edges or brake bends at time of forming.

.2 Chalking of exterior paint in excess of 8 when measured in accordance with ASTM D4214.

.3 Fading or colour change in excess of 5 colour difference units when measured in accordance with ASTM D2244 on exposed painted surfaces.

.3 Finish Coating: 15-Year Limited Product Warranty against physical defects of systems and products that are properly installed and maintained according to the manufacturer's published application instruction.

.4 Contractor's Labour Warranty: 2-year labour warranty, starting from the date of Substantial Performance, to cover repair of materials found to be defective as a result of installation errors.

Part 2 Products

2.1 Manufacturer

.1 Pre-finished metal siding as manufactured by VICWEST or approved equal.

.1 MT-09: VICWEST Traditional 150 Steel Siding, Size: 400 Wide x 38 High, Hidden Fastener Cladding, Colour: 9821 Graphite.

.2 Pre-finished aluminum facia panels as manufactured by LARSON by ALUCOIL NORTH AMERICA or approved equal.

.1 MT-01: Prefinished Aluminum fascia panels, Colour: Black.

.3 Pre-finished aluminum soffit/ceiling panels for ceiling and canopy as manufactured by Forma Steel or approved equal.

.1 MT-02: Forma Steel Forma Plank Slimline Panel, Size: 143 Wide by 2438 Length, Colour: Similar to Gunstock Woodgrain SMP.

.4 Pre-finished aluminum ceiling panels as manufactured by AL13 Architectural Systems or approved equal.

.1 MT-04: AL13 Architectural Systems, Panel system, Colour: alternate between Battle Gray & Slate (2 Battle Gray, 1 Slate), 305mm [1'] W x 1220mm [4'] L.

2.2 Accessories

.1 Girts: Fabricated from minimum 1.27 mm (0.05") thickness galvanized steel to ASTM A653, Grade 230 with Z275 coating; finish material visible after assembly of wall system to match aluminum cladding.

.2 Sub-Girts: Structural quality steel to ASTM A653, with Z275 zinc coating to ASTM A792, adjustable double-angle profile as indicated to accept panel with structural attachment to building frame.

.3 Extrusions: 3658 mm (144") long, corners and caps to profile for application.

.4 Clips: 102 mm (4") long system clips

.5 Fasteners:

.1 Attachment of Cladding to Steel Substrate: Number 10-16 self-drilling, self-tapping screws with corrosion-resistant coating to withstand 3000 hours of salt spray protection.

.1 Acceptable Materials:

.1 #10 Hex Head Tredecim, coated with drill-point.

.2 Attachment of Cladding to Wood Substrate: Number 12 drill-point fasteners with EPDM washers and corrosion-resistant coating to withstand 3000 hours of salt spray protection.

.1 Acceptable Materials:

.1 #12 Hex Head Tredecim coated with drill point.

.3 Attachment of Cladding to Concrete Walls: 4.7 mm (3/16 inch) with corrosion-resistant coating to withstand 3000 hours of salt spray protection, minimum 2000 psi.

.1 Acceptable Materials:

.1 4.7 mm (3/16") Hex Head Tredecim coated with matched tolerance drill bit.

.6 Isolation Tape: Manufacturers standard material for separating dissimilar metals from direct contact.

.7 Insulation Fastenings: Corrosion resistant, galvanized bugle head screws with 38 mm (1.5 inch) diameter washer, 25 mm (1 inch) minimum penetration into framing.

.8 Insulation: Rigid type [4] [3] [2] as specified in Section 07 21 13.

.9 Air/Vapour Retarder: Self-adhering membrane as specified in Section 07 27 13.

.10 Sealant: as indicated in Section 07 92 00 and as recommended by manufacturer. Colour of exposed sealant to match adjacent cladding.

.11 Gaskets: Santoprene or EPDM as recommended by manufacturer.

.12 Accessories: cap flashings, drip flashings, internal corner flashings, copings and closures for head, jamb, sill and corners, of same material, thickness and finish as exterior cladding, brake formed to shape.

.13 Bituminous Coating: Cold-applied asphalt mastic, in accordance with CGSB 1.108, compounded for 0.40 mm (15 mil) dry film thickness per coat with inert type non-corrosive compound free of asbestos fibres, sulphur components, and other deleterious impurities.

.14 Expansion joints: as recommended by Manufacturers Instructions.

2.3 FABRICATION

.1 Fabricate and finish cladding, and accessories at the factory to greatest extent possible using manufacturer's standard procedures and processes, and conforming to indicated profiles and with dimensional and structural requirements.

.2 Fabricate cladding true, plumb and square, with no oil-canning or deformity that detracts from aesthetic appearance, matching quality and installation of accepted mock-up specified above.

.3 Apply bituminous coating or other permanent separation materials on concealed panel surfaces where cladding will be in direct contact with substrate materials that are not compatible or could result in corrosion or deterioration of either materials or finishes.

Part 3 EXECUTION

3.1 Manufacturer’s Instructions

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

3.2 Preparation

.1 Obtain dimensions from job site before fabricating wall system.

.2 Ensure structural support is aligned and condition is acceptable.

.3 Building surfaces shall be smooth, clean and dry, and free from defects detrimental to the installation of the system. Notify Contractor of conditions not acceptable for installation of system.

.4 Inspect wall system and components before installation and verify that there is no shipping damage.

.5 Do not install damaged planks; repair or replace as required for smooth and consistent finished appearance.

3.3 Installation

.1 Install cladding and components in accordance with CGSB 93.5, shop drawings, and manufacturer's written instructions.

.2 Ensure continuity of building envelope air barrier and vapor retarder systems.

.3 Install continuous starter strips, inside and outside corners, edgings, soffit, drip, cap, sill and window/door opening flashings as indicated.

.4 Install outside corners, fillers and closure strips with carefully formed and profiled work.

.5 Maintain joints in exterior cladding, true to line, tight fitting, hairline joints.

.6 Attach components in manner not restricting thermal movement.

.7 Caulk junctions with adjoining work with sealant. Do work in accordance with Section 07 92 00 - Joint Sealing.

.8 Apply isolation coating to areas of contact between dissimilar metals.

.9 Touch-Up Painting: Inspect completed wall system and apply matching touch-up paint as needed to correct minor paint flaws.

3.4 Control/Expansion Joints

.1 Construct control and expansion joints as indicated.

.2 Use cover sheets, of brake formed profile, of same material and finish as adjacent material.

.3 Use mechanical fasteners to secure sheet materials.

.4 Assemble and secure wall system to structural frame so stresses on sealants are within manufacturers' recommended limits.

3.5 Construction

.1 Installation Tolerances: Shim and align cladding within installed tolerance of 6 mm (¼") in 6100 mm (20'-0") on level, plumb, and location lines as indicated, and within 3 mm (1/8") offset of adjoining faces and of alignment of matching profiles.

3.6 Field Quality Control

.1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.

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

.3 Schedule site visits to review Work at stages listed:

.1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.

.2 Twice during progress of Work at 25% and 60% complete.

.3 Upon completion of Work, after cleaning is carried out.

.4 Submit reports to Consultant within three days of review and submit.

3.7 Cleaning

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Wash down exposed interior and exterior surfaces using solution of mild domestic detergent in warm water, applied with soft, clean wiping cloths. Wipe interior surfaces clean as part of final clean-up.

.3 Remove excess sealant with recommended solvent.

.4 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

METAL FLASHING

PART 1 - GENERAL

1.1 General Instructions

.1 Read and be governed by conditions of the Contract and sections of Division 1.

1.2 Section Includes

.1 Supply and installation of prefinished metal flashings.

.2 Supply and installation of galvanized metal breakforms.

1.3 Quality Assurance

.1 Qualifications:

.1 Work of this section shall be installed by a Subcontractor that is a member in good standing of the Canadian Roofing Contractors Association, who has been a member for at least 5 years, and who has a minimum of 5 years proven satisfactory roofing experience installing sheet metal work on projects of comparable scope.

.2 Sealant shall be applied by a Subcontractor of recognized standing, having preferably not less than 5 years of proven experience in this type of work, and who has the necessary equipment and skilled mechanics to carry out the work of this section satisfactorily and can substantiate this to satisfaction of Consultant.

.3 Upon request, provide proof of qualification in accordance with Section 01600.

.2 Quality control shall be in accordance with Section 01400. The independent inspection and testing company shall attend the pre-installation meeting.

.3 The work of this section shall be inspected and tested in conjunction with inspection and testing of roofing work.

1.4 Submittals

.1 Submit required submittals in accordance with Section 01340.

.2 Shop drawings:

.1 Submit layout drawings indicating locations of all joints in metal flashings at perimeter of roofs. Submit drawing of metal flashings for vents and similar components which penetrate roofing.

.3 Samples:

.1 Submit full-size samples of each specified flashing material formed to detailed profile including corner, curb, cap, and parapet flashing, and coping including lock- joints and hold-down clips.

.2 Submit duplicate 50 mm x 50 mm (2" x 2") samples of each type of sheet metal material, colour and finish.

1.5 Building Envelope Performance Requirements

.1 Building envelope performance requirements shall be in accordance with Section 01900.

1.6 Product Handling

.1 Keep materials and equipment free from debris, ice, snow and contaminants. Allow air to circulate around metal components, sheets and break shapes.

.2 Protect holes, and reglets from water and ice during freezing weather.

1.7 Warranty

.1 The warranty period with regard to the work of this section is 2 years.

PART 2 - PRODUCTS

2.1 Prefinished Steel Flashing

.1 Sheet steel: 0.457 mm (26 gauge) minimum thickness, commercial quality to ASTM A653 with Z275 designation zinc coating.

.2 Finish: CSSBI Metallic 10000 Series, colour to later selection by Consultant from manufacturer’s full range.

2.2 Prefinished Aluminum Parapet Flashing

.1 Sheet aluminum: 3 mm minimum thickness, aluminum sheet to Aluminum Association AA- 5005-H14.

.2 Finish: PPG Duranar Metallic, colour to be Silver Metallic PPG BK20539XL, Valspar 399X440 (Classic II).

2.3 Accessories

.1 Isolation coating: to CAN/CGSB-1.108-M, bituminous type.

.2 Sealants: in accordance with Section 07900, colour selected by Consultant from manufacturer's full range.

.3 Cleats: of same material, temper, and thickness as sheet metal, minimum 50 mm (2") wide.

.4 Fasteners: of same material as sheet metal, to CSA B111-1974, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.

.5 Washers: of same material as sheet metal, 1 mm (0.039") thick with rubber packings.

.6 Flexible flashing membrane: 1.2 mm (47 mils) thick, peel-n-stick membrane complete with primer, 'Ice & Water Shield' by W.R. Grace, Bakor 'Blueskin PE 200 HT'.

.7 Expansion joint flashings: 40 mil reinforced PVC with foam backing and metal nailers, purpose made for roof/wall expansion joints as detailed, L.P. Expansion Joint Cover as manufactured by Lexsuco or approved alternate.

2.4 Fabrication

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA "FL" Series details and as indicated. *Provide* prefinished metal flashing over equipment curbs which are covered with roofing membrane.

.2 Form pieces in 2440 mm (96") maximum lengths. Make allowance for expansion at joints.

.3 Hem exposed edges on underside 12.7 mm (1/2") Miter and seal corners with sealant.

.4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

PART 3 - EXECUTION

3.1 Installation

.1 Install sheet metal work in accordance with CRCA guidelines and written recommendations.

.2 Use concealed fastenings except where exposed flashings are accepted by Consultant prior to installation.

.3 Counterflash membrane flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips.

.4 Lock end joints and caulk with sealant.

.5 Install surface mounted flared joint true and level, and caulk top of reglet with sealant.

.6 Insert metal flashings to other materials and flashings to form weathertight junction.

.7 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm (1") where indicated. Wedge flashing securely into joint.

.8 Seal flashing at reglet and cap flashing with sealant.

.9 Install flexible flashing membrane in accordance with manufacturer's printed installation instructions.

3.2 Installation of Roof Accessories

.1 Incorporate devices to which roofing and flashing may be secured.

.2 Install work to ensure that roofing and flashings will be properly applied to maintain building envelope weathertight.

3.3 Field Quality Control

.1 Field quality control shall be in accordance with Section 01400.

.2 Arrange a pre-installation meeting for the work of this section in accordance with Section 01200.

END OF SECTION

JOINT SEALANTS

PART 1 – GENERAL

1.1 Scope

.1 Review other Sections of the Specifications for extent of sealant work specified in those Sections. Provide all other joint sealant materials, equipment and labour necessary to complete the work of this Section as indicated on the drawings, specified herein, or as required by job conditions and normally considered as work covered by this Section.

.2 The term "sealant" to be synonymous with the term "caulking" where used on the drawings and/or specifications.

1.2 Related Work

Concrete Floor Finishing	Section 03345
Unit Masonry.	Section 04200
Gypsum Wallboard	Section 09250
Miscellaneous Specialties	Section 10200

1.3 References

.1 CAN/CGSB-19.6, Caulking Compound, Oil Base.

.2 CAN/CGSB-19.13, Sealing Compound, one-component, Elastomeric, Chemical Curing.

.3 CAN/CGSB-19.21, Sealing and Bedding Compound Acoustical.

.4 CAN/CGSB-19.22, Mildew Resistant, Sealing Compound for Tubs and Tiles.

.5 CAN/CGSB-19.24, Multi-component, Chemical Curing Sealing Compound.

1.4 Submittals

.1 Manufacturer's Data: Submit manufacturer's literature describing each material to be used in the work of this Section. Literature shall contain a statement that the material complies with the specified standard.

.2 Samples: Submit for approval and colour selection sample of each type of compound, recommended primers and joint filler or fillers proposed to be used.

.3 Safety Data Sheets: 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 Quality Assurance

.1 Prior to commencing work the sealant manufacturer, Contractor, subcontractor, Consultant, and Owner’s representative shall establish the proper sealants to be used throughout the work.

.2 Sealants shall be installed by qualified caulking contractor with minimum five years experience and proven record of being able to produce good quality work.

.3 Installation of sealants to be performed only by workmen skilled and trained in the techniques of caulking, and who are completely familiar with the published recommendations of the manufacturer of the sealant material being used.

.4 Manufacturer's recommendations for mixing or preparation of materials shall be strictly adhered to. Pot life or installation times shall not be exceeded.

.5 Integral materials which compose a joint detail shall be compatible. Component parts, where possible, shall have the same manufacturer.

.6 A representative of sealant material manufacturer shall visit the site during application to ensure that all work is carried out according to the manufacturer's printed instructions.

.7 The Owner may appoint (and pay) an independent Inspection and Testing agency, to carry out random inspection and testing on work and materials.

.8 Apply sealants to joints in surfaces to be painted before painting.

1.6 **Delivery, Storage and Handling**

.1 Deliver sealants to site in sealed containers bearing manufacturer's name, brand name of sealant and reference standard to which sealant complies.

.2 Store materials in a dry area having an ambient temperature within limitations recommended by material manufacturer.

1.7 **Project/site Conditions**

.1 Apply sealants only to completely dry surfaces, and at air and material temperatures above minimum established by manufacturer's specifications.

.2 The temperature of sealants and the materials to which it is applied not to be below 5 deg C.

.3 Should it become necessary to apply sealants when the temperature is below 5 deg C, consult the sealant manufacturer and follow his recommendations.

1.8 **Warranty**

.1 Warrant the work of this Section against defects in materials and workmanship in accordance with General Conditions, for a period of five (5) years and agree to promptly make good any defects which occur or become apparent during the warranty period without cost to the Owner, such defects to include, but not restricted to, leakage, cracking, deterioration, shrinkage, loss of cohesion, staining or failure to provide intended seal.

PART 2 – PRODUCTS

2.1 Sealants

.1 Sealant Type "A": Multi-component, chemical curing, polyurethane, conforming to CAN/CGSB-19.24, Type II, Class B Silicone by Dow Corning.

.2 Sealant Type "B": One component, moisture curing, modified polyurethane joint sealant, conforming to CAN/CGSB-19.13, 'DyMonic' by Tremco (Canada) Ltd., or 'Sternson RC-2' by Sternson Construction Products, or approved equal.

.3 Sealant Type "C": Oil based caulking compound conforming to CAN/CGSB-19.6-M87.

.4 Sealant Type "D": One component polyurethane based type conforming to ASTM C920, Type M, Grade P, Class 25, `THC-900' by Tremco (Canada) Ltd., or 'Sternson RC-2 SL' by Sternson Construction Products, or approved equal.

.5 Sealant Type "E": One component silicone base, solvent curing conforming to CAN/CGSB-19.22, 'Proglaze' by Tremco (Canada) Ltd., 'Dow Corning 786' by Dow Canada Inc. or 'Sanitary 1700' by Canadian General Electric Company. or approved equal.

.6 Colours: Selected by Consultant, not necessarily from manufacturer's standard colours.

2.2 Accessories

.1 Joint Cleaner: Non-corrosive solvent recommended by sealant manufacturer for applicable substrate material.

.2 Primer: Non-staining type recommended by sealant manufacturer.

.3 Joint Back-Up: Round closed cell foam, extruded polyethylene, Shore A hardness of 20, tensile strength 140 to 200 KPa, oversized 30-50% compatible with sealant and primer, non-adhering to sealant, 'Sof Rod' by Tremco (Canada) Ltd., or approved equal.

.4 Bond Breaker: Pressure sensitive polyethylene tape, not bondable to sealant.

.5 Preformed Compression Seal: Compartmental open cell neoprene extrusion type conforming to ASTM C509-91, complete with liquid lubricant adhesive recommended by manufacturer.

PART 3 – EXECUTION

2.1 Examination

.1 Examine joints to be sealed and report in writing to the Consultant any defects in work of other Sections which would impair installation, performance and warranty of sealants.

.2 Check form release agent used on concrete for compatibility with primer and sealant. If incompatible inform Consultant and change primer and sealant to approved compatible types or clean concrete to Consultant's approval.

.3 Where surfaces, to be sealed, are prime painted in shop before caulking, check to make sure prime paint is compatible with primer and sealant. If incompatible inform Consultant, consult the manufacturer, and change primer and sealant to approved compatible types.

.4 Ensure masonry and concrete have cured 28 days minimum.

.5 Do not commence installation of sealants until conditions are acceptable. Commencement of work implies acceptance of surface and conditions.

2.2 **Preparation**

.1 Clean and prepare surfaces to be sealed to provide clean sound surfaces for sealant adhesion in accordance with sealant manufacturer's recommendations.

.2 Remove dust, oil, grease, water, frost, loose mortar and other foreign matter. Remove loose particles by blowing joint out with compressed air.

.3 Chemically clean non-porous surfaces such as metal and glass, taking care to wipe solvents dry with a clean cloth. Use solvents recommended by sealant manufacturer.

.4 Clean porous surfaces such as masonry, concrete and stone by mechanical abrading.

.5 Prevent staining of adjacent surfaces by masking with tape prior to priming and sealing.

.6 Prime joints in accordance with sealant manufacturer's recommendations. Apply primer before installing premoulded backup.

.7 Install premoulded backup in joints 6 mm and more in width. Roll rope type backup into joint, do not stretch or braid. Install bond breaker in joints less than 6 mm in width.

.8 Support joint filler on horizontal traffic surfaces against vertical movement which might result from traffic loads or foot traffic.

.9 Examine joint sizes and correct to achieve depth to width proportions schedule herein, with minimum width and depth of 6 mm, maximum width 25 mm.

2.3 **Application**

.1 Apply sealants in accordance with manufacturer's directions, under pressure using suitable equipment, to leave a weathertight, airtight installation. Gun nozzle shall be of proper size to fit, and seal joint.

.2 Force sealant into joints in full bead, making certain that full contact is made with sides of joint. Tool joints to produce a slightly concave surface.

.3 Sealant must appear as a concave recessed joint, free of ridges, wrinkles and embedded foreign matter. Sealant shall not spread or bulge beyond surfaces on each side of joint.

.4 Apply sealants in accordance with following table:

Joint Width	Sealant Depth

6mm	6mm
10mm	7mm
15mm	10mm
20mm	12mm
25mm	15mm

.5 Where recommended by sealant manufacturer, vent exterior joints in accord with such recommendations.

2.4 **Field Quality Control**

.1 Cooperate with the Consultant and/or any inspection and testing agency the Owner may appoint.

.2 Provide cut tests of 150 mm in length in order to ensure correct thickness, hardness, mixing and surface finish. Provide these cut test samples at times and from locations as directed by the Consultant and make good the areas from which the samples are taken.

.3 All tests of the sealant installation shall be inspected by the sealant manufacturer's representative.

2.5 **Cleaning**

.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. Make good any damage caused.

2.6 **Protection**

.1 Protect all sealant against puncture or damage until sealant has attained its final set.

.2 Provide temporary covers over joints where joints have been cleaned out, but not yet sealed.

2.7 **Schedules**

.1 Use only sealants which are proven to be compatible with materials they are in contact with. Notify Consultant prior to start of work should any sealant specified be considered unsuitable for the purpose intended.

.2 Provide, as part of the work of this Section, all joint sealants required by the project conditions excluding joint sealants specified as part of the work of other Sections and generally as scheduled below:

.1 Apply Type "A" sealant to all Exterior locations where sealants are required, (except where other type is specifically scheduled), including the following locations:

.1 Between dissimilar materials in exposed locations.

.2 Expansion joints.

.3 Control joints and shelf angle joints in masonry elements.

.4 At perimeter of door steel door and screen frames and louvre frames.

.5 At penetrations through exterior building elements.

.2 Apply Type "B" sealant to all Interior locations where sealants are required, (except where other type is specifically scheduled), including the following locations:

.1 Between dissimilar materials in exposed locations except where specifically indicated otherwise.

.2 Perimeter of exterior steel door and screen frames and louvre frames.

.3 Perimeter of interior steel door and screen frames where gap between frame and wall exceeds 1.5 mm or where gap is irregular.

.4 Control joints in masonry elements, and joints between bearing and non-bearing masonry walls.

.5 Between masonry partitions / walls and concrete structure where exposed, except at firestopped / smoke sealed locations.

.6 Between concrete block and concrete elements.

.7 Expansion joints, except where covered with expansion joint cover.

.8 Between steel stair stringers and wall.

.9 Inside corners and control joints in ceramic tile.

.10 Perimeter of firehose cabinets, access panels, and control panels.

.11 Between walls and drinking fountains, hand basins, wash fountains, urinals.

.12 Between countertops/vanities and lavatories.

.13 Between floors and WC's.

.14 Between countertops/vanities and wall.

.15 Between floor and floor mounted service sinks.

.3 Type "C": Gun apply 3 continuous serpentine beads under exterior thresholds. Make sealant bead diameter of sufficient size to ensure full width seal.

.4 Type "D": Floor control joints.

.5 Type "E": At vanities/countertops, joints between walls and service sinks, urinals, etc. where non-staining sealant is required, at plumbing fixtures and at ceramic wall tile control joints use silicone sealant.

END OF SECTION

ARCHITECTURAL SPECIFICATIONS
STEEL DOORS AND FRAMES

PART 1 – GENERAL

1.1 General Requirements

.1 General Conditions, Supplementary Conditions and Division 01 apply to this section.

1.2 Work Included

.1 Work under this section consists of the furnishing of all labour, materials, equipment, and services necessary for, and incidental to, the complete and proper fabrication and supply of all hollow metal doors, frames and screens including preparation for specified hardware and labelling of fire rated doors and frames and related work as shown on the drawings or specified herein, and in accordance with all applicable requirements of the contract documents.

1.3 Related Work

Unit Masonry	Section 04300
Metal Fabrications	Section 05500
Joint Sealants	Section 07900
Finish Hardware	Section 08710
Gypsum Wallboard	Section 09250
Painting	Section 09900

1.4 Work Supplied but Not Installed

.1 Supply frames and anchors to other Sections where it is necessary to build frames into work of other Sections.

.2 Supply instructions required for accurate positioning and proper installation of components supplied to other Sections.

1.5 References

.1 Canadian Steel Door and Frame Manufacturers Association - Specifications for Commercial Steel Doors and Frames.

.2 Canadian Steel Door and Frame Manufacturers Association - Canadian Fire Labelling Guide for Steel Doors and Frames.

.3 Canadian Steel Door and Frame Manufacturers Association - Canadian Metric Guide for Steel Doors and Frames (Modular Construction).

.4 NFPA 80-1992, Fire Doors and Windows.

.5 NFPA 252-1990, Fire Tests for Door Assemblies.

.6 CAN4-S104M-M80 (R 1985), Fire Tests of Door Assemblies.

.7 CAN4-S105M-M85(R 1992), Fire Door Frames.

.8 CAN/CSA-G40.21-M92, Structural Quality Steels.

.9 CSA W59-03, Welded Steel Construction (Metal Arc Welding).

.10 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.11 CGSB 41-GP-19Ma, Rigid Vinyl Extrusions for Windows and Doors.

.12 CAN/ULC-S704-01, Thermal Insulation, Urethane and Isocyanurate, Unfaced.

.13 Replaced by ASTM A653/A653M-04a & A924/A924M-04, Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Alloy -Coated (Galvanized) by the Hot-Dip Process.

.14 ASTM A 526M-90, Specification for Steel Sheet, Zinc-Coated (Galvanized) Zinc Alloy -Coated (Galvanized) by the Hot-Dip Process.

.15 ASTM E 2074-00, Methods for Fire Tests of Door Assemblies.

1.6 **Design Criteria**

.1 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35°C to 35°C.

1.7 **Submittals**

.1 Provide submittals specified and as required to assess conformance with the Contract Documents, in accordance with the General Conditions and Division 01 of the Specifications.

.2 Prepare and submit detailed shop drawings to Consultant for review prior to fabrication.

.3 Indicate each type of frame, material, steel core thickness, frame configuration, anchor types, and spacings, location of cutouts for hardware, reinforcement, and finish.

.4 Indicate each type of door, material, steel core thickness, mortises, reinforcements, locations of exposed fasteners, openings, arrangement of hardware, finishes and, where required, fire rating.

.5 Provide schedule identifying each unit, with door marks and numbers relating to numbering each unit in relation to Architectural Schedule/Drawings.

1.8 **Quality Assurance**

.1 Conform to requirements of Canadian Steel Door and Frame Manufacturers Association (CSDFMA) standards except where noted otherwise.

.2 Steel fire doors and frames shall be labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104-M80 (R 1985) for ratings specified or indicated.

.3 Installed frame and door assembly to conform to ULC for fire rated class indicated in schedule.

.4 Install fire labelled steel doors and frame products in accordance with NFPA-80 current edition, except where specified otherwise.

.5 Conform to applicable codes and standards for fire rated doors including requirements for fire protection rating, maximum temperature rise on unexposed side of doors and maximum area of wired glass in doors.

.6 Welding shall conform to CSA W59-03.

1.9 **Delivery, Storage and Handling**

.1 Adequately protect units against rust and damage during manufacture, delivery and storage.

.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 noted on the carriers' Bill of Lading and immediately reported, in writing, to the supplier.

.4 Doors shall be removed from their wrappings or coverings upon receipt on site, shall be stored in a vertical position on planks in a dry area, spaced with blocking to permit air circulation between them and covered to protect from damage. Make good immediately any damage done. Clean scratches and touch-up with rust-inhibitive primer.

1.10 **Warranty**

.1 The work of this section shall be warranted for a period of two (2) years.

PART 2 – PRODUCTS

2.1 **Approved Manufacturers**

.1 Macotta Company of Canada Limited.

.2 Daybar Industries Limited.

.3 S.W. Fleming Limited.

.4 Baron Metal Industries Inc.

.5 Or other prior approved alternate who is a member of the CSDFMA.

2.2 **Materials**

.1 Steel: Commercial grade steel to ASTM A568/A568M-03, Class 1, hot-dip galvanized to ASTM Replaced by A653/A653M-04a coating designation to ASTM Replaced by A653 and A924, ZF75 (A25) known commercially as ’Colour bond’, ’Satincoat’ or ’Galvanneal’ except where specified otherwise.

.2 Reinforcement: Steel to CSA-G40.21-98, Type 44W, coating designation to ASTM A653 and A924.

.3 Hardware/Reinforcing/Accessories (steel thickness):

.1 Strike lock reinforcements
1.5 mm

.2 Hinge reinforcements
3.4 mm

.3 Reinforcement for surface mounted hardware
2.7 mm

.4 Mortar guard boxes
0.76 mm

.5 Floor anchors
1.5 mm

.6 Wall anchors (strap type)
1.5 mm
(Note: wire type anchors not permitted)

.7 Top/Bottom Channels
1.2 mm

.8 Top Caps
1.2 mm

.4 Cores:

.1 Insulated: Polyurethane, rigid board insulation CAN/ULC-S704-01.

.2 Honeycomb Construction: Structural small cell 24.5 mm maximum kraft paper honeycomb, weight 36.3 kg per ream minimum, density 16.5 kg/m^3 minimum, sanded to required thickness.

.3 Fire rated doors core equal to fibreglass – reinforced components used for stiles, rails and blocking.

.5 Adhesives:

.1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced polychloroprene based, low viscosity, contact cement.

.2 Polystyrene and polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement.

.3 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, sealant/adhesive.

.6 Door Silencers: Single stud resilient rubber.

.7 Touch-up Paint: Zinc-Rich primer to CAN/CGSB-1.181-99.

2.3 **Fabrication - Frames**

.1 Provide welded frames of 1.5 mm thick sheet steel to profiles indicated.

.2 Assemble components with accurately cut joints. Mitre outside corner joints of frames. Weld joints on inside of profile; grind welds, flush and sand to smooth uniform surface.

.3 Fit and assemble work in the shop wherever possible, eliminating field joints.

.4 Countersink frames at anchor locations to accommodate 10 mm screw fasteners for frames installed into concrete openings. Provide steel sleeves between frame and wall.

.5 Drill strike jamb of each single door frame for 3 bumpers. Drill head member of double door frames for 2 bumpers.

.6 Provide angle or channel head reinforcement for door frames wider than 915 mm.

.7 Tack weld two removable minimum 1.2 mm thick steel spreader channels to inside faces of door frames at base.

.8 Provide adjustable base clips for anchorage to floor at bottom of each door jamb.

.9 Provide frames, set in masonry walls, with minimum 0.9 mm guard boxes welded to frame, at hinges, strikes and other hardware items recessed into frames.

.10 Hardware reinforcements shall in addition to frame thickness.

.11 Where indicated provide removable mullions.

.12 Thermally Broken Frames:

.1 Fabricate thermally broken frames in two sections joined by thermal break material. Fabricate anchors for thermally broken frames to suit wall conditions, avoiding cold transfer from exterior frame section to interior frame section. Insulate thermally broken frames to provide continuous thermal barrier in exterior frames.

.2 Provide thermally broken frames at exterior doors.

.3 Provide welded on drip at head of exterior door frames.

.13 Fire Rated Frames:

.1 Refer to Door and Frame Schedule for location of labelled fire door locations.

.2 Frames shall be labelled for 1-1/2 hour or 3/4 hour fire rating, as called for on Door and Frame Schedule.

2.4 **Fabrication - Doors**

.1 Fire Rated Doors:

.1 Construct fire rated doors in accord with fire test requirements. Provide astragals at fire rated pairs of doors. Skins shall be 1.5 mm thick.

.2 Provide fire rated doors bearing a 1-1/2 hour label (Class B) or 3/4 hour (Class C) as required, refer to Door and Frame Schedule.

.2 Exterior Doors:

.1 Exterior doors shall be of hollow steel construction with all spaces filled with insulation. Skins shall be 1.5 mm thick.

.2 Provide flush steel end closures at top edge of exterior doors and where required for attachment of hardware and weather stripping.

.3 Provide condensation weep holes at bottom edge of exterior door.

.3 Interior doors shall be of honeycomb core construction. Skins shall be 1.2 mm thick, except for high traffic doors. Interior doors wider than 1000 mm shall be steel stiffened.

.4 Join door face sheets at vertical edges by continuous weld extending full height of door. Render joints invisible by grinding, filling and dressing smooth; mechanically locked joints are not acceptable.

.6 Provide hardware reinforcements as specified in addition to door skin thickness.

.7 Surround openings in flush doors with minimum 1.2 mm thick steel edge channels, welded to both face sheets

.8 Provide removable glazing stops of zinc coated steel channels mitred at corners, accurately fitted into position and fastened with countersunk Phillips, flathead sheet metal screws.

.9 Glazing stops at outside of exterior doors shall be rendered non-removable.

2.5 **Finishes**

.1 Wipe coat galvanized for paint finish on site.

PART 3 – EXECUTION

3.1 Installation - Frames

.1 Set frames in place plumb, square and level and at correct elevations, in accordance with Canadian Steel Door and Frame Manufacturers' Association standards.

.2 Coordinate with block layer and drywall installer for proper anchor placement. Secure floor anchors.

3.2 Installation - Glazing

.1 All fire-rated door lites shall be glazed with wired glass in accordance with certification requirements. All glazing for rated and non-rated screens/doors will be done by Section 08800.

3.3 Field Quality Control

.1 Tolerances:

.1 Maximum Diagonal Distortion: 3 mm measured with straight edge, corner to corner.

3.4 Schedules

.1 Refer to Door Schedule.

END OF SECTION

ALUMINUM STOREFRONT DOORS, FRAMES AND WINDOWS

PART 1 – GENERAL

1.1 Scope

Provide all material and equipment for supply and installation of all aluminum storefront doors, frames and windows, including, transoms, and all associated hardware, weather-stripping, glazing, caulking and thresholds.

Entrance doors to be sliding automatic entrances.

1.2 Related Work Specified Elsewhere

Rough Carpentry	Section 06100
Joint Sealants	Section 07900
Glass	Section 08810

1.3 Shop Drawings

.1 Submit shop drawings in accordance with Section 01340.

.2 Clearly indicate materials and provide large scale details for head, jamb and sill, indicating profiles of components, elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes and fasteners, fabrication details, finishes, hardware and glass.
Sample of aluminum storefront door/widows must be provided for review.

.3 Shop drawings must bear the seal of a licensed professional engineer.

1.4 Design Criteria

.1 The entire framing system shall be designed to provide gaskets, joints and seals to ensure that no rainwater penetrates beyond the interior glass surface.

.2 All openings shall be situated so as to prevent direct water entry.

.3 Design the exterior skin of the system to resist anticipated loads in accordance with the National Building Code and have a maximum deflection of 1/175 of the span.

.4 System shall be designed to meet or exceed air and water infiltration performance criteria of the applicable CGSB specifications.

.5 Sliding automatic entrances complete with infrared sensor, override and breakout doors.

1.5 Maintenance Data

.1 Provide maintenance data for cleaning and maintenance of aluminum windows for incorporation into manual specified in Section 01700.

1.6 Extended Warranty

.1 Provide a written warranty for two years that is two years from expiry of the standard two-year period.

.2 This warranty shall cover leaking, discoloration of aluminum surfaces, deterioration of finish, cracks, loss of seal at insulated units, breakdown of sealants and workmanship.

PART 2 – PRODUCTS

2.1 **Materials**

.1 All frames at storefront windows shall be equal to Commdoor Aluminum 511 Series 50x 125mm., thermally broken to suit 25 mm front glazing or approved equal. Size and reinforce heads and jambs to suit support conditions.

.2 All doors shall be equal to Commdoor 500 Series or approved equal.

.3 All sections shall be aluminum extrusions of 6063 alloy with T5 heat treatment. All exposed sheet intended for finishing shall be proper anodizing quality. Sheets not exposed shall be utility grade.

.4 Thermal break material shall be flexible PVC, compressed to seal between main sections and pressure plates.

.5 Sliding Automatic Entrance equal to Entrematic system by Hunter or Assa Abloy – Besam SL 500 system.

.6 Exterior and interior glazing seals shall be extruded EPDM splines to accommodate 25 mm sealed units or insulated panels.

.7 Finish on all exposed surfaces shall be equal to Thermosetting Acrylic Enamel coating in accordance with AAMA 603.8. Colour from PPG standard chart equal to " Black Anodized" .

.8 Locks – Adams-Rite or equal maximum security deadlocks, cylinder c/w cylinder guard (with thumb turns at interior faces) inside and outside lock, and master keying by others.

.9 Weather stripping - Install metal backed pile cloth on 3 sides of doors and adjustable astragal with stainless steel backing at meeting stiles of pairs of doors, except at mall entrance doors where no astragal is required.

.10 Combination Push/Pull handles - on all doors shall be equal to CO.9, offset pull, brushed stainless steel finish. All doors to have a door holder 9000-490 and closures equal to LCN 4040 9000-422 (hold open)

.11 Threshold shall be aluminum and continuous across openings, compatible with door bottom seal.

.12 Door Bottom shall have vinyl seal which engages threshold in the closed position.

.13 Sealant shall be equal to Silicone, colour-matched to adjacent window frame.

.14 Hinges shall be butt hinges, stainless steel with n.r. pins.

.15 Glass and Glazing materials to be in accordance with Section 08800. Thickness of glazing shall be compatible with aluminum frame and as noted above.

.16 Isolation Coating shall be alkali resistant bituminous paint.

.17 Reinforcement shall be provided horizontally and vertically to suit manufacturer's recommendations.

2.2 **Fabrication**

.1 Fabricate window units square and true with maximum tolerance of plus or minus 1.5 mm for units with diagonal measurement of 1.8 m or less, and plus or minus 3mm for units with diagonal measurement over 1.8 mm.

.2 Make allowance for deflection of structure. Ensure that structural loads are not transmitted to windows.

.3 Manufacturer's nameplate on windows is not acceptable. Place manufacturer's nameplates in semi concealed locations.

.4 Finish steel clip and reinforcing steel with steel primer.

.5 All joints shall be accurately fitted and sealed to provide neat, waterproof joints.

.6 Door construction shall consist of butt jointed corners with reinforcement at top and bottom corners. All butt joints shall be welded on the concealed corners to form true and square corners.

.7 Glass stops at doors are to be snap-on dry glazing type using concealed screws and spring clips.

.8 Glass stops at window units to be screw applied pressure plates concealed by exterior snap-on covers.

.9 Securing of insulation into back-up panels shall be by impaling insulation onto welded pins and retained by integral disc.

.10 Approved fabricator and installer equal to Daco Aluminum – Joe Lentini.

2.3 **Isolation Coating**

.1 Isolate aluminum from following components, by means of isolation coating:

- Dissimilar metals
- Concrete, mortar and masonry
- Wood

2.4 **Glazing**

.1 Prepare frames and sash to accommodate glass and glazing method specified in Section 08810.

.2 Site glaze windows with sealed units and doors with safety glass in accordance with Section 08810.

PART 3 – EXECUTION

3.1 **Examination**

.1 Do not install frames until satisfied that openings are complete, true, and square. Verify all dimensions in field before fabricating. Commencement of the installation will denote acceptance of the openings.

3.2 **Installation**

.1 Install all members plumb, square and level, free of warp, twist, and superimposed loads. Securely fasten using concealed fastening system. Shim with aluminum plates retained by fastenings.

.2 Apply hardware to manufacturer's instructions and templates. Use Lok-Tite or similar bonding agent to ensure snug, durable connections.

.3 Caulk full perimeter inside and outside of all openings using sealant colour matched to window frames.

.4 Seal joints between frame member and other components with sealant to provide weather tight seal at outside and air, vapour seal at inside.

.5 Seal joints between windows and window sills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window frame. Caulk butt joints in continuous sills.

.6 Apply sealant in accordance with Section 07900. Conceal sealant within aluminum work except where exposed use is permitted by Architect. Do not caulk snap-on covers to adjacent construction.

.7 Remove all protective materials.

.8 Check and adjust all hardware after installation and glazing.

END OF SECTION

FINISH HARDWARE

PART 1 – GENERAL

1.1 Scope

.1 Work under this section consists of the furnishing of all labour, materials, equipment, and services necessary for, and incidental to, the complete and proper supply of finishing hardware and related work as shown on the drawings or specified herein, and in accordance with all applicable requirements of the contract documents.

.2 Installation of Hardware and hanging of doors is included as part of Section 08500 Aluminum Storefront Doors and Windows.

1.2 Related Work

Painting	Section 09900

1.3 References

.1 Underwriters Laboratories of Canada (ULC):

.2 Warnock Hersey Institute of Canada (WHI)

.3 AHC - Association of Hardware Consultants.

.4 BHMA - Builders Hardware Manufacturing Association.

1.4 Design Criteria

.1 Lay out keying system for building in consultation with Owner. System includes keying differently, and master keying locks to meet Owner's requirements. Prepare and submit keying chart and related explanatory data for approval. Do not commence lock work until written confirmation of keying arrangements is received.

1.5 Submittals

.1 Provide submittals specified and as required to assess conformance with the Contract Documents, in accordance with the General Conditions and Division 01 of the Specifications.

.2 Provide product data on supplied hardware.

1.6 Samples

.1 Submit samples of complete line of hardware and finishes, if and when requested, to accompany any proposal for substitution. Full label each sample as to manufacture, type, size and location for use proposed.

.2 Do not order hardware from manufacturers until samples have been approved. Hardware and finishes supplied shall be identical with approved samples.

1.7 **Quality Assurance**

.1 Provide services of a qualified Architectural Hardware Consultant (AHC) or equivalent experience to prepare detailed schedule and supervise ordering, itemizing and check in of all finish hardware products.

.2 Architectural Hardware Supplier to inspect complete installation and certify that hardware and installation has been provided and installed in accordance with manufacturer's printed instructions and specified herein.

.3 Supplier shall have been regularly involved in the supply of builders hardware on a contract basis for a minimum of 2 yrs and if requested by Consultant be able to supply a list of three completed projects of similar scope.

1.8 **Regulatory Requirements**

.1 Conform to applicable code for requirements applicable to fire rated doors and frames.

.2 Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., and acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.9 **Delivery, Storage and Handling**

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for strategic off the ground, under cover storage locations. Do not load any areas beyond the design limits.

.2 Package hardware separately for each opening; clearly mark opening number. Identification shall correspond with Hardware List symbols. label all packages legibly, indicating manufacturer's number, types, sizes and Hardware List reference number. Wrap hardware and include in package, screws, bolts and fastenings necessary for proper installation. If hardware package is not complete, pay additional charges incurred by installer.

.3 Supply hardware in new unblemished condition in original manufacturer's cartons individually packaged and itemized for each opening according to approved hardware schedule.

.4 Hardware supplier will supervise lay-up of all hardware items and maintain detailed records verifying receipt of hardware on site. a copy of these records will be made available to Consultant upon written request.

.5 Exercise extreme care in handling units to prevent damage and scratched surfaces.

.6 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.

.7 Protect hardware from damage during construction by removing and reinstalling or where necessary, using temporary hardware, to maintain hardware in new condition and maintain manufacturer's warranty.

1.10 **Warranty**

.1 Warrant door closers to remain free from defects in materials and workmanship for a period of five (5) years, and hinges, locks and locksets for two (2) years. Agree to promptly make good defects which become apparent within warranty periods without cost to Owner.

PART 2 – PRODUCTS

2.1 **Materials**

.1 Supply all door hardware in accordance with prepared Hardware Schedule to be issued by the Consultant.

.2 All door hardware to be of Grade1: Heavy Duty Commercial Usage.

.3 Door Handles: Schlage Original E Keyway / Lever Handle, unless indicated otherwise.

.4 Where base material and quality of finish are not otherwise indicated, provide at least commercially recognized quality specified in applicable Federal Specifications.

.5 Keying: supply 2 keys for each lock. Supply 2 master keys for each keyed group. Keying system will be coordinated with Owner's Master Keying system. Use construction keying system that voids use of construction keys once permanent keys are used.

2.2 **Finishes**

.1 Type and finish of hardware equal in all respects to Finish Hardware Schedule and samples of hardware and finishes to be approved by Consultant. Metal finishes clean and unstained, of uniform colour and free from defects.

PART 3 – EXECUTION

3.1 **General**

.1 Supply to the jobsite all items of finishing hardware as herein scheduled. 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 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.

.4 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.

.5 Supply for installation by others where specified, all hardware for all doors, wood hollow metal, interior, exterior, etc as scheduled or indicated on the drawings.

.6 Provide manufacturers' instructions for installation of all finish hardware.

.7 The following are the mounting heights of various hardware items, unless indicated otherwise on the drawings:

		mm AFF
.1	Locksets, latchsets	914
.2	Deadlocks	1219
.3	Panic device crossbar	914
.4	Door pulls	965
.5	Push plates	1016
.6	Guard bars	914

3.2 **Field Quality Control**

.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 **Schedule**

Consult Door Schedule for required hardware for each door.

END OF SECTION

PART 1 - GENERAL

1.1 General Instructions

.1 Read and be governed by conditions of the *Contract* and sections of Division 1.

1.2 Quality Assurance

.1 Qualifications:

.1 Execute the work of this section only by a certified Subcontractor who has adequate plant, equipment, and skilled workers to perform it expeditiously, and is known to have been responsible for satisfactory installations similar to that specified during a period of at least the immediate past 5 years, and with 10 years satisfactory experience.

.2 Installer shall be approved in writing by the manufacturer of the operators for installation of their Product.

.3 Upon request, submit proof of qualification in accordance with Section 01600.

.2 Regulatory requirements:

.1 Use ULC or ULI listed and labelled hardware in fire separations and exit doors.

.2 Be responsible for, and abide by, all requirements and regulations of the building code. Conduct tests and inspections required and pay all charges incidental thereto.

.3 Barrier free door operators shall be certified by the manufacturer to performance design criteria in accordance with CAN/CSA C22.2 No. 247, and ANSI A156.19.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01340.

.2 Samples: submit samples of each finish material proposed for use in the Work.

.3 Shop drawings: to be prepared specifically for this Contract and to indicate location of components, anchorage details, adjacent construction interface, and dimensions as well as all necessary wiring and electrical requirements.

.4 Product data: submit manufacturer's technical Product data sheets for Products proposed for use in the Work.

.5 Quality assurance certification: submit certificate of conformance to specified standards following procedures for submittal of Product data.

.6 Submit templates to Contractor for use by installers and fabricators as required for proper location and installation of hardware.

1.4 Delivery, Storage and Handling

.1 Store finishing hardware in locked, clean dry area.

.2 Package each item of hardware, including fastenings, separately or in like groups of hardware, and label each package as to item definition and location.

1.5 Dimensions

.1 Check dimensions at the Place of the Work before fabrication commences, and report to Consultant in writing all discrepancies.

.2 Where dimensions are not available before fabrication commences, the dimension required shall be agreed upon between the various sections concerned.

1.6 Warranty

.1 The warranty period with regard to the work of this section is 2 years.

PART 2 - PRODUCTS

2.1 Automatic Door Operators

.1 For all Washrooms: Type 4100LE surface mounted applied operator with connecting arms with touchless activation option, as manufactured by Horton Automatics or approved equal.

.2 Fit intersecting members to flush hairline weathertight joints and mechanically fasten together, except where indicated otherwise.

.3 Conceal fastenings from view, except where indicated otherwise.

.4 Form cut-outs, recesses, mortising or milling for finishing hardware to templates supplied. Reinforce with aluminum or galvanized steel plates.

.5 Field apply isolation coating to aluminum in contact with dissimilar metals or cementitious materials.

PART 3 - EXECUTION

3.1 Examination

.1 Verify that door openings are properly installed and ready to receive the work of this section.

.2 Verify that electrical service is available, properly located, and of proper type.

3.2 Installation

.1 Install in accordance with manufacturer’s instructions and in accordance with CAN/CSA C22.2 No. 247.

.2 Adjust door operators for proper operation, without binding or scraping, and without excessive noise.

.3 Provide operator system complete in all its parts and connected to electrical service Provided as part of the work of Division 16. Secure all wiring such that it is concealed from view.

3.3 Adjustment

.1 Verify that installed hardware and operators function properly and instruct installers accordingly of requirements and procedures for adjustments to ensure satisfactory operation.

3.4 Protection

.1 Apply temporary protective coating to finished surfaces. Remove coating after erection. Do not use coatings, such as masking tape or lacquer, that will become hard to remove or leave residue.

END OF SECTION

PART 1 – GENERAL

1.1 General Requirements

1. General Conditions, Supplementary Conditions and Division 01 apply to this section.

1.2 Work Included

1. Work under this section consists of the furnishing of all labour, materials, equipment, and services necessary for, and incidental to, the complete and proper installation of aluminum curtain wall systems and related work as shown on the drawings or specified herein, and in accordance with all applicable requirements of the contract documents.

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. Ensure accurate setting of built-in items; where necessary provide templates, diagrams or other suitable means of instruction.

1.4 Related Work

Cast-in-Place Concrete	Section 03300
Metal Fabrication	Section 05500
Thermal Insulation	Section 07210
Metal Flashing	Section 07620
Joint Sealants	Section 07900
Finish Hardware	Section 08710

1.5 References

1. ASTM A653/A653M-04a - Sheet Steel, Zinc-Coated Galvanized or Zinc-Iron Alloy – Coated (Galvanized)by the Hot-Dip Process.

2. ASTM B209-04 - Aluminum and Aluminum-Alloy Sheet and Plate.

3. ASTM B221-02 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.

4. CAN/CGSB-12.1-M90 - Glass, Safety, Tempered or Laminated.

5. CAN/CGSB-12.3-M91 - Glass, Polished Plate or Float, Flat, Clear.

6. CAN/CGSB-12.8-M90 - Insulating Glass Units.

7. CAN/CSA-G40.21-98 - Structural Quality Steels.

8. CSA G164-M92 (R 1998) - Hot Dip Galvanizing of Irregularly Shaped Articles.

1.6 **Design Criteria**

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 following minimum requirements:

   .1 Design system based on the rain screen, pressure equalization principle. The curtain wall must form an air sealed envelope on the building. Ensure that all ties to other building envelope components are air sealed. The curtain wall system shall include metal soffits returns if indicated on drawings.

   .2 Design components to sizes and profiles indicated, reinforced if required, to limit deflection to L/200 maximum under positive and negative peak wind design gust pressures, in accordance with OBC Climatic Design Data (30 year probability), in accordance with ASTM E330-02.

   .3 Make provisions to accommodate thermal and structural movement, including building structural framing deflection and creep, in component parts of system and fastenings without joint seal failure, glass breakage and other detrimental effects.

   .4 Prevent water infiltration into building through system, when system is subjected to water spray at 5 gals/sf/hr maintained for 15 minutes with static pressure difference across system of 4 psf, in accordance with ASTM E331-00.

   .5 Limit air infiltration and exfiltration through system to maximum .02 cfm/sf when subjected to static pressure of 1.57 psf, in accordance with ASTM E283-04.

   .6 Provide effective vapour seal at inside face of system, designed to prevent detrimental condensation and ice build-up within system.

   .7 Prevent condensation and frosting on inside surfaces of system when subjected to outside temperature of - 25ºC and 15 mph wind and inside temperature of +20ºC /25% R.H.

.8 Limit temperature difference between central and edge portions of any pane of glass to less than the maximum permissible value stated by glass manufacturer.

.9 Design thermal barrier connection to achieve complete metal-to-metal separation between main framing and glass retention members except for screw fasteners. Assembled frame section shall have a maximum "U" factor of .455 Btu/(sf/hr/ºF).

1.7 **Submittals**

1. Provide submittals specified and as required to assess conformance with the Contract Documents, in accordance with the General Conditions and Division 01 of the Specifications.

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.

.5 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.

.6 Samples:

.1 Submit duplicate minimum 50 mm x 100 mm samples of each type of aluminum 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.

1.8 **Quality Assurance**

1. System Manufacturer's Qualifications: 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: Manufacturer's forces or forces licensed by manufacturer. Work of this Section shall be performed by worker's 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.

3. Fabrication Tolerances: overall height, width and diagonal dimensions of frames shall be within the following tolerances:

4. Dimension of 2 m and less: +/- 2 mm Dimension more than 2 m: +/- 3.5 mm

5. Caulking: comply with requirements of Section 07920 except where specifically stated otherwise herein.

6. Glazing: Comply with requirements of Section 08800 except where specifically stated otherwise herein.

1.9 **Site Job Mock-up**

1. Prior to erection of curtain wall system construct full size mock-up in permanent location on building as directed by Consultant.

2. Mock-up shall serve to establish minimum quality standards for erected work of this Section and shall be subject to Consultant's review and acceptance.

3. Include all pertinent features of system including typical glazing conditions, anchorage to building structure and the like as stated by the Consultant.

1.10 **Delivery, Storage and Handling**

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.

1.11 **Maintenance Data**

1. Provide maintenance data for cleaning and maintenance for incorporation into maintenance manual.

1.12 **Warranty**

1. Warrant work of this Section against any defects in materials and workmanship in accordance with the General Conditions but for an extended period of ten (10) years and agree to promptly and without cost to Owner 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.

PART 2 – **PRODUCTS**

2.1 **Approved Products and Manufacturers**

1. This specification is based on ‘Reliance’ by Oldcastle BUILDINGENVELOPE. Curtain wall systems by other manufacturer’s will be considered acceptable provided all design criteria, specified herein, has been met.

2.2 **Materials**

1. Aluminum:

.1 Extrusions: AA6063-T5 alloy, anodizing quality, conforming to ASTM B221-02.

.2 Plate and sheet: AA1100-H14 alloy, anodizing quality unless otherwise indicated minimum 3 mm thick, conforming to ASTM B209-04.

.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 Screws, bolts, nuts, washers, rivets and other fasteners, incorporated into aluminum sections: aluminum or ANSI Series 300 stainless steel, or hot dip galvanized steel.

.5 Anchoring devices: aluminum, non-magnetic stainless steel or hot dip galvanized steel.

2. Structural Steel Sections and Steel Plate:

.1 CAN/CSA-G40.21-04 Grade 300W structural quality steel and Grade 350W, Class H tubular members and ASTM A446 Grade A sheet steel.

3. Galvanized Steel Sheet:

.1 Commercial grade, stretcher levelled or temper rolled conforming to ASTM A525-91b with galvanized zinc G90 (Z275) coating conforming to ASTM A526/A526M-90.

4. Glass & Glazing Materials:

.1 Glass Retaining Member Seals: P.V.C. or neoprene conforming to ASTM C542-94, 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:

.1 Neoprene, Shore "A" durometer hardness of 70 to 90 points; spacer shims, 40 to 50 points, as recommended by glass manufacturer.

.4 Double glazed insulating units:

.1 GL-1: used in COL 2 curtainwall where no colour required:

.1 Nominal thickness: 25 mm
.2 Low-E coating on No. 2 surface
.3 Space between glass filled with Argon gas
.4 Use warm edge spacer
.5 Use fully tempered glass on glazing units located at 2440mm or lower above finish floor.
.6 Glass product: Low E coating, Guardian Sunguard AG43

.1 GL-2 used in COL 1 curtainwall where laminated glass is required:

.1 Nominal thickness: 25 mm
.2 Low-E coating on No. 2 surface

.3 Space between glass filled with Argon gas
.4 Use warm edge spacer
.5 Use tempered glass on interior lite
.6 Provide with 0.30 vinyl interlayer, to CAN/CGSB-12.1-M90 between No.3 and No.4 surface.
.7 Glass product: Low E coating, Guardian Sunguard AG43

.5 Spandrel glass:
.1 GL-3: used in COL 3 curtainwall:
.2 Heat strengthened float glass with Prelco Therma-Span White (SMF1/W) colour coating on No.2 surface. Insulated back pan to be anodized aluminium to match adjacent framing.

.6 Float glass: CAN/CGSB-12.3-91, Glazing Quality, clear.

.7 Tempered glass: CAN/CGSB-12.1-M90, fully tempered clear, minimum 6 mm thick.

.8 Thermal barrier between pressure plate and mullion extrusions: extruded hard PVC.

.9 Structural glazing sealant: high modulus black silicone, to ASTM C920 by G.E., Tremco, or Dow Corning.

.10 Glazing wedges and splines: solid extruded neoprene or EPDM having Shore "A" Durometer hardness of 50 to 70 points as recommended by window manufacturer.

5. Caulking Materials:

.1 Sealant: multi-part chemical curing type to CAN/CGSB 19.24-M90; acceptable product: Tremco Dymeric; or one part silicone: Dow Corning 790; colour selected by Consultant.

.2 Primer: as recommended by sealant manufacturer.

.3 Joint backing: foamed, closed cell polyethylene rope, minimum 12 mm wider than joint, compressed when installed.

6. Flexible Flashings: EPDM sheet minimum 40 mil thick, by Lexcan, Dunlop or Firestone.

7. Aluminum Flashings:

.2 Minimum 24 gauge with two coat fluoropolymer thermal setting enamel finish to match aluminum caps.

.3 Supply aluminum flashing material to Section 07510 and 07525 for fabrication and installation.

8. Miscellaneous Materials:

.4 Bituminous paint: alkali resistant asphaltic enamel.

.5 Bedding compound: non-hardening and non-skinning.

.3 Insulation: RXL 40 by Roxul Inc.

2.3 **Fabrication**

.1 Aluminum components shall be extruded sections and shapes, unless otherwise specified.

.2 Curtain wall framing shall consist of tubular inner aluminum section reinforced if necessary, thermal break, pressure plate and exterior cap except where required to be structurally glazed. Unless otherwise shown, depth shall be 19 mm for vertical and horizontal caps. Use machine screws to fasten pressure plates; self-drilling, self-tapping screws are not permitted. Provide special caps where indicated.

.3 Size units to allow for structural deflection of surrounding construction.

.4 Design work so that it will not be distorted, nor fasteners overstressed, from expansion and contraction of metal.

.5 Reinforce members as required to withstand loads and to maintain deflection within allowable limits.

.6 Internally reinforce framing members where work of other Sections is to be fastened thereto.
Provide heavy duty reinforcing at all door and frame hardware fastening points.

.7 Fastenings shall be concealed where possible. Where concealed fastenings cannot be used, use countersunk flathead screws. Exposed fastenings shall match base metal on which they occur.

.8 Mechanically joined sections shall have hairline joints.

.9 Spandrel back-up panels: brake form insulation back-up panels from minimum 1 mm thick galvanized sheet steel at concealed locations and of minimum 2 mm thick aluminum with finish matching adjacent framing at exposed locations, designed to engage into framing in manner maintaining air and vapour barrier in all locations. Install back-up panels into framing and provide air seal, at shop, not in the field.

.10 Metal spandrel face panels: fabricate panels to profile indicated of minimum 3 mm thick aluminum sheet. Exposed face of panel shall be flat, smooth, free of waves, buckles, dents and other defects, meeting the following fabrication tolerances:

.1 Panel bow: 0.2% of panel dimension, up to maximum 5 mm.

.2 Width or length ± 1 mm up to 1.2 m, ± 2 mm from 1.2 m to 2.4 m.

.3 Squareness: maximum 5 mm difference between diagonal measurements.

.4 Camber: maximum 1 mm.

.11 Fabricate extruded or formed aluminum sills profiles indicated to suit wall condition and minimum 3 mm 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.

.12 Closures, covers, flashings and trim shall be extruded or formed to profiles shown and unless otherwise shown, minimum 2 mm thick.

.13 Make provision to accommodate horizontal and vertical expansion and contraction of curtain wall framing without causing detrimental effects.

.14 Make provisions to drain to exterior any moisture entering or forming inside systems.

.15 Provide additional mullion and insulated metal panel at door heads to accommodate door operator height.

.16 Completely fill all voids within framing at locations adjacent to the exterior and as indicated on the Drawings.

.17 Provide splayed mullions for angular glass greater than five (5) degrees measured parallel to adjacent glass pane.

.18 Fabricate Feature Wave Wall as 3 metre wide frames in shop and transported to site.

2.3 **Metal Finishes**

.1 Exposed aluminium surfaces for Types 1 and 2 curtainwall: clear anodized, AA M12 C22 A31, Class I.

.2 Contact surfaces of steel and aluminum components with dissimilar building components shall be coated with bituminous paint.

PART 3 – EXECUTION

3.1 **Examination**

1. 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.

2. 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 indicates acceptance of surfaces and conditions.

3.2 **Preparation**

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.

3.3 **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 3 mm per 3000 mm 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 accordance with requirements of Section 07900.

7. Use concealed fastenings only.

8. Touch up steel anchoring components, after installation, with zinc rich paint.

3.4 **Doors and Frames**

.1 Install doors and frames.

.2 Install finish and operating hardware and weatherstripping required, in accordance with hardware manufacturer's directions. Check test operation of all operable parts and, if necessary, adjust to ensure correct and smooth function.

.3 Coordinate with Division 16 for required power connection and wiring to automatic door operator and controls.

3.5 **Glazing**

.1 Provide insulating glass at all locations unless otherwise indicated.

.2 Provide tempered glass inside and outside at doors and screens.

.3 Glaze openings in accordance with window and glass manufacturer's recommendations so as to achieve weathertight installation.

.4 Provide structurally glazed vertical joints in accordance with system manufacturer's directions. Fill joint with sealant; tool joint slightly concave, smooth, free from ridges, wrinkles, sags, air pockets and embedded impurities.

3.6 **Covers, Closures and Trim**

.1 Provide covers, closures and trim as indicated and as required to provide complete and finished installation.

.2 Wherever possible provide concealed fastenings unless approved otherwise by Consultant.

.3 Locate intermediate joints as directed by Consultant.

.4 Provide custom mullions as indicated on the Drawings.

3.7 **Cleaning**

1. 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 Section 01700.

2. GC shall be responsible for obtaining and paying for a skilled cleaning specialist for the final cleaning.

END OF SECTION

ARCHITECTURAL SPECIFICATIONS
GYPSUM WALLBOARD

PART 1 – GENERAL

1.1 Scope

.1 The work of this Section includes all labour, material, and equipment required to complete all gypsum wallboard exterior sheathing as part of the perimeter wall construction, and interior wall surfaces where indicated on the drawings.

1.2 Related Work Specified Elsewhere

Unit Masonry	Section 04200
Thermal Insulation	Section 07210
Joint Sealants	Section 07900

1.3 Reference Standards

.1 Do work in accordance with CSA A82.31-M1980 unless specified otherwise. Adhere to construction details and procedures described in C.G.C. Drywall Construction Handbook and the Manual of G.W.B. Construction by Gypsum Drywall Contractors International.

1.4 Submittals

.1 No shop drawings or samples are required for this work.

1.5 Delivery & Storage of Materials

.1 Do not install damaged or wet materials.

1.6 Job Conditions

.1 Air and surface temperature must be minimum of 10□C, Maximum 21□C for 24 hours before, during, and until entire installation is complete.

PART 2 – PRODUCTS

2.1 Materials

.1 Non-load bearing metal channel studs to ASTM C645-76, 41 mm (1 5/8"), 64 mm (2 5/8"), 92 mm (3 5/8") or 150 mm (6") width as shown on the drawings.

.2 Floor and ceiling tracks to ASTM C645-76 in widths to suit studs. Lengths as required.

.3 Metal Furring to CSA A82.30-M1980, 32 mm wide, 22 mm deep, hat shaped.

.4 Suspension system shall consist of furring channels and accessories:
- □ 25 ga. zinc coated steel cold rolled carrying channel
- □ 12 ga. galvanised steel hangers
- □ 16 ga. galvanised soft annealed steel wire

.5 Vapour Barrier to be Polyethylene film 6 mil. to CAN2-51.33 -M80 Type 2.

.6 Gypsum Wallboard to CSA A82.27M-1977 in 12.7 mm (1/2") or 15.9 mm (5/8") as designated on the drawings. Use tapered edge type in sheets as long as is practical.

.7 Water resistant gypsum wallboard to be used at all locations subject to water damage or where tile finish is shown, to CSA A82.27 M1977.

.8 Corner bead and casing bead shall be 28 ga steel with perforated flanges and Z275 zinc finish to ASTM A525M-80A. Use one piece length per location.

.9 Resilient clips where specified on the drawings for resilient attachment of wallboard, .5 mm glav. steel, 38 mm (1 1/2") wide 12.7 mm (1/2") projection.

.10 Screws shall be CGS brand screws type S 25 mm (1"), 32 mm (1 1/4"), and 41 mm (1 5/8") as required to CSA A82.31-M1980. Screws should be at least 9 mm (3/8") longer than the total thickness of the gypsum board layers. At exterior sheathing use cadmium plated, corrosion-resistant screws.

.11 Joint compound, tape, taping compound, laminated compound to ASTM 0474 and 0475 and CSA 482, 31-M1980.

2.2 **Manufacturer**

All materials shall be equal to those manufactured by Canadian Gypsum Co. Ltd.,or approved equal.

PART 3 – EXECUTION

3.1 **Examination**

.1 Examine surfaces and other conditions on which work of this Section depends and do not proceed until conditions are suitable.

.2 Commencement of work will denote acceptance of conditions.

3.2 **Furring or Suspension Installation**

.1 Space hangers at 1200 mm (48") maximum o.c. along carrying channels and not more than 150 mm (6") from ends.

.2 Space channels at 1200 mm (48") maximum o.c. and not more than 0 mm (6") from perimeter walls.

.3 Where splices are necessary, lap members at least 200 mm (8") and wire each end with two laps; avoid clustering or lining up splices.

.4 Attach to hangers by bending hanger under runner and securely wire in place with a saddle tie.

.5 Provide 25 mm (1") clearance between channels and abutting walls and partitions.

.6 Install channels transversely across runner channels.

.7 Space channels at 300 mm (12") o.c. and not more than 150 mm (6") from perimeter walls. Provide 25 mm (1") clearance between channels and abutting walls and partitions.

.8 Level channels to a maximum tolerance or 3 mm over 4 m (1/8" over 12 ft.).

.9 Frame openings with suitable channels; check clearances with respective Trades. Provide support for edges of board at all cutouts and openings in ceilings.

.10 Co-operate with Mechanical and Electrical Trades to accommodate and similar items and provide hangers and supports for fixtures.

.11 Note where furring channels are secured to walls and secure with approved fasteners.

3.3 **Fire Ratings**

.1 Conform with the following:

- Fire resistant ratings called for on drawings and schedules.
- Appropriate codes and regulations.
- Use "Firecode C", Type X or approved equivalent gypsum board as noted on the drawings.
- Continuity of Fire rated assemblies to be maintained.

3.4 **Finishing**

.1 Mix joint compound (powder) in accordance with manufacturer's printed instructions.

.2 Prefill "V" grooves of rounded edges with special non-shrink filler. Finish flush with tapered surface ready for tape reinforcing application. Allow pre-fill material to dry thoroughly before application of embedding compound and tape.

.3 Apply embedding compound in thin uniform layer; embed reinforcing tape accurately centered on joint, securely pressed in, leaving sufficient compound under tape to provide proper bond. Immediately apply skin coat over tape application. Allow drying thoroughly before application of filler coat.

.4 Apply filler coat such that taper depression is flush with board surfaces. Allow drying thoroughly before application of finish coat.

.5 Apply finish coat extending slightly beyond the filler coat and feathered out onto the board surface.

.6 Sand between coats and following the finish coat, where necessary, and leave surface smooth and ready for painting.

.7 Finish screw depressions with filler material and finish coat as specified in.5 and .6 above.

.8 Joint and depression finish shall in no case protrude beyond the plane of the board surface.

.9 Finish corner beads and metal trim flush with board surface using filler and finishing coats feathered out approximately 50 mm (2") and 100 mm (4") respectively onto the board surface to ensure that metal is visible only at edges.

3.5 **Cleaning**

.1 Clean thoroughly and remove all excess materials from other surfaces.

.2 Remove all excess materials as job proceeds and at completion.

END OF SECTION

PART 1 - GENERAL

1.1 General Instructions

.1 Read and be governed by conditions of the *Contract* and sections of Division 1.

1.2 Quality Assurance

.1 Execute work of this section only by a *Subcontractor* who has adequate plant, equipment, and skilled workers to perform it expeditiously, and is known to have been responsible for satisfactory installations similar to that specified during a period of at least the immediate past 5 years.

.2 *Subcontractor* shall be a member company in good standing of the Terrazzo, Tile and Marble Association of Canada and have been a member for at least the past 5 years.

.3 Upon request, provide proof of qualification in accordance with Section 01600.

1.3 Submittals

.1 Submit required submittals in accordance with Section 01340.

.2 Samples:

.1 Submit 305 mm (12") x 305 mm (12") sample panels of each colour, texture, size, and pattern of tile and grout.

.3 Mock-ups:

.1 Install tile to suit mock-up for acceptance by *Consultant*. Accepted mock-up shall form basis of standard of workmanship for remainder of work.

.2 Install each product and colour mock-up for acceptance by *Consultant*. Accepted mock-up shall form basis of standard of workmanship for remainder of work. Mock- up shall consist of floor/wall/wall corner intersection, with 300 mm (12") of finish product on each face.

.4 Shop drawings: in addition to requirements of Section 01340, indicate location of expansion and control joints.

1.4 Maintenance Material

.1 Provide minimum 2% of each type and colour of tile required for project for maintenance use. Store where directed.

.2 Maintenance material to be of same production run as installed material.

.3 Submit maintenance instructions for inclusion in the maintenance manuals in accordance with Section 01730.

1.5 Job Conditions

.1 Environmental Conditions: Execute work of this section while temperature is maintained within safe working temperatures in accordance with manufacturer's installation instructions for a period of 72 hours before, during and following installation. Avoid concentrated or irregular heating during curing period.

.2 Protection: Protect work of this section against damage by work of other sections for a minimum of 72 hours after application of grouting by prohibiting passage of traffic over tile. Do not immerse in water and protect tilework from freezing for at least 28 days after installation.

1.6 Warranty

.1 The warranty period with regard to the work of this section is 2 years.

PART 2 - PRODUCTS

2.1 Floor Tile

.1 Ceramic tile types:

.1 TL-1: Olympia Tile and Stone: Pinch Series – Coloured Body Porcelain, Colour: Black - Matte Finish, Size: 610 [2’] x 610 [2’]

2.2 Grout and Adhesives

.1 Edge protection and transition strips: Schluter-Jolly AC, size as required for tile assembly, colour to later selection by *Consultant* from manufacturer’s standard range.

.2 Control joints: Schluter-Dilex, size as required for tile assembly, colour to later selection by *Consultant* from manufacturer’s standard range.

.3 Setting adhesives:

.1 Colour: grey typical.

.2 Typical: Portland cement/sand/latex mixture, to ANSI A118.4-1999 and with minimum Shear Bond (Porcelain Tile, immersion and dry 28 day cure tests) of 2.3 MPa (340 psi) when tested to ANSI A118.4-1999.

.1 Laticrete 'Laticrete 4237 Latex Thin Set Liquid' with 'Portland 211 Crete Filler Powder'.

.2 Mapei 'KERALASTIC' mixed with 'KERABOND'.

.3 TEC Specialty Products, Inc. 'Super Flex Latex-Modified Thin Set Mortar'.

.4 Grout:

.1 Polymer-modified, latex-modified, non-shrink, efflorescence-free, ANSI A118.6.

.1 Mapei 'ULTRA/COLOR'.

.2 Mapei 'KER 200 Series'.

.3 Laticrete '500 Series' mixed with '1776 Grout Admix'.

.4 TEC Specialty Products, Inc. 'AccuColour Premium Sanded 650'.

.2 Epoxy, to ANSI A118.

.1 Flextile '100 Flex-Epoxy 100% Solids Epoxy Grout'.

.3 Grout colours to later selection by *Consultant* from manufacturer's full range.

.4 Grout sealer: HG Marble and Stone Protector.

.5 Water: clean and free of chemicals detrimental to mortar and grout mixes.

.6 Sand: to ASTM C144-97, passing 16 mesh.

.7 Cement: to CAN/CSA-A5/A8/A362-93, Type 10.

.8 Floor levelling and repair compound: "Ultra/Plan" High Compressive Strength Self- Levelling Underlayment and manufactured by Mapei.

.5 Mortar bed for floors; where applicable: 1 part cement, 4 parts sand, 1 part water. Water volume may be adjusted depending on water content of sand.

2.3 Accessories

.1 Cleavage membrane: polyethylene film to CAN/CGSB-51.34-M86, type 2, 0.10 mm (0.004") thick.

.2 Waterproofing membrane: to ANSI A118.10, soft polyethylene membrane with fleece webbing laminated on both sides; use special cut-width rolls and special shapes for corners and pipe sleeves; Schluter-KERDI-200.

.3 Drainage mat underlayment (exterior walls): to ANSI A118.10, corrugated polyethylene matting with 3 mm (1/8") high dovetail-shaped ribs with polypropylene-fibre support webbing laminated to the underside to provide a mechanical bond to the substrate adhesive; Schluter-DITRA.

.4 Cleavage membrane: polyethylene film to CAN/CGSB-51.34-M86, type 2, 0.10 mm (0.004") thick.

PART 3- EXECUTION

3.1 Examination

.1 Ensure compatibility of *Products* supplied under this section, and which bear contact with substrate.

.2 Before work of this section commences, examine the areas to be covered and report any flaw or adverse conditions in writing to the *Contractor* and the *Consultant*. Do not proceed with the tilework until surfaces and conditions comply with the requirements indicated in the manufacturer's instructions and in ANSI A108.5 specification.

.3 Miscalibrated tiles, tiles with chipped corners, tiles with holes, will not be accepted for installation.

.4 Carefully inspect the tiles for colour variation. Tiles presenting noticeable variations shall be carefully selected, set aside and used in areas where they fit in the pattern homogeneously. Provide for appropriate lighting equipment in addition to existing lighting in the immediate area where the installation is being performed so that any shade differences which are normally very slight can be identified easily.

3.2 Preparation

.1 Wall Surfaces:

.1 Roughen previously painted surfaces having hard glossy finish by sandpaper or other abrasive medium, and completely remove finishes which are not compatible with compounds specified under this section, and that are to be in contact with such objectionable finishes.

.2 Remove all foreign matter such as loose mortar, plaster, visible laitance, cement, form release agents, dust and the like which would otherwise impede bonding of levelling coat or mortars.

.3 Prime very dry gypsum, wood or porous concrete with primer, brush or roller applied at full strength in accordance with adhesive manufacturer's recommendations.

.2 Floor Surfaces:

.1 Completely remove oil, grease, waste and all other contaminants from floor areas scheduled to receive new ceramic tile.

.2 Mechanically or chemically (using trisodium phosphate or similar material) remove all paints, adhesives or other previously applied compounds to expose clean surface of existing concrete substrate. Do not use any acids.

.3 Levelling Underlayment: Where substrate varies beyond limitations as set forth hereinafter, prime substrate, mix and apply underlayment in accordance with manufacturer's instructions.

.4 Concrete shall be minimum of 28 days old.

.5 Wire brush steel substrates to remove deleterious substances and rust, to promote full adhesion to steel.

.6 Provide levelling coat where required to bring surfaces to true even plane within 1:1000. Allow levelling coat to completely cure prior to installation of tile finish.

.3 Mixing:

.1 General: Mix mortars, additives and grouts in strict accordance with manufacturer's requirements.

.2 Rotating Blade Mechanical Mixer: Pour latex additive, start mixer and add sand first, followed by Portland cement. Mix no mortar in same mixer as a dissimilar type of mortar unless the mixer is first thoroughly washed clean.

.3 Pail batch mixing with low revolution drill mixers as follows:

.1 Premix separately prior to adding to the latex additive.

.2 Pour latex additive into clean mixing vessel and add dry materials slowly while mixing into a homogeneous and smooth consistency.

3.3 Tolerances

.1 Maximum allowable lippage:

.1 Tile up to 152 mm x 152 mm (6" x 6") in size: 1 mm.

.2 Tile greater than 152 mm x 152 mm (6" x 6") in size: 2 mm.

3.4 Installation - General

.1 Install all products in accordance with manufacturer's specifications and as indicated herein.

.2 Install tile in accordance with TTMAC specification guide and otherwise in accordance with ANSI A108.5, and ANSI 108.10.

.3 Lay out tile work so tiles less than 1/2 the least dimension do not occur and with minimum amount of cutting.

.4 Set tile flat and level with uniform joints throughout, properly aligned. Provide uniform slopes to floor drains.

.5 Install edge protection at tile edges and corners, unless otherwise indicated, using maximum length pieces.

.6 Install edge protection and transition strips at tile transitions, unless otherwise indicated, using maximum length pieces.

.7 Lap tile at inside corners and seal around doors. Sealant colour to later selection by Consultant.

.8 Install stainless steel trim on top of all tile baseboards.

3.5 Setting

.1 Using a damp towel, wipe off the back side of floor tile to remove any dust or other residue that may be left over from the manufacturing process.

.2 Place as much tile as possible in one operation before setting bed reaches initial set. Clean back and remove bed when it has set before tile is laid.

.3 Prime materials and by methods specified by manufacturer of bond coat.

.4 Line up joints between tile installed on stairs from tread to tread.

.5 Except where tiles have setting tabs, and except for expansion, control and isolation joints, maintain joint widths as selected by *Consultant*.

.6 Back up tile coves, curbs and other shaped pieces solid with mortar. Rigidly set, reinforce or otherwise make firm and secure such pieces.

.7 Beat tiles in thoroughly and sufficiently to cause mortar ribs or notches to come together into a continuous void free bed and allow the mortar to flow up partially into the joint space to approximately 1/3 the thickness of the tile. Sound floor tiles by tapping and reset all tiles with voids in setting bed.

.8 Remove any excess setting material from the joint area so that 2/3 of the depth of the tile is available for grouting.

.9 Remove smudges or smears of setting material from the tile surface with a damp sponge or cloth immediately after final adjustment and beat-in while the mortar is fresh.

.10 Do necessary cutting and drilling of fixtures, fittings, and built-in or penetrating units without marring the tile. Replace all cracked or damaged tile.

.11 Form external angles with round edge tile extending over edge of square edge adjacent tile. Internal angles shall be formed square, carrying 1 flat tile past edge of other.

.12 Extend tile into recesses at windows, doors, or other openings.

.13 Extend tiles 100 mm (4”) behind mirrors, and fully behind cabinets, cupboards and other fixed objects at walls.

.14 Cut tiles to conform with irregularities in wall lines and vertical planes along outer edges. Smooth cut edges with carborundum block or by other means to provide clean straight edge.

.15 At floor drains: provide medium setting bed +/- 10 mm sloped to drain of 6 mm in 305 mm.

3.6 Waterproofing Membrane Installation

.1 Install waterproofing membrane in accordance with manufacturer's instructions in locations indicated.

.2 Apply tile setting adhesive to substrate using a 4.5 mm (3/16") V-notch trowel.

.3 Work waterproofing membrane into adhesive with a flat trowel to achieve full contact and to remove air pockets.

.4 Lap and seal membrane seams a minimum of 50 mm (2").

.5 Provide strips of waterproofing where required to span expansion joints or terminate waterproofing into movement joint type tile setting accessories, in accordance with manufacturer's instructions.

.6 Adhere waterproofing membrane to fixtures, joints around pipes, door and window frames, and the like, with transparent waterproof sealant as recommended by manufacturer.

.7 Run waterproofing membrane 152 mm, minimum, up tiled wall and 50 mm up gypsum board wall behind wood base, and extend 900 mm, minimum, into washrooms.

3.7 Thin-set Mortar System

.1 Locations: Wall locations and floors, except as otherwise specified.

.2 Perform surface preparation, mixing and application in accordance with manufacturer's instructions. Apply mortar over flat surfaces using notched tooth trowel to produce a bed of approximately 3 mm (1/8") to 6 mm (1/4") in thickness.

.3 Do not dampen tile set in adhesive.

.1 Tap tile firmly into position sufficiently to obtain minimum 100% positive contact. Adjust tile before initial set takes place.

.2 In addition to setting bed material, use setting material to fully back butter tile for tiles larger than 250 mm (10") x 250 mm (10") prior to setting into adhesive.

3.8 Control Joints

.1 Carry existing joints in the concrete subfloors and walls through tile work.

.2 Install control joints around the perimeter of tiled areas, around columns and where tile abuts other hard materials, also incorporate control joints over all building expansion joints.

.3 Provide control joints equal to width of interior tile joints in floors and walls at perimeters of floor and at 5000 to 6000 mm on centre by raking out joints to full depth of tile and cleaning joints for application of sealant by Section 07900. Locate where directed by *Consultant*.

3.9 Grouting

.1 Apply grout in strict accordance with manufacturer's printed instructions.

.2 Allow sufficient time after installation of tile units, before grouting unless otherwise recommended by manufacturer.

.3 Force grout into joints for full depth, level with surface of tile. Scrape surplus grout from surface of tile thoroughly and quickly. After grout has attained slight initial set, completely clean up and polish surfaces of tile.

.4 Grout joint width to be 2mm, typically.

.5 Use caution when using sanded grouts to prevent scratching of tile surface.

3.10 Protection and Clean-Up

.1 Allow minimum 24 hours after installation of tiles before grouting unless otherwise recommended by manufacturer.

.2 Clean installed tile surfaces after installation and grouting cured.

.3 Re-point joints after cleaning to eliminate imperfections. Avoid scratching tile surfaces.

END OF SECTION

PAINTING

PART 1 – GENERAL

1.1 Scope

.1 Work of this section includes supply and application of paint finishes and clear sealers to areas and surfaces shown on Drawings.

1.2 Related Work Specified Elsewhere

Concrete Finishing	Section 03300
Joint Sealants	Section 07900
Steel Doors and Frames	Section 08110
Gypsum Wallboard	Section 09250

1.3 Work Not Included

.1 Unless otherwise indicated, painting is not required on surfaces in concealed areas and inaccessible areas such as furred spaces, foundation spaces, utility tunnels, pipe spaces, and duct shafts.

.2 Metal surfaces of anodized aluminum, brass, stainless steel, chromium plate, copper, bronze, and similar finished materials will not require painting under this Section unless so specified.

.3 Do not paint moving parts of operating units, mechanical or electrical parts such as valve operators, linkages, sensing devices, and motor shafts, unless otherwise indicated.

.4 Do not paint over required labels or equipment identification, performance rating, name, or nomenclature plates.

1.4 Definitions

.1 "Paint" as used herein, means coating systems materials including primers, emulsions, epoxy, enamels, sealers, fillers, and other applied materials whether used as prime, intermediate, or finish coats.

1.5 Quality Assurance

.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 Provide finish coats, which are compatible with the prime coats, actually used. Review other Sections of these Specifications as required, verifying the prime coats to be used and assuring compatibility of the total coating system for the various substrata. Upon request, furnish information on the characteristics of the specific finish materials to assure that compatible prime coats are used. Provide barrier coats over non-compatible primers, or remove the primer and re-prime as required. Notify the Consultant in writing of anticipated problems in using the specified coating systems over prime coatings supplied under other Sections.

1.6 **Job Conditions**

.1 Do not apply solvent thinned paints when the temperature of the surfaces to be painted and the surrounding air temperatures are below 45□ F (10□C), unless otherwise permitted by the manufacturers' printed instructions and as approved by the Consultant.

.2 Do not apply paint in snow, rain, or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces, unless otherwise permitted by the manufacturers' printed instructions or as approved by the Consultant.

.3 Applications may be continued during inclement weather only within the temperature limits specified by the paint manufacturer as being suitable for use during application and drying periods.

.4 Do not apply paint finish in areas where dust is being generated.

.5 Surfaces must be dry, clean, free from dust grease or other contaminants, which will effect the work of this Section.

1.7 **Delivery, Storage**

.1 In addition to requirements of Section 01600 deliver packaged materials in original, unopened, labeled and sealed containers.

.2 Keep stored materials covered at all times and take necessary precautions against fire.

1.8 **Protection**

.1 Use sufficient drop cloths and protective coverings to protect floors, furnishings and work of others not being painted.

PART 2 – PRODUCTS

2.1 **Manufacturers**

.1 The following paint manufacturers are acceptable:

.1 Benjamin-Moore and Co. Ltd.

.2 Sherwin-Williams Co.

.2 Use same brand of paint throughout.

.3 The following sealer manufacturers are acceptable:

.1 Thoro Systems Products

.2 Process Solvent Co. (Pro So Co)

2.2 **Materials**

.1 Paints, enamels, fillers, primers, varnishes and stains to be ready mixed products of one of the manufacturers listed above. Substitutes will not be allowed.

.2 Undercoats, thinners, cleaners shall be of type and brand recommended by the paint manufacturer.

.3 Materials to be new and first line of manufacturer.

.4 Paint materials to CGSB Standards listed in Finishing Formulae.

.5 Paint materials for each coating formula to be products of a single manufacturer.

.6 Sealer to be "Thoroglaze" or "Weatherseal" 7 1/2% clear acrylic semi gloss sealer for concrete or masonry.

2.3 **Colour Schedules**

.1 Refer to finishing schedule and digital image board for finishing colours.

.2 The Consultant may select, allocate, and vary colors on different surfaces throughout the work.

2.4 **Application Equipment**

.1 For application of the approved paint, use only such equipment as is recommended for the particular paint by the manufacturer and as approved by the Consultant.

.2 Prior to use of application equipment, verify that the proposed equipment is actually compatible with the material to be applied, and that integrity of the finish will not be jeopardized by use of the proposed equipment.

2.5 **Other Materials**

.1 Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Consultant.

PART 3 – EXECUTION

3.1 **Surface Conditions**

.1 Examine the areas and conditions under which 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.

3.2 **Materials Preparation**

.1 Mix and prepare paint materials in strict accordance with the manufacturers' recommendations as approved by the Consultant.

.2 When materials are not in use, store in tightly covered containers.

.3 Maintain containers used in storage, mixing, and application of paint in a clean condition, free from foreign materials and residue.

.4 Stir materials before application, producing a mixture of uniform density.

.5 Do not stir into the material any film which may form on the surface, but remove the film and, if necessary, strain the material before using.

3.3 **General Surface Preparation**

.1 Perform preparation and cleaning procedures in strict accordance with the paint manufacturers' recommendations as approved by the Consultant.

.2 Remove removable items which are in place and are not scheduled to receive paint finish; or provide surface-applied protection prior to surface preparation and painting operations.

.3 Following completion of painting in each space or area, reinstall the removed items by using workmen who are skilled in the necessary trades.

.4 Clean each surface to be painted prior to applying paint of surface treatment.

.5 Remove oil and grease with clean cloths and cleaning solvent of low toxicity and flash point in excess of 200 □F, prior to start of mechanical cleaning.

.6 Schedule the cleaning and painting so that dust and other contaminants from the cleaning process will not fall onto wet newly painted surfaces.

3.4 **Preparation of Metal Surfaces**

.1 Thoroughly clean surfaces until free from dirt, oil and grease.

.2 On wiped galvanized surfaces, use solvent for the initial cleaning, and then treat the surface thoroughly with phosphoric acid etch. Remove etching solution completely before proceeding.

.3 Allow to dry thoroughly before application of paint.

3.5 **Paint Application - General**

.1 Touch-up shop-applied prime coats, which have been damaged, and touch-up bare areas prior to start of finish coats application.

.2 Slightly vary the colour of succeeding coats.

.3 Do not apply additional coats until the completed coat has been inspected and approved.

.4 Only the inspected and approved coats of paint will be considered in determining the number of coats applied.

.5 Sand and dust between coats to remove defects visible to the unaided eye from a distance of 1.5 meters (5 ft.).

.6 On removable panels and hinged panels, paint the edges and back sides to match the exposed sides.

.7 Allow sufficient drying time between coats, modifying the period as recommended by the material manufacturer to suit adverse weather conditions.

.8 Consider oil-base and oleo-resinous solvent-type paint as dry for recoating when the paint feels firm, does not deform or feel sticky under moderate pressure of the thumb, and when the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

3.6 **Brush Applications**

.1 Brush out and work the brush coats onto the surface in an even film.

.2 Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, and other surface imperfections will not be acceptable.

3.7 **Spray Application**

.1 Except as specifically otherwise approved by the Consultant, confine spray application to metal framework, finish coats at ceilings, and interior surfaces where hand brush work would be inferior.

.2 Where spray application is used, apply each coat to provide the hiding equivalent of brush coats.

.3 Do not double back with spray equipment to build up film thickness of two coats in one pass.

3.8 **Miscellaneous Surfaces**

.1 Finish exposed mechanical items such as access doors, pipes, ducts grilles, and items of similar nature to match the adjacent wall surfaces. Wash metal with solvent, prime and apply two coats of alkyd semi-gloss enamel.

.2 Finish exposed electrical items such as conduits, boxes, and items of similar nature to match the adjacent wall surfaces. Wash metal with solvent, prime and apply two coats of alkyd semi-gloss enamel.

.3 Finish exposed prime coated hardware items to match the adjacent wall surfaces. Wash metal with solvent, prime and apply two coats of alkyd semi-gloss enamel.

.4 At wet areas, in showers, bathrooms and janitors rooms, add an approved fungicide to paints. For oil based paints, use 1% phenolmercuric or 4% tetrachlorophenol.

3.9 **Finish Formulae**

Formula 1 - <u>For all structural and misc. steel, primed ferrous metal surfaces</u>:

- One coat spot priming CGSB 1-GP-40M
- One coat enamel undercoat CGSB 1-GP-38M
- One coat semi-gloss enamel CGSB 1-GP-60M

Formula 2 - <u>For dipped galvanized metal</u>:

- One coat alkyd primer
- One coat alkyd primer one coat enamel undercoat CGSB 1-GP-38M
- Two coats gloss enamel CGSB 1-GP-60M

Formula 3 –For Gypsum Wall Board and HardiePanel

- One coat latex primer
- Two coats latex eggshell enamel CGSB 1-GP-60M

Formula 4 - For exposed interior masonry:

- One coat block filler CGSB 1-GP-188M
- One coat primer sealer CGSB 1-GP-119M
- Two coats semigloss enamel CGSB 1-GP-57M

END OF SECTION

ARCHITECTURAL SPECIFICATIONS
MISCELLANEOUS SPECIALITY

PART 1 – GENERAL

1.1 Scope

.1 Work of this section includes supply and installation of:
- Access panels
- Washroom Accessories
- Grab Bars
- Standard Washroom Signage
- Hose and Supply Boxes
- Washroom Partitions
- Corridor Lockers

1.2 Related Work Specified Elsewhere

Metal Fabrications	Section 05500
Rough Carpentry	Section 06100

1.3 Delivery and Storage

.1 In accordance with Section 01600.

.2 Store all items in dry, clean, protected areas.

1.4 Co-ordination

.1 In addition to requirements in Section 01600, coordinate supply and installation of all specified items.

.2 Where manufacturer installs, clarify with Contractor before submitting Tenders.

.3 Supply sleeves, bolts, anchors, templates and other items required for other trades, for building-in of units specified in this Section.

1.5 Shop Drawings

.1 Provide shop drawings as indicated in Section 01340 for the Consultant's review.

PART 2 – PRODUCTS

2.1 Manufacturers

.1 Each item is generally specified by manufacturer's name and catalogue number.

.2 Other manufacturers equally complying with design and specified requirements, can be submitted to the Consultant for approval.

2.2 Access Panels

.1 At un-rated partitions, ceilings – provide Flush Access Door Type DSC-214P by Acudor Products Limited or approved equal. Unless indicated otherwise, size to be 610mm x 610mm with flush screwdriver type locks, primed for painting. Locations per drawing.

.2 Wall access panels for plumbing inspection/ maintenance in washrooms to be 152 x 152 [6" x 6"], lockable 16 gauge cold rolled steel and equipped with a hidden pin hinge, general purpose access door with flange.

2.3 Washroom Accessories

.1 Mirrors – Surface mount acrylic or tempered glass mirror with stainless steel frame, 6mm thick, size per drawings. Mirror to be tilted if mounting height is higher than 1000mm.

.2 Adult Change Table: Pressalit Care 3000 Height Adjustable Changing Table. Model R8539 or approved equal.

.3 Coat Hook: Frost Safety Coat Hook, Model No. JM066 (Mfg. No. 1150), satin finish or approved equal.

.4 Stainless Steel Shelf: Bobrick B-295 x 16, 18-gauge (1.2mm), type 304 Stainless Steel, Satin Finish.

.5 Electric Hand Dryer: Xlerator Hand Dryer Surface Mounted Automatic Hand Dryer - Sprayed Nickel Finish.

.7 Toilet Backrest for accessible tankless toilets: Frost Code 1028, Stailess Steel Finish.

.8 Toilet Paper Dispenser: Bobrick B-4288 ContraSeries Surface-Mounted Multi-Roll Toilet Tissue Dispenser. Unless another model is provided by the City.

.9 Soap Dispenser: Gojo GOJ888006 Foam Soap Wall-Mounted Soap Dispenser.

.10 Baby Changing Table: Koala Kare KB310-SSWM Horizontal Stainless Steel Surface-Mounted baby changing station.

.11 Toilet Paper Dispenser: Jumbo Bath Tissue Dispenser, Model H-1347.

.12 Feminine Hygiene Disposal: One per Stall on the Floor.

2.4 Grab Bars

.1 Grab Bars shall be equal to Canadian Builders Hardware 416 243 1166 – list of stainless-steel grab bars, brushed finish with knurled grip and concealed flange.

2.5 Standard Washroom Signage

.1 Provide 1 Code 966 – 6"x6" Universal Washroom sign with Braille equal to Frost Products Ltd. Location of sign as per door schedule.

.2 Provide 1 Code 965 – 6"x6" Unisex Washroom sign with Braille equal to Frost Products Ltd. Location of sign as per door schedule.

2.6 Hose & Supply Boxes

.1 Hose and Supply Boxes shall be equal to keyed stainless-steel recess boxes 8140 Series by Acorn. Recess box to have flange and door.

2.7 Changeroom Partitions

.1 Changeroom partitions: All steel, doors, panels, and pilasters, as manufactured by Hadrian Manufacturing Inc. Style: Floor mounted Elite Max Series, Brushed Stainless Steel finish.

.2 Doors and panels shall be 2337 mm (92”) high, 25 mm (1”) thick, 22 or 20 gauge sheet steel laminated to a double-faced honeycomb core. Interlock edges, weld and grind smooth corners.

.3 Pilasters shall be 32 mm (1 ¼”) thick 20 gauge sheet steel manufactured as .2 above. Provide solid steel carrying member integral to pilaster.

.4 Shoes shall be 75 mm (3”) polished 20 gauge stainless steel one piece with concealed hold-down clip.

.5 Wall and pilaster brackets and hardware shall be heavy chrome plated die castings. Hinged brackets, strikes, and keepers will be through bolted with tamper-proof sex bolts.

.6 Mounting height at 102 mm (4”).

2.8 Corridor Lockers

.1 Hadrian Gladiator Atheletic Ventilated Lockers or approved equal
Size: 381 [15”] Wide x 1829 [72”] high x 457 [18”] Deep Double Tier
Colour: 828 Dovetail, ASTM D6678 Graffiti Resistance.
Accessories: Box Base and Sloped Top.
Latch & Locking System: Friction Catch with Padlocks.

PART 3 – EXECUTION

3.1 Installation

.1 Washroom accessories and lockers are to be installed with vandal proof concealed fastenings of stainless steel or other non-corroding material.

.2 Hand over items to be incorporated in construction by other sections.

.3 Install all other items in accordance with manufacturer’s instructions.

END OF SECTION

PART 1- GENERAL

1.1 Scope

This section includes Quartz surfacing for vanity countertops in universal washroom and individual washrooms.

1.2 Related Work

Metal Fabrication	Section 05500
Rough Carpentry	Section 06100
Joint sealant	Section 07900

1.3 References

1.3.1 ASTM C97 – Absorption and Bulk Specific Gravity of Dimension Stone

1.3.2 ASTM C99 – Modulus of Rupture of Dimension Stone

1.3.3 ASTM C170 – Compressive Strength of Dimension Stone

1.3.4 ASTM C217 – Weather Resistance of Slate

1.3.5 ASTM C482 – Bond Strength of Ceramic Tile to Portland Cement.

1.3.6 ASTM C484 – Thermal Shock Resistance of Glazed Ceramic Tile

1.3.7 ASTM C501 – Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser

1.3.8 ASTM C531 – Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes

1.3.9 ASTM C880 – Flexural Strength of Dimension Stone

1.3.10 ASTM C1026 – Resistance of Ceramic Tile to Freeze-Thaw Cycling

1.3.11 ASTM C1028 – Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method

1.3.12 ASTM C1243 – Relative Resistance to Deep Abrasive Wear of Unglazed Ceramic Tile by Rotating Disc

1.3.13 ASTM D256 – Izod Pendulum Impact Resistance of Plastics

1.3.14 ASTM D2047 – Static Coefficient of Friction of Polish-Coated Floor Surfaces by the James Machine

1.3.15 ASTM E84 – Surface Burning Characteristics of Building Materials

1.4 Submittals

1.4.1 Submit under provisions of Section 01340 - Submittals.

1.4.2 Product Data: Manufacturer's data sheets on each product to be used, including:

1.4.2.1 Quartz Surfacing: Submit manufacturer’s product data, fabrication, and

installation instructions.

1.4.2.2 Accessories: Submit manufacturer's product data and installation instructions.

1.4.3 Shop Drawings: Identify color[s] and finish[es], and show: Field-verified dimensions, Quartz surfacing dimensions, Locations and dimensions of cutouts, required locations of support and blocking members, Edge profiles, Installation details and methods

1.4.4 Samples: Cut sample and seam together for representation of seaming techniques, Indicate full range of color and pattern variation.

1.5 Quality Assurance

1.5.1 Allowable Tolerance:

1.5.1.1 Variation in component size ± 1/8" (3mm) over a ten (10) foot length

1.5.1.2 Location of openings: ± 1/8" (3mm) from indicated location

1.5.1.3 Maximum 1/8" (3mm) clearance between quartz surfaces and each wall

1.6 Delivery, Storage, and Handling

1.6.1 Packaging, Shipping, Handling, and Unloading

1.6.1.1 Observe manufacturer's recommendations and handle accordingly in order to prevent breakage or damage.

1.6.1.2 Brace parts if necessary.

1.6.1.3 Transport in the near-vertical position with finished face turned toward finished face.

1.6.1.4 Do not allow finished surfaces to rub during shipping or handling.

1.6.2 Storage and Protection

1.6.2.1 Store in racks in near-vertical position.

1.6.2.2 Prevent warpage and breakage.

1.6.2.3 Store inside away from direct exposure to sun.

1.6.2.4 Store between 25ºF and 130ºF (-4 ºC and 54ºC).

1.6.2.5 Store with finished face turned toward finished face.

1.7 Warranty

1.7.1 Provide manufacturer's Limited Commercial Lifetime Warranty against product defects when fabricated and installed by a manufacturer's certified fabricator.

PART 2 - PRODUCTS

2.1 Approved Products and Manufacturers

2.1.1 All countertops shall Quartz surfacing as manufactured by Caesarstone, Classico Collection or approved equal.

2.1.1.1 CT-01: Colour: 5141 Frosty Carrina, Polished, 20mm Thick

2.2 Accessories

2.2.1 Adhesive:

2.2.1.1 Provide structural-grade silicone, or epoxy adhesives, as recommended by manufacturer for application and per conditions of use.

2.2.1.2 Provide spacers, if required, recommended by adhesive manufacturer.

2.2.1.3 Provide epoxy, or polyester adhesive, recommended by manufacturer for application and conditions of use.

2.2.1.4 Color: Adhesive that will be visible in finished work should be tinted to match quartz surfacing.

2.2.2 Joint Sealant:
- 2.2.2.1 Clear silicone sealant, as recommended by manufacturer for application and per conditions of use.
- 2.2.2.2 Provide anti-bacterial type in washrooms.

PART 3 - EXECUTION

3.1 Acceptable Installer

3.1.1 Installer: Firm shall have five years' experience installing architectural stone and shall be certified by the manufacturer.

3.2 Examination

3.2.1 Site Verification
- 3.2.1.1 Verify dimensions by field measurements prior to fabrication.
- 3.2.1.2 Verify that substrates supporting quartz surfaces are plumb, level, and flat to within 1/16 inch in ten feet (1.6 mm in 3000 mm), and that necessary supports and blocking are in place.

3.2.2 Materials Review
- 3.2.2.1 Inspect finished surfaces for damage.
- 3.2.2.2 Do not install until damaged materials have been repaired or replaced in an acceptable manner.

3.3 Preparation

3.3.1 General
- 3.3.1.1 Protect finished surfaces against scratches.
- 3.3.1.2 Apply masking where necessary.
- 3.3.1.3 Guard against grit, dust, and other potentially abrasive dirt or residue.

3.4 Installation

3.4.1 General
- 3.4.1.1 Install materials in accordance to manufacturer's recommendations.
- 3.4.1.2 Lift and place carefully to avoid breakage.

3.4.2 Preliminary Installation and Adjustment
- 3.4.2.1 Position materials to verify correct sizing and preparation.
- 3.4.2.2 Make necessary adjustments.
- 3.4.2.3 If cutting, grinding, or polishing is required at the jobsite, use water-cooled tools.
- 3.4.2.4 Protect jobsite and surfaces against dust and water.
- 3.4.2.5 Perform work away from installation site, if possible.
- 3.4.2.6 Gypsum drywall back walls, [which are not [fire] [or] [acoustically] [rated], may be routed up to half the thickness of the drywall to allow the countertop to fit.
- 3.4.2.7 Allow gaps for expansion of no less than 1/16 inch (1.5 mm), per every five feet, when installed between walls or other fixed conditions.

3.5 Permanent Installation

3.5.1 After verifying fit:
- 3.5.1.1 Remove quartz surfacing from position.
- 3.5.1.2 Clean substrates of dust and contamination.
- 3.5.1.3 Clean quartz surfacing back side and joints with solvent.

3.5.2 Apply sufficient quantity of mounting adhesive in accordance with adhesive manufacturer's recommendations to provide permanent, secure installation.

3.5.3 Spacing of mounting adhesive shall not exceed:

3.5.4 Install surfacing plumb, level, square, and flat to within 1/16 inch in ten feet (1.6mm in 3000 mm).

3.6 Joints

3.6.1 Joints between adjacent pieces of quartz surfacing
- 3.6.1.1 Joints shall be flush, tight fitting, level, and neat.
- 3.6.1.2 Securely join with stone adhesive.
- 3.6.1.3 Fill joints level with quartz surfacing.
- 3.6.1.4 Clamp or brace quartz surfacing in position until adhesive sets.

3.7 Cleaning

3.7.1 Remove masking and excess adhesives and sealants. Clean exposed surfaces.

3.8 Protection

3.8.1 Protect surfacing from damage by other sections.

END OF SECTION

ENTRANCE FLOOR GRILLES

PART 1 – GENERAL

1.01 Scope

A. Section Includes
   1. Entrance floor grille and frame assemblies.

B. Related Requirements

Cast-In-Place Concrete	Section 03300

1.02 References

A. ASTM B 221-93 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
B. ASTM A 276-92 Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
C. AAMA 606.1 Voluntary Guide Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum
D. AAMA 607.1 Voluntary Guide Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.

1.03 Coordination

A. If product is to be recessed, coordinate with concrete work so that products are available for placing integrally with floor slabs.

1.04 Submittals

A. Product Data: Manufacturers product specifications, installation and maintenance instructions.
B. Shop Drawings: Show layout and types of grates and frames not less than half-scale sections of typical installations, details of patterns or designs, anchors, and accessories, and field measurements of slab recess to receive frames grates (if applicable).
C. Samples for Selection Purposes: Actual sections of grate and frame material in a convenient but representative size showing full range of colors, textures, finishes and patterns available for each type of floor grate and frame specified.
D. Samples for Verification Purposes: Not less than 6 inch square sections of grate material and 6 inch length of frame material in selected colors and finishes for each type of grate and frame specified.
E. Installation, Operations and Maintenance data.

1.05 Warranty

A. Provide manufacturer's written warranty.
B. Warrant materials and fabrication against defects after completion and final acceptance of Work.
C. Repair defects, or replace with new materials, faulty materials or fabrication developed during the warranty period at no expense to Owner.

PART 2 - PRODUCTS

2.01 Acceptable Manufacturers

Stainless Steel, heavy duty entrance grids as manufactured by **Nystrom** - **eleGRIL®** or approved equal.

2.02 Design Criterial

A. Rolling Load: 1000 lbs/wheel.

B. Uniform Load: 1000 lbs/sq. ft.

2.03 Entrance System Floor Grate

A. Stainless Steel Type 304 or Stainless Steel Type 316 per ASTM A 276
B. Rail Finish: Rail finish shall be supplied in mill
C. Tread Spacing: Wire spacing shall be 0.233" (5.9mm) o.c.
D. Construction: Surface Wires: .093" (2.4mm) by 0.156" (4mm) wire with 0.070" (1.8mm) support bars spaced 1" (24mm) oc. Tread wires shall be resistance welded at each joint.
E. Fasteners: Non-corrosive screws and anchors for securing frames together and to floors.
F. Trads: rigid grate with .093" (2.4mm) by 0.156" (4mm) V wire and Rugged Scrub® carpet tread: Crimped solution-dyed 600 denier polypropylene fibers tufted into a woven double backing and mechanically secured to tread rails. Color: Black.

2.04 Entrance System Grate Frame

A. Stainless Steel Type 304 per ASTM A 276
B. Frame finish shall be supplied in mill (standard) .
C. Mounting:
   1. **LBM, Level Bed, mechanically attached stainless steel frame**, shall 9/16" (14.2mm) deep with 1/8" (3.2mm) exposed surface. *Leveling screed required [by others]*

2.05 Lock Down Mechanism

A. Hidden Lock Down shall be a 1 7/8" (47.62mm) x 1" (25.4mm) x 1/8" (3.175mm) type 304 stainless steel hold down plate to secure **eleGRIL** to concrete surface.

PART 3 - EXECUTION

3.01 Examination

A. Products must be placed on a flat and level substrate. Substrate shall meet tolerance of 1/8" over 10 feet in accordance with ACI 302.
B. Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper or timely completion.
   1. Do not proceed until unsatisfactory conditions have been corrected.

3.02 Installation

A. Install products in accordance with manufacturer's instructions, at locations shown and with top of products level with adjoining finished flooring where applicable.
B. Coordinate top of product surfaces with swinging doors to provide under-door clearance.
   1. Provide necessary shims, spacers, and anchorages for proper location and secure attachment of frames to concrete.
   2. For installation in terrazzo flooring, contact manufacturer.

3.03 Adjusting and Cleaning

A. Adjust top surface of assembly to be flush with adjacent finishes.

B. Coordinate top of surfaces with doors that swing across surface to provide adequate underdoor clearance.

C. Clean dirt and debris from frame recess before installing floor system.

3.04 Protection

A. Upon completion of frame installations, provide temporary filler of plywood or fiberboard in grate recesses, and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near time of Substantial Completion.

B. Install product when no further wheeled construction traffic will occur and wet type operations including painting and decorating are complete.

END OF SECTION

PART 3
IT PERFORMANCE SPECIFICATION

The Corporation of the City of Brampton

IT Performance Specification Division 27, Communications New Build

Version 1.6
March 18, 2021

Revised by:
Marc Flores
Network Administrator – Cable Plant

This document is a living document and will be updated as needed.
It is the Consultant / Contractors responsibility to inquire with CoB IT Department that the latest version of this document is being used.

Table of Contents

REVISION HISTORY

Version #	Date	Revised by	Description of Revisions
1.1	18-Jan-06	MCW Consultants	Initial Creation
1.2	26-Feb-10	David Barnwell	Addition of test-results/as-built documentation requirements, cabinet layout, triple became double drop standard. UPS requirements added
1.3	23-Feb-15	David Barnwell	Removed Cat5e and lower performance fibre
1.4	15-Jun-17	Marc Flores	Updated Labeling, added Appendixes, removed part numbers from spec materials and referred to appendixes (Refer to Appendix for part number changes). Document combined into 1 Living document. Added Fire stopping section.
1.5	31-Jan-19	Marc Flores	Updated patch cable colouring standards Removed Gigaspeed patch panel and replaced with only M2000 patch panels Revised appendix drawings
1.6	18-March-21	Marc Flores	Added CAT6a cabling for Wifi Access Points Revised part numbers in Wireless section 271544 appendix.

GROUNDING AND BONDING FOR COMMUNICATION SYSTEMS

1 SCOPE OF WORK

1.1 Include detailed design, manufacturer, supply, installation, inspection and testing of grounding and bonding systems and items contained within as described in these performance specifications and summarized in the following elements of the work:

.1 The scope of work included within the section includes grounding and bonding requirements of communication systems.

2 DESIGN AND PERFORMANCE REQUIREMENTS

2.1 Design, manufacturer, supply and installation of grounding and bonding systems and related items shall comply with the following standards, unless otherwise stated:

- Canadian Electric Code
- Ontario Building Code
- TIA/EIA-568-B.1 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements
- TIA/EIA-568-B.1-5 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 5 – Telecommunications Cabling for Telecommunications Enclosures
- TIA/EIA-569-B Commercial Building Standard for Telecommunication Pathways and Spaces
- TIA/EIA-606-A Administration Standard for Commercial Telecommunication Infrastructure
- TIA/EIA-758-A Customer-Owner Outside Plant Telecommunications Infrastructure Standard
- TIA/EIA-942 Telecommunications Infrastructure Standard for Data Centres
- CSA-T527 Grounding and Bonding for Telecommunications in Commercial Buildings
- BICSI – Telecommunication Distribution Methods Manual
- BICSI – Information Transport Systems Installation Manual
- BICSI – Customer-Owner Outside Plant Design Manual
- CISCA – Ceiling and Interior Systems Construction Association

2.2 All bonding and grounding elements shall be constructed from copper.

2.3 Provide a solid copper tin plated busbar with holes for use with standard-sized two hole lugs, have minimum dimensions of 6.3 mm x 100 mm x 610 mm (0.25 in x 4 in x 12 in) within the main communication room mounted to the backboard.

2.4 Provide a solid copper tin plated busbar with holes for use with standard-sized two hole lugs, have minimum dimensions of 6.3 mm x 100 mm x 305 mm (0.25 in x 4 in x 6 in) within each communication room mounted to the backboard.

2.5 Provide a continuous unbroken Telecommunication Bonding Backbone (TBB) wire between the main communication room grounding busbar and the grounding busbar of the communication room on the top floor of a multi-story building. TBB shall be sized based on the following:

TBB Length Linear m (ft)	TBB Size AWG
Less than 4 (13)	6
4 to 6 (13 to 20)	4
6 to 8 (20 to 26)	3
8 to 10 (26 to 33)	2
10 to 13 (33 to 44)	1
13 to 16 (44 to 52)	1/0
16 to 20 (52 to 66)	2/0
Greater than 20 (66)	3/0

2.6 Each communication room in a multi-story building shall be bonded to the TBB with a wire sized to match that of the TBB. The bonding wire shall be coupled to the TBB with an exothermic weld.

2.7 All cabinets, cable trays, conduits and intrabuilding armoured cable shall be bonded to the busbar in the room to which they are located with a minimum #6 AWG wire.

2.8 All metal parts of the access floor shall be bonded to ground in accordance with CEC Rule 10-406. A minimum of every fourth pedestal shall be bonded to ground with a minimum #6 AWG wire.

2.9 Bond wire basket cable trays to ground in the following way:

.1 Ground at the end of a continuous run

.2 Ground continuous runs every 18.3 m (60 ft).

.3 All on-site fabricated sections (any sections that have been cut in any way) shall be bonded to ground at both ends. This includes but is not limited to Bends, Crosses, Tees, “Y” fittings and vertical fittings.

.4 Each section of tray that is spliced to another section of tray shall be spliced with a minimum of four (4) splices. Either Flexmate or Splice Washers shall be used for splicing.

3 MATERIALS

NIL

4 FIELD QUALITY CONTROL

NIL

INTERIOR PATHWAYS FOR COMMUNICATION SYSTEMS

1 **SCOPE OF WORK**

1.2 Include detailed design, manufacturer, supply, installation and inspection of communication pathway systems as described in these performance specifications and summarized in the following elements of the work:

.2 The scope of work included within the section includes conduits, cable trays and slings supports.

2 **DESIGN AND PERFORMANCE REQUIREMENTS**

2.1 Design, manufacturer, supply and installation of pathway systems shall comply with the following standards, unless otherwise stated:

- Canadian Electric Code
- Ontario Building Code
- TIA/EIA-568-B.1 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements
- CSA-T527 Grounding and Bonding for Telecommunications in Commercial Buildings
- TIA/EIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces
- TIA/EIA-606-A Administration Standard for Commercial Telecommunications Infrastructure
- BICSI – Telecommunication Distribution Methods Manual

2.2 Outlet boxes shall be 100 mm (4 in) x 100 mm (4 in) x 57 mm (2.25 in) with a single gang adapter plate. Outlet boxes designated for an open office area shall be mounted at 775 mm (30.5 in) AFF. Outlet boxes designated as voice for a wall mounted public phone shall be mounted at 1120 mm (44 in) AFF. Mounting heights measured from the bottom of the outlet box.

2.3 A minimum of one 27 mm (1 in) conduit shall run from the outlet box to the ceiling space. A conduit run shall serve no more than one outlet box.

2.4 Sling supports shall support the cable every 1.2 m (4 ft) from the conduit to the nearest cable tray.

2.5 Cable tray sized not to exceed 40% fill shall be the main pathway system. Run cable tray in a continuous run through every main corridor and walk way and up to the exterior wall of the communication rooms.

2.6 Cable shall pass through into the communication rooms from the cable tray with the use of an appropriately rated re-enterable firestop sized to not exceed 40% fill.

2.7 Cable tray sized not to exceed 40% fill shall be the main pathway system within the communications rooms and data centres. Run cable tray in such a way as to continuously support horizontal cable and backbone cable between cable entrance points, backboards and cabinets.

2.8 Cable tray shall be modified on-site by the contractor as per manufacturer's specifications to suit the design and on-site conditions.

2.9 All cable tray inner corners shall consist of a 45-degree angle not a 90 degree angle. In corridors, a sweep bend shall be used consisting of a 300 mm (11.8 in) radius for 150 mm (6 in) wide cable tray, 400 mm (15.85 in) radius for 300 mm (12 in) wide cable tray and 500 mm (19.7 in) radius for 450 mm (18 in) wide cable tray.

2.10 Cable trays shall be installed a minimum of 75 mm (3 in) above T-bar ceilings and have a minimum of 150 mm (6 in) of clear space above the cable tray.

2.11 Cable trays shall be supported at both ends of each section of 3m (10 ft.), 600 mm (12 in) from the ends.

2.12 All pathways shall avoid potential sources of electromagnetic interference by maintaining clearances of at least:

a. 305 mm (1 ft.) from fluorescent ballasts.

b. 305 mm (1 ft.) from electrical power distribution conduit and cable, less than 1kV.

c. 1000 mm (3.3 ft.) from electrical power distribution conduit and cable, more than 1kV.

d. 1220 mm (4 ft.) from motors and transformers.

e. 305 mm (1 ft.) from fluorescent lighting. Pathways shall cross perpendicular to fluorescent lighting and power distribution and conduits.

f. 305 mm (1 ft.) from HVAC equipment, ducts and pipes

2.13 Conduit capacity shall never exceed 40% fill as per TIA/EIA-569-B standards. Conduit capacity shall be as follows:

Conduit Size mm (in)	**Cable Diameter mm (in)**	
	<=6.1 (0.24)	**7.4 (0.29)**
21 (0.75)	3	2
27 (1)	6	3
35 (1.25)	10	6
41 (1.5)	15	7
53 (2)	20	14
63 (2.5)	30	17
78 (3)	40	20

2.14 If the capacity of the conduit is exceeded, then the next trade size shall be used.

2.15 If conduit has an internal diameter of 53 mm (2 in) or less, then the bend radius shall be at least six times the internal diameter. If conduit has an internal diameter of more than 53 mm (2 in) then the bend radius shall be at least ten times the internal diameter.

2.16 The maximum number of bends between cable pull boxes in a conduit run shall be two 90^{o} bends.

2.17 Conduit runs shall have no continuous sections longer than 30 m (100 ft.).

2.18 If a conduit run requires a reverse bend between 100 º and 180 º then a pull box shall be inserted at the bend.

2.19 Pull boxes shall be adequately sized for the radius of the connecting conduits and the manufacturer's specified cable bend radius, as follows:

Conduit Size mm (in)	Pull Box Width mm (in)	Pull Box Length mm (in)	Pull Box Depth mm (in)	Width Increase for Additional Conduit mm (in)
27 (1)	102 (4)	406 (16)	76 (3)	51 (2)
35 (1.25)	152 (6)	50 (20)	76 (30)	76 (3)
41 (1.5)	203 (8)	686 (27)	102 (4)	102 (4)
53 (2)	203 (8)	914 (36)	102 (4)	127 (5)
78 (3)	305 (12)	1219 (48)	127 (5)	152 (6)

2.20 Pull boxes shall be installed in fully accessible ceiling spaces.

2.21 Support and secure all boxes independent of the conduit connected thereto.

2.22 All conduit ends shall be protected by insulating bushings.

2.23 Use only manufacturer approved cable lubricants. Any excess lubricant shall be cleaned to leave conduit exteriors suitable for painting.

2.24 All conduits shall be left with a nylon pull string installed.

3 MATERIALS

3.1 Obtain cable tray components through one source from a single manufacturer.

3.2 Cable tray shall have the following characteristics:

.1 Continuous, rigid, welded steel wire mesh.

.2 Continuous T-weld on top rail of tray.

.3 All cable tray shall be purchased in 3 m (10 ft.) straight sections.

.4 Finish: electroplated zinc coating

3.3 Obtain sling support components through one source from a single manufacturer.

3.4 Sling supports shall have the following characteristics:

.1 Comply with UL and EIA/TIA requirements for structured cabling systems.

.2 Comply with NFPA 90A for plenum spaces.

.3 Rated load weight shall be 100 lbs.

4 FIELD QUALITY CONTROL

4.1 NIL

EXTERIOR PATHWAYS FOR COMMUNICATION SYSTEMS

1 **SCOPE OF WORK**

1.3 Include detailed design, manufacturer, supply, installation and inspection of communication pathway systems as described in these performance specifications and summarized in the following elements of the work:

.3 The scope of work included within the section includes underground ducts and maintenance holes.

2 **DESIGN AND PERFORMANCE REQUIREMENTS**

2.1 Design, manufacturer, supply and installation of pathway systems shall comply with the following standards, unless otherwise stated:

- Canadian Electric Code
- Ontario Building Code
- TIA/EIA-758-A Customer-Owner Outside Plant Telecommunications Infrastructure Standard
- CSA-T527 Grounding and Bonding for Telecommunications in Commercial Buildings
- TIA/EIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces
- TIA/EIA
    - Provide a minimum of three 103mm (4”) conduits from the property line (location to be recommended by the utility) to the entrance facility designated for Access Provider use. Do not include more than two 90-degree bends in the conduit run between pull points. Never exceed a 90-degree bend. Conduits entering the room shall extend above the floor by 103 mm (4 in) AFF or extend down below the ceiling to 2.4 m (8 ft.) AFF. All conduits entering the building shall be sealed with a rubber plug or water plug.
-
- -606-A Administration Standard for Commercial Telecommunications Infrastructure
- BICSI – Telecommunication Distribution Methods Manual
- BICSI - Customer Owner Outside Plant Design Manual

2.2 A minimum of four (4) 103 mm (4 in) underground ducts shall connect two campus buildings. All campus buildings shall be connected to the building containing the main campus equipment room or data centre in a star configuration.

2.3 Only data, voice, CATV, security and fire alarm communication cables shall occupy these underground ducts. All other services such as power shall be run in a separate duct system.

2.4 Data, voice, CATV and security/fire alarm shall each be run in a separate conduit within the same duct system.

2.5 A maintenance hole shall be located within a duct run whenever one of the following apply:

- When calculation results for conduit pulling, tension exceeds the cable manufacturers recommended limits (typical cable cannot exceed a total installation load of 2700 Newton, 600 lbs.).
- When a cables maximum available reel length is exceeded and a splice to a second length of cable is required.
- Whenever a splice is required to split a large cable into two or more cables (for example a 24-strand fibre cable spliced to two 12-strand fibre cables).

2.7 The following equation shall be used to calculated pulling tensions for straight inclined or horizontal conduit: $T = T_0 + w (fx +/- h)$

- T = the pulling tension.
- T_0 = the tail load at the reel, typically a load of 890 Newton (200 lbf).
- f = coefficient of friction between the cable and conduit, typically 0.36 for PVC conduit and low density polyethylene.
- w = weight per unit length of cable (N/m or lb/ft). For metric units, the cable weight (Kg) must be converted to the force of its weight by multiplying it by 9.8 N/Kg.
- x = horizontal projection of segment.
- h = vertical projection of segment (h is positive for an increase in elevation, negative for a decrease in elevation and 0 for no change in elevation).

2.8 The following equation shall be used to calculated pulling tensions for uniformly curved segment of conduit: $T = (wr) PTR$

- T = the pulling tension.
- T_0 = the tail load from the previous section.
- f = coefficient of friction between the cable and conduit, typically 0.36 for PVC conduit and low density polyethylene.
- w = weight per unit length of cable (N/m or lb/ft.). For metric units, the cable weight (Kg) must be converted to the force of its weight by multiplying it by 9.8 N/Kg.
- r = radius of curvature of the bend (m or ft.).
- a = displacement angle of bend (degrees).
- PTR = pulling tension ratio as calculated from the chart below:

T_0/(wr)	f a													
	5	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**	**70**
0.2	0.29	0.38	0.48	0.58	0.68	0.79	0.90	1.02	1.15	1.29	1.44	1.59	1.76	1.95
0.4	0.50	0.60	0.70	0.81	0.92	1.05	1.18	1.32	1.47	1.63	1.80	1.99	2.19	2.41
0.7	0.81	0.92	1.05	1.18	1.32	1.47	1.63	1.80	1.99	2.19	2.41	2.65	2.90	3.18
1.1	1.23	1.38	1.53	1.70	1.88	2.07	2.28	2.50	2.75	3.01	3.30	3.62	3.96	4.33
1.8	1.99	2.19	2.41	2.64	2.90	3.18	3.48	3.81	4.17	4.56	4.99	5.45	5.96	6.51
2.8	3.07	3.36	3.68	4.03	4.41	4.82	5.27	5.76	6.29	6.87	7.50	8.19	8.95	9.77
4.5	4.92	5.38	5.88	6.42	7.01	7.66	8.36	9.13	10.0	10.9	11.9	13.0	14.1	15.4
6.5	7.10	7.75	8.47	9.24	10.1	11.0	12.0	13.1	14.3	15.6	17.1	18.6	20.3	22.2
9.3	10.2	11.1	12.1	13.2	14.4	15.7	17.2	18.7	20.4	22.3	24.3	26.6	29.0	31.6
12.0	13.1	14.3	15.6	17.0	18.6	20.3	22.1	24.2	26.4	28.8	31.4	34.2	37.4	40.8
16.0	17.5	19.1	20.8	22.7	24.8	27.0	29.5	32.2	35.1	38.3	41.8	45.6	49.8	54.3
20.0	21.8	23.8	26.0	28.4	31.0	33.8	36.9	40.2	43.9	47.9	52.3	57.0	62.2	67.9
24.5	26.7	29.2	31.8	34.7	37.9	41.4	45.1	49.3	53.7	58.7	64.0	69.8	76.2	83.2
30.0	32.7	35.7	39.0	42.5	46.4	50.6	55.3	60.3	65.8	71.8	78.4	85.5	93.3	102
37.0	40.4	44.1	48.1	52.5	57.2	62.5	68.2	74.4	81.2	88.6	96.6	105	115	126
45.0	49.1	53.6	58.5	63.8	69.6	76.0	82.9	90.5	98.7	108	118	128	140	153
54.0	58.9	64.3	70.2	76.6	83.5	91.2	99.5	109	118	129	141	154	168	183
65.0	70.9	77.4	84.5	92.2	101	110	120	131	143	156	170	185	202	221
77.0	84.0	91.7	100	109	119	130	142	155	169	184	201	219	239	261
89.0	97.1	106	116	126	138	150	164	179	195	213	232	254	277	302
100	109	119	130	142	155	169	184	201	219	239	261	285	311	339

2.9 Pulling tensions shall be calculated from both ends as if the cable were pulled from either end and the worst case shall be used as the reference. However installers should pull from the end with the lower tension.

2.10 Maintenance holes shall have the following characteristics:

- Precast
- Minimum interior dimensions of 3.6m (12ft) long x 1.8m (6ft) wide x 2.1m (7ft) high
- Equipped with a built-in sump
- Minimum entrance opening of 762 mm (30”) interior diameter
- Equipped with a corrosion-resistant pulling iron at either end
- Grounding system
- Cable racks on both side
- Fixed or movable ladder
- Capable of supporting the heaviest anticipated weight, based on the following table:

Rating	**Heaviest anticipated weight**
Light duty	Pedestrian traffic only
H-5 (5,000 Kg)	Sidewalk applications and occasional non-deliberate traffic
H-10 (10,000 Kg)	Driveways, parking lots, and off-road applications subject to non-deliberate heavy traffic
H-20 (20,000 Kg)	Deliberate heavy traffic

2.11 Maintenance holes shall be located based on the following:

- Out of the roadway (when possible)
- Away from locations where water is likely to pool
- Allow for adequate traffic control when the MH is open
- Not jeopardize vehicular or pedestrian traffic flow.
- Not in or near an intersection or near a point where a curve occurs in a road.

2.12 Duct systems shall have the following clearances:

- Below the frost line
- 150 mm (6 in) when crossing pipes
- 300 mm (12 in) when parallel to pipes
- 75 mm (3 in) from power run in concrete
- 300 mm (12 in) from power direct buried

2.13 All duct runs and maintenance holes shall be clearly shown on as built drawings indicating number and size of ducts and the cable size in fibre strands and copper pairs contained within.

3 MATERIALS

3.1 NIL

4 FIELD QUALITY CONTROL

4.1 NIL

IDENTIFICATION FOR COMMUNICATION SYSTEMS

1 **SCOPE OF WORK**

1.2 Include detailed identification and administration of communication system as described in these performance specifications and summarized in the following elements of the work:

.3 The scope of work included within the section includes identification and administration of an end-to-end structured cabling system and its pathways and spaces.

2 **DESIGN AND PERFORMANCE REQUIREMENTS**

2.1 Inspection, testing and administration of identification and administration shall comply with the following standards, unless otherwise stated:

- Canadian Electric Code
- Ontario Building Code
- TIA/EIA-568-B.1 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements
- TIA/EIA-568-B.2 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components
- TIA/EIA-568-B.3 Commercial Building Telecommunication Cabling Standard – Part 3: Optical Fibre Cabling Components Standard
- TIA/EIA-569-B Commercial Building Standard for Telecommunication Pathways and Spaces
- TIA/EIA-606-A Administration Standard for Commercial Telecommunication Infrastructure
- TIA/EIA-758-A Customer-Owner Outside Plant Telecommunications Infrastructure Standard
- TIA/EIA-942 Telecommunications Infrastructure Standard for Data Centres
- CSA-T527 Grounding and Bonding for Telecommunications in Commercial Buildings
- BICSI – Telecommunication Distribution Methods Manual
- BICSI - Customer Owner Outside Plant Design Manual

2.2 Labelling shall be in accordance with the following:

.1 All labelling shall be mechanically printed and follow the TIA/EIA-606-A guidelines and be in accordance with the requirements of this specification. Hand written labels are not permitted.

.2 Cable labels shall be Vinyl construction with a white printing area and a clear tail that self-laminate the printed area when wrapped around the cable. The clear area should be of sufficient length to wrap around the cable at least 1.5 times.

.3 Vinyl identification labels shall appear on the following locations with the designations indicated on the cable schedule and drawings:

- Port identification on both ends of every cable
- Port identification on the front of all faceplates
- Port identification on the front of all patch panels
- Panel identification on the front top right hand corner of all patch panels
- Pair identification on the front of termination fields
- Wireless identification on the front of all wireless access points

.4 Lamicoid identification labels shall appear on the following locations with the designations indicated on the cable schedule and drawings:

- Cabinet identification on the top right hand side of the cabinet

.5 All firestops shall be labelled stating "WARNING FIRESTOP SEAL DO NOT DISTURB" and also the contractors name, address and phone number, date installed, fire rating.

.6 Horizontal cabling systems (faceplate ports, cable, patch panel ports) shall use the following labelling scheme: (DO NOT USE **X** IN THE LABELING USE LAN ROOM LETTER)

- 1st Data = **X**-001A where '**X' = 'LAN ROOM LETTER**, '001' = 'port number' and 'A' = 1st data port
- 2nd Data = **X**-001B where **'X' = 'LAN ROOM LETTER**, '001' = 'port number' and 'B' = 2nd data port

.7 Backbone cabling shall use the following labelling scheme (DO NOT USE **X** IN THE LABELING USE LAN ROOM LETTER):

- TC**X**-**2**-001-200 where 'TC**X**' = 'Telecommunication **X**', '2' = '2 floor communication room and '001-200' = 'port 1-200'

8 Cabinets shall use the following labelling scheme:

- TC**X**-**1A** where 'TCA' = 'Telecommunication LAN Letter', ''Cabinet Number

.9 Wireless access points shall use the following labelling scheme: *(See Appendix for Cable and Jack Colours)*

- **X-**W-01 where WL = 'WIRELESS', 01 = 'wireless port number' increasing by 1 for each extra wireless access point. W-02, W-03 etc**. (Where X is the LAN room Letter this drop terminates to)**

.10 Elevator drops shall use the following labelling scheme: *(See Appendix for Cable and Jack Colours) X = Lan room Letter*

- **X**-EL-01 where EL = 'Elevator', 01 = 'port number' **. (Where X is the LAN room Letter this drop terminates to)**

.11 Fire control panels shall use the following labelling scheme: *(See Appendix for Cable and Jack Colours) X = Lan room Letter*

- **X**-FR-01 where FR = 'Fire', 01 = 'port number'**(Where X is the LAN room Letter this drop terminates to)**

.12 Bonding and grounding systems shall use the following labelling scheme:

- TMGB where 'TMGB' = 'Telecommunication Main Grounding Busbar'
- TGB-4B where 'TGB' = 'Telecommunication Grounding Busbar' and '4B' = '4th floor communication room B' and
- ESBC where 'ESBC' = 'Electrical Service Bonding Conductor'
- TBB-4B where 'TBB' = Telecommunication Bonding Backbone' and '4B' = '4th floor communication room B' and
- EBC-TCA where 'EBC' = 'Equipment Bonding Conductor', 'TCA' = 'Telecommunication Cabinet A'
- CBC-TCA-4B-001-200 where 'CBC' = 'Cable Bonding Conductor', 'TCA' = 'Telecommunication Cabinet A', '4B' = '4th floor communication room B' and '001-200' = 'port 1-200'

2.3 As-built drawings shall include, but are not limited to, the following:

- Work area port designations
- Main routing of pathways
- Cabinet elevations
- Backboard elevations
- Communication room layouts
- Riser routing and cable counts

2.4 A full-size copy of the as-built drawings shall be placed in every communication room.

3 **MATERIALS**
NIL

4 **FIELD QUALITY CONTROL**
NIL

FIRESTOPPING

NOTE TO SPECIFIER: in the design using EZ-Path - do not take tray through wall: Coordinate drawings to show tray terminating at wall or floor and resuming on other side.

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes Labor, materials and equipment necessary to complete the installation required for the items specified under this Section, including but not limited to:

1. Firestopping of Through Penetrations in Fire Rated Assemblies.

1.2 RELATED SECTIONS

A. Related Work: Consult all other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

B. This Specification should be considered as an augmentation to Section 07 84 00 Firestopping and any or all sub sections of Section 07 84 00.

C. This Section addresses those unique elements that affect the Firestopping of Information Technology cabling systems which may not be addressed in 07 85 00 or any of its sub-sections.

1.3 REFERENCES

A. CAN4-S115-M, “Standard Method of Fire Tests of Firestop Systems”.

B. CAN/ULC-S115, “Standard Method of Fire Tests of Firestop Systems”.

C. Underwriters Laboratories Canada Inc. (ULC) – Fire Resistance Directory

D. Underwriters Laboratories, Inc. (cUL) – Fire Resistance Directory of Products Certified for use in Canada.

1.4 PERFORMANCE REQUIREMENTS

A. Fire rated cable pathway devices shall be used for ALL low-voltage, video, data and voice cabling, optical fibre raceways and certain high-voltage cabling where frequent cable moves, adds and changes may occur. Pathways required for high voltage cabling will be detailed on the prints. Such devices shall:

1. Meet the hourly fire-rating of fire rated wall and or floor penetrated.

2. Be tested for the surrounding construction and cable types involved.

3. Have ULC, cUL or cULus Systems permitting cable loads from; “*Zero to 100% Visual Fill*.” This requirement eliminates need for fill-ratio calculations to be made

by cable technicians to ensure cable load is within maximum allowed by ULC, cUL or cULus System.

4. Not have a constrictive inner liner that tightens around or compresses cables tightly together encouraging potential cross-talk or interference.

5. Be “Zero-Maintenance”, zero-maintenance is defined as; No action required by cabling technician to open and/or close pathway for cable moves, adds or changes, such as, but not limited to:
   a. Opening or closing of doors.
   b. Spinning rings to open or close fabric liner.
   c. Removal and or replacement of any material such as, but not limited to, firestop caulk, putty, pillows, bags, foam muffins, foam, foam plugs, foam blocks, or foam closures of any sort.
   d. Furnish letter from manufacturer certifying compliance with this definition of “Zero-Maintenance”.

6. Pathways shall be engineered such that two or more devices may be ganged together for larger cable capacities.

7. Pathways shall be engineered to be re-enterable so they can be retrofitted and removed from around existing cables without cutting and re-splicing them.

8. Cable Pathway Devices passing vertically through floors shall have equal FT Rating. (See UL System # F-A-3037, Item #4 “EZ-PATH Grid T-Rating Kit” Part # TRK444)

9. Affix adhesive wall label immediately adjacent to devices to communicate to future cable technicians, authorities having jurisdiction and others the manufacturer of the device and the corresponding UL System number installed.

B. Where non-mechanical pathways must be utilized, such as sealing (caulking) around single or grouped conduits, provide products that upon curing do no re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during or after construction. Provide letter from manufacturer certifying compliance with this section.

C. Cable pathway shall replace conduit sleeves in walls and floors, and;
   a. When installed individually in floors, devices shall pass through core-drilled opening utilizing tested floor plates.
   b. When multiple units are ganged in floors, devices shall be anchored by means of a tested grid.
   c. When installed individually in walls, devices shall pass through core drilled opening utilizing tested wall plates.
   d. When multiple units are ganged in walls, devices shall be anchored by means of a tested grid.

D. Cable tray shall terminate at each fire barrier and resume on the other side such that cables pass independently through devices. Cable tray shall be properly supported on each side of fire barrier.

Note to Specifier: Coordinate drawings to show tray terminating at wall or floor and resuming on other side.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Product Data: Provide manufacturer's standard catalog data for specified products demonstrating compliance with referenced standards and listing numbers of systems in which each product is to be used.

C. Schedule of ULC, cUL or cULus System Drawings: Submit schedule of all expected opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance ratings. If engineering recommendations are necessary, list these in the schedule too.

D. ULC, cUL or cULus System Drawings: Furnish copies of all ULC, cUL or cULus Systems identified in schedule above. Include any engineering recommendations.

E. Certificates: Product Certificate of Compliance from the firestop system manufacturer certifying material compliance with applicable code and specified performance characteristics.

F. Installation Instructions: Submit manufacturer's printed installation instructions.

1.6 QUALITY ASSURANCE

A. Products/Systems: Provide firestopping systems that comply with the following requirements:

1. Firestopping tests are performed by a qualified, testing and inspection agency. A qualified testing and inspection agency is ULC, cUL or cULus, or another agency performing testing and follow-up inspection services for firestop system acceptable to authorities having jurisdiction.

2. Firestopping products bear the classification marking of qualified testing and inspection agency.

B. Installer Qualifications: Experience in performing work of this section who is qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products in accordance with specified requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Manufacturer's original, unopened, undamaged containers, identification labels intact identifying product and manufacturer, date of manufacture; lot number; shelf life, if applicable; qualified testing and inspection agency's classification marking; and mixing instruction for multi-component products.

2. Handle and store products according to manufacturer's recommendations published in technical materials. Leave products wrapped or otherwise protected and under clean and dry storage conditions until required for installation.

B. Storage and Protection:

1. Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

1.8 PROJECT CONDITIONS

A. Do not install firestopping products when ambient or substrate temperatures are outside limitations recommended by manufacturer.

B. Do not install firestopping products when substrates are wet due to rain, frost, condensation, or other causes.

C. Maintain minimum temperature before, during, and for a minimum 3 days after installation of materials.

D. Do not use materials that contain flammable solvents.

E. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

F. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

G. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Specified Technologies Inc., or Approved Alternative.

B. Single Source: Obtain firestop systems for each type of penetration and construction condition indicated only from a single manufacturer.

2.2 MATERIALS

A. General: Use only firestopping products that have been tested for specific fire resistance rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire rating involved for each separate instance.

B. Firestop Sealants: STI SpecSeal® Brand or Approved Alternate single component latex formulations that upon cure do not re-emulsify during exposureto moisture, the following products are acceptable:

1. Specified Technologies Inc. (STI) SpecSeal® Series SSS Sealant or Approved Alternate.

2. Specified Technologies Inc. (STI) SpecSeal® Series LCI Sealant or Approved Alternate.

C. Firestop Putty: STI SpecSeal® Brand or Approved Alternate intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds, the following products are acceptable:

1. Specified Technologies Inc. (STI) SpecSeal® Series SSP Putty or Approved Alternate

D. Firestop Pillows: STI SpecSeal® Brand or Approved Alternate re-enterable, non-curing, mineral fiber core encapsulated on six sides with intumescent coating contained in a flame retardant poly bag, the following products are acceptable:

1. Specified Technologies Inc. (STI) SpecSeal® Series SSB Pillows or Approved Alternate.

E. Fire Rated Cable Pathways: STI EZ-PATH™ Brand or Approved Alternate device modules comprised of steel raceway with intumescent foam pads allowing 0 to 100 percent cable fill, the following products are acceptable:

1. Specified Technologies Inc. (STI) EZ-PATH™ or Approved Alternate Fire Rated Pathway
   a. Series 22 or Approved Alternate
   b. Series 33 or Approved Alternate
   c. Series 44 or Approved Alternate

Note to Specifier: Coordinate drawings to show size device desired to accommodate future cabel capacity. If no size is specified, contractors will use smallest size. Labor to install all three sizes is approximately the same.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before beginning installation, verify that substrate conditions previously installed under other sections are acceptable for installation of firestopping in accordance with manufacturer's installation instructions and technical information.

B. Surfaces shall be free of dirt, grease, oil, scale, laitance, rust, release agents, water repellants, and any other substances that may inhibit optimum adhesion.

C. Provide masking and temporary covering to protect adjacent surfaces.

D. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install through-penetration firestop systems in accordance with Performance Criteria and in accordance with the conditions of testing and classification as specified in the published design.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of firestopping products.

3.3 FIELD QUALITY CONTROL

A. Inspections: Owner shall engage qualified independent inspection agency to inspect through-penetration firestop systems.

B. Keep areas of work accessible until inspection by authorities having jurisdiction.

C. Where deficiencies are found, repair firestopping products so they comply with requirements.

3.4 ADJUSTING AND CLEANING

A. Remove equipment, materials, and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed openings to be free of excess firestopping materials and soiling as work progresses.

3.5 **SCHEDULES**:

Review this list and update as required, Contact STI for assistance

Penetrant Type	Concrete Floor	Concrete Wall	Gypsum Board Wall
Blank Opening	C-AJ-0100, C-AJ-0101	C-AJ-0100, C-AJ-101	
Metal Conduits	C-AJ-1080, C-AJ-1240, C-AJ-1353	C-AJ-1080, W-J-1098, W-J-1100	W-L-1049, W-L-1222, W-L-1168
Plastic Conduits/ Raceways	C-AJ-2140, C-AJ-2292	W-J-2018, W-J-2076	W-L-2093, W-L-2241
Cables	C-AJ-3214, C-AJ-3231, F-A-3015	C-AJ-3214, C-AJ-3231, W-J-3098, W-J-3099	W-L-3218, W-L-3219
Cable Trays	C-AJ-4029	W-J-4021, W-J-4022, W-J-4033	W-L-4008, W-L-4029, W-L-4043

3.6 DOCUMENTATION

A. Place system stickers on each side of wall penetrations.

B. Place a reproduction (photo copy) of the UL System description in a document protector and mount to the wall next to the wall penetration

1. Highlight the section of the system description that lists the allowed cable types.

COMMUNICATION EQUIPMENT ROOMS

1 **SCOPE OF WORK**

1.1 Include detailed design, manufacturer, supply, installation, inspection and testing of communication rooms and items contained within as described in these performance specifications and summarized in the following elements of the work:

.2 The scope of work included within the section includes architectural requirements, electrical systems, environmental requirements, cable management and pathways, and cabinets.

2 **DESIGN AND PERFORMANCE REQUIREMENTS**

2.1 Design, manufacturer, supply and installation of communication rooms and related items shall comply with the following standards, unless otherwise stated:

- Canadian Electric Code
- Ontario Building Code
- TIA/EIA-568-B.1 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements
- TIA/EIA-568-B.1-5 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 5 – Telecommunications Cabling for Telecommunications Enclosures
- TIA/EIA-569-B Commercial Building Standard for Telecommunication Pathways and Spaces
- TIA/EIA-606-A Administration Standard for Commercial Telecommunication Infrastructure
- TIA/EIA-758-A Customer-Owner Outside Plant Telecommunications Infrastructure Standard
- TIA/EIA-942 Telecommunications Infrastructure Standard for Data Centres
- CSA-T527 Grounding and Bonding for Telecommunications in Commercial Buildings
- BICSI – Telecommunication Distribution Methods Manual
- BICSI – Information Transport Systems Installation Manual
- BICSI – Customer-Owner Outside Plant Design Manual
- CISCA – Ceiling and Interior Systems Construction Association

2.2 Locate communication rooms in accordance with the following:

.1 As close to the centre of, and on the same floor as the area it is intended to serve.

.2 Accessible to hallways or common areas and access for delivery of large equipment.

.3 In multifloored buildings the communication rooms shall be stacked vertically.

.4 Avoid locations that may be subject to water infiltration, steam infiltration, humidity exceeding 55%, sources of heat such as direct sunlight, corrosive or adverse environmental conditions and sources of excessive EMI such as machinery.

.5 Avoid spaces in or adjacent to mechanical rooms, boiler rooms, washrooms, janitor closets, storage rooms, and loading docks.

2.3 Size communication rooms in accordance with the following:

.1 If the serving area is 500 m^2 (5000 ft^2) or less the room shall be 3.0 m x 2.4 m (10 ft. x 8 ft.).

.2 If the serving area is larger than 500 m^2 (5000 ft^2) and less than or equal to 800 m^2 (8000 ft^2) the room shall be 3.0 m x 2.7 m (10 ft. x 9 ft.).

.3 If the serving area is larger than 800 m^2 (8000 ft^2) and less than or equal to 1000 m^2 (10,000 ft^2) the room shall be 3.0 m x 3.4 m (10 ft. x 11 ft.).

.4 If the serving area exceeds 1000 m^2 (10,000 ft^2) a second communication room shall be required on the same floor.

2.4 A separate room shall be provided for the entrance facility. The room shall be located next to or directly below the main equipment room. A space of at least 1.2 m x 1.8 m (4 ft. x 6 ft.) shall be provided for each Access Provider.

2.5 A separate room shall be provided for the main equipment room. A space of at least 3 m x 4.6 m (10 ft. x 15 ft.) is required.

2.6 Design communication rooms to have fully outward opening, lockable doors that are a minimum of 0.91 m (3 ft.) wide and 2 m (80 in) tall. Access Provider rooms sized at 1.2 m x 1.8 m (4 ft. x 6 ft.) shall have two outward opening 0.91 m (3 ft.) wide and 2 m (6.7 ft.) tall doors.

2.7 False ceilings are not permitted.

2.8 Ceiling height shall be a minimum of 3 m (10 ft).

2.9 Communication room walls shall extend to the structural ceiling, install high-pressure laminate tile and treat walls and ceiling. Walls shall be 2-hour fire rated.

2.10 All walls, floors and ceiling surfaces shall be white in color.

2.11 Design access floors in accordance with the following:

.1 Shall meet the requirements of CISCA.

.2 Shall be covered in high-pressure laminate or other durable tile.

.3 Have a uniform load capacity of 12 kPa (250 lbs/ft^2).

.4 Have a concentrated load capacity of 8.8 kN (2000 lbs.).

.5 All metal parts of the access floor shall be bonded to ground in accordance with CEC Rule 10-406. A minimum of every fourth pedestal shall be bonded to ground with a 6 AWG wire.

2.12 Access floors shall only be installed in data centre applications.

2.13 In a multifloored building vertically interconnect communication rooms with a minimum of four 103 mm (4 in) sleeves or conduits. All conduits and sleeves shall be installed with bushing and appropriately rated firestop. Sleeves and conduits entering the communication room shall extend above the floor by 78 mm (3 in) AFF or extend down below the ceiling to 2.4 m (8 ft.) AFF.

2.14 Horizontally interconnect multiple rooms on a floor with conduit sized to 40% fill or cable tray that provides equivalent capacity. Regardless of cable counts there shall always be a minimum of two 53 mm (2") conduits or cable tray that provides equivalent capacity between rooms. All conduits shall be installed with bushing and appropriately rated firestop. Conduits entering the communication room shall extend down below the ceiling to 2.4 m (8 ft.) AFF.

2.15 Provide a minimum of three 103mm (4") conduits from the property line (location to be recommended by the utility) to the entrance facility designated for Access Provider use. Do not include more than two 90-degree bends in the conduit run between pull points. Never exceed a 90-degree bend. Conduits entering the room shall extend above the floor by 103 mm (4 in) AFF or extend down below the ceiling to 2.4 m (8 ft) AFF. All conduits entering the building shall be sealed with a rubber plug or water plug.

2.16 Design communication rooms to have the following power requirements:

.1 Provide a 15 amp 120-volt duplex convenience receptacle on standard power every 1.8 m (6 ft) around the perimeter walls.

.2 In rooms containing active equipment, provide a dedicated communication power panel with Transient Voltage Surge Suppression (TVSS). Identify the panel on the front door with a lamicoid label stating "Communication Panel" and panel designation. If a main UPS is installed in a data centre, all communication power panels shall be powered from that UPS.

.3 Provide one 20 amp 120 volt duplex receptacle (5-20RA) and one 20 amp 120 volt duplex twist lock receptacle (L5-20), both black in colour, for each cabinet and rack installed, mounted on the side of the cable tray or below the raised floor where applicable. These receptacles must be fed from the dedicated communication power panel.

.4 Provide two 20 amp 120 volt duplex receptacles (5-20RA), black in colour, for every 4ft wide section of backboard installed. These receptacles must be fed from the dedicated communication power panel.

2.17 Design communication room to have the following lighting requirements:

.1 Minimum of 500 lux (50 fc) measured 0.91 m (3 ft.) above finished floor, in front and behind cabinets installed. Position fixtures to minimize shadows.

.2 Do not use dimmer switches.

.3 Locate fixtures a minimum of 2.6 m (8.5 ft.) above finished floor.

.4 Power for lighting shall not come from the dedicated power panel in the communication room but from standard power.

.5 A minimum of 50% the fixtures shall be on emergency power, if available.

2.18 Design communication rooms to have a grounding and bonding system as per Specification Section 270526 'Grounding and Bonding for Communication Systems'.

2.19 Line a minimum of two walls within the communication room with AC grade or better, void-free plywood, 2.4 m (8 ft) high with a thickness of 19 mm (¾ in). The plywood shall be installed with the 'C' grade facing the wall. Plywood shall be pressure impregnated with fire-retardant chemicals in conformance with CAN/CSA-O80 Series-M and have a flame-spread rating not more than 25. A plywood backboard shall always appear where backbone sleeves enter and leave the communication room, in order to support backbone cables.

2.20 Design communication rooms containing active equipment to have the following environmental conditions and controls:

.1 Maintain continuous and dedicated environmental control (24 hours per day, 365 days per year). Connect HVAC system to emergency power where available.

.2 Maintain positive pressure with a minimum of one air change per hour.

.3 Dissipate the heat generated by active equipment. Coordinate with the City of Brampton IT department for equipment lists. Regardless of heat loads the cooling provided shall never be less than 0.5 tons/hr (6,000 Btu/hr) in general communication rooms and never less than 1 ton/hr (12,000 Btu/hr) in the main communication room. To include model #?

.4 Maintain a temperature of 18 ^{0}C to 22 ^{0}C.

.5 Maintain a relative humidity of 30% to 55%.

2.21 Design cabinet installations to be run side by side, with a minimum clearance of 0.91 m (3 ft) in the front and rear of the cabinets. Provide two vertical cable managers in each cabinet. Provide a solid side panel at both ends of a cabinet run, but never between cabinets.

2.22 Provide 2 vertical power bars in each floor standing cabinet.

2.23 Each cabinet shall have an UPS installed at the bottom of the cabinet. UPS shall be supplied and installed by the City of Brampton. *(See Appendix A for Part Numbers).*

3 **MATERIALS**

3.1 Acceptable manufacturer of all cabinets and associated accessories shall be RF Mote or equivalent.

3.2 Floor standing cabinets shall have the following characteristics:

.1 Model of cabinet shall be *(See Appendix A for Part Numbers)*

.2 CSA and UL approved.

.3 Standard EIA 19" mounting with 44U unit capacity.

.4 Dimensions: 762 mm (30 in) W x 914 mm (36 in) D x 2109 mm (83 in) H

.5 #10-32 EIA universal mounting hole spacing.

.6 Constructed from 11 gauge steel, textured black colour.

.7 Side panel shall be solid.

.8 Front door shall be smoked acrylic, with lockable recessed handles.

.9 Rear door shall be mesh, with lockable recessed handles.

.10 Cable management shall be a vertical internal ladder style.

.11 Exhaust fans shall exhaust a minimum of 200 CFM.

.12 Rear mounting rails shall be installed.

3.3 Vertical power bars shall have the following characteristics:

.1 CSA and UL approved.

.2 Rating: 20 amps, 120 volts.

.3 10 outlets, 20 amps, 120 volts (5-20RA).

.4 10 ft power cord, with a 20 amp plug (5-20P).

.5 Built in surge and spike protection.

.6 Power to the bar shall be switch disabled.

3.4 Wall mounted cabinet shall have the following characteristics:

.1 Model of cabinet shall *(See Appendix A for Part Numbers)*

.2 Standard EIA 19" hinged cabinet with 12U, 20U, and 26U unit capacity.

.3 Dimensions shall be at minimum: 762 mm (30 in) W x 477 mm (18.75 in) D x 565 mm (22.25 in) H.

.4 Extender brackets for cabinets shall be installed *(See Appendix A for Part Numbers)*, to increase depth by 152mm (6 in).

.5 Constructed from 11 gauge steel, textured black colour.

.6 CSA and UL approved.

.7 #10-32 EIA universal mounting hole spacing.

.8 Built-in vertical cable management.

.9 Provision for two exhaust fans.

4 FIELD QUALITY CONTROL

NIL

COPPER BACKBONE CATEGORY 3

1 SCOPE OF WORK

1.1 Include detailed design, manufacturer, supply and installation of communication cabling as described in these performance specifications and summarized in the following elements of the work:

.1 The scope of work included within the section includes voice end-to-end structured cabling between communication rooms.

.2 Supply an End-to-End Certified Structured Cabling System installed by a Systimax Value Added Reseller for the systems described in these specifications.

2 DESIGN AND PERFORMANCE REQUIREMENTS

2.1 Design, manufacturer, supply and installation of communication cabling shall comply with the following standards, unless otherwise stated:

- Canadian Electric Code
- Ontario Building Code
- TIA/EIA-568-B.1 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements
- TIA/EIA-568-B.1-5 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 5 – Telecommunications Cabling for Telecommunications Enclosures
- TIA/EIA-568-B.2 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components
- TIA/EIA-568-B.2-2 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 2
- TIA/EIA-568-B.2-3 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 3 – Additional Considerations for Insertion Loss and Return Loss Pass/Fail Determination
- TIA/EIA-568-B.2-4 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 4 – Solderless Connection Reliability Requirements for Copper Connecting Hardware
- TIA/EIA-568-B.2-5 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 5
- BICSI – Telecommunication Distribution Methods Manual
- BICSI – Information Transport Systems Installation Manual
- BICSI – Customer Owned Outside Plant Design Manual

2.2 For every horizontal cable intended for voice, provide two (2) pairs plus 25% spare pairs in the backbone cable between the general communication room and the main communication room or data centre.

2.3 No means of splicing shall be used.

2.4 Provide 3 m (10 ft) of cable slack within the communication room. All cable slack shall be stored in a neat extended loop or figure of eight within the cable tray or on the backboard. Cable shall not be stored in a bundled loop.

2.5 All pairs shall be directly cabled back to a backboard mounted wiring block located within the communication room.

2.6 Backbone cable channel link shall not exceed 800 m (2624 ft); this length shall include the cable slack.

2.7 Maintain minimum bend radii of four times the cable diameter for twisted pair cable.

2.8 Do not exceed the maximum cable pulling force of 110 N (25 lbs) for twisted pair cable.

2.9 Neatly bundle cable in logical bundles with minimum 3/4" Velcro or hoop & loop cable tie. Secure cable bundles to horizontal supports and plywood backboard. Plastic tie wraps are not acceptable. Where tie-wraps are used in a plenum space, only UL listed plenum rated tie-wraps shall be used.

2.10 Do not deform the cable jacket when using fasteners. Test to see that the fastener is loose enough to rotate easily around the cable when pressed with medium finger pressure.

2.11 The twist of the individual pairs shall be maintained up to the point of termination. The maximum amount of untwisting in a pair as a result of termination shall be no greater than 13 mm (0.5 in).

2.12 All twisted pair terminations shall use a T568A wire map.

2.13 Cables shall be properly supported and protected from damage always and shall be installed in such a way as to ensure that cable will not deform over time.

2.14 Where cables are exposed to potential damage, split loom tubing shall be used.

2.15 Allow no rough handling, kinking, denting or abrasion of the cable.

2.16 Where cables are run in cable tray, neatly bundle and tie-wrap all cables. Separate voice, data and fibre cables into individual bundles.

2.17 Vertical riser cable shall be supported a minimum of three (3) times per floor. Supports shall be placed 1 m (3 ft) apart.

2.18 Bix Block to be cross connected to 24 Port patch panel in LAN closet with all pairs terminated to Patch Panel.

3 MATERIALS

3.1 Acceptable manufacturer of all end-to-end structured cabling systems shall be Systimax only.

3.2 Obtain components through one source from a single manufacturer.

3.3 Voice Backbone cabling shall have the following characteristics:

.1 Model of cable shall be *(See Appendix A for Part Numbers)*.

.2 Cable shall meet or exceed Category 3 requirements per TIA/EIA-568-B.

.3 Conductors: Multipair 24 AWG solid copper

.4 UL and CSA rated as CMP/FT6.

.6 Insulation: colour coding as per TIA/EIA-568-B

.7 Jacket: printed at intervals stating cable code, AWG, manufacturer and length markings, grey in colour.

3.4 Wiring Block shall have the following characteristics:

.1 Model of wiring block shall be BIX System Kit

.2 25 pair capacity

.

4 FIELD QUALITY CONTROL

4.1 Refer to ‘Testing of Communications Systems’ section.

COMMUNICATIONS FIBRE BACKBONE MULTIMODE 550

1 SCOPE OF WORK

1.1 Include detailed design, manufacturer, supply and installation of communication cabling as described in these performance specifications and summarized in the following elements of the work:

.1 The scope of work included within the section includes data end-to-end structured cabling between communication rooms.

.2 Supply an End-to-End Certified Structured Cabling System installed by a Systimax Value Added Reseller for the systems described in these specifications.

2 DESIGN AND PERFORMANCE REQUIREMENTS

2.1 Design, manufacturer, supply and installation of communication cabling shall comply with the following standards, unless otherwise stated.

- Canadian Electric Code
- Ontario Building Code
- TIA/EIA-568-B.1 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements
- TIA/EIA-568-B.1-3 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 3 – Supportable Distances and Channel Attenuation for Optical Fibre Applications by Fibre Type
- TIA/EIA-568-B.1-4 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 4 – Recognition of Category 6 and 850 nm Laser-Optimized 50/125 um Multimode Optical Fibre Cabling
- TIA/EIA-568-B.1-5 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 5 – Telecommunications Cabling for Telecommunications Enclosures
- TIA/EIA-568-B.3 Commercial Building Telecommunication Cabling Standard – Part 3: Optical Fibre Cabling Components Standard
- TIA/EIA-568-B.3-1 Commercial Building Telecommunication Cabling Standard – Part 3: Optical Fibre Cabling Components Standard – Addendum 1 – Additional Transmission Performance Specifications for 50/125 um Optical Fibre Cables
- CSA-T527 Grounding and Bonding for Telecommunications in Commercial Buildings
- TIA/EIA-492AAAB Detail Specification for 50-um Core Diameter/ 125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibre
- TIA/EIA-492AAAC-A Detail Specification for 850-nm Laser Optimized, 50-um Core Diameter/ 125-um Cladding Diameter Class Ia Grade-Index Optical Fibre
- BICSI – Telecommunication Distribution Methods Manual

- BICSI – Information Transport Systems Installation Manual
- BICSI - Customer Owner Outside Plant Design Manual

2.2 In a new building, each general communication room shall be connected to the main communication room or data centre with a fibre backbone cable.

2.3 In the case of an extension to an existing building each general communication room shall be connected to the existing main communication room or data centre with a fibre backbone cable, unless stated otherwise by the City of Brampton.

2.4 For every forty eight (48) horizontal cables being run to a communication room, provide two (2) multimode strands in the backbone, with a minimum of a twenty four (24) strand cable.

2.5 Provide 3 m (10 ft) of cable slack within the communication room. All cable slack shall be stored in a neat extended loop or figure of eight within the cabinet cable management. Cable shall not be stored in a bundled loop.

2.6 Maintain a bend radius during installation of fibre cable of 20 times the cable diameter and 10 times the cable diameter after installation.

2.7 Do not exceed the maximum cable pulling force of 222 N (50 lbs.) for fibre cable.

2.8 Neatly bundle cable in logical bundles with minimum 3/4” Velcro or hoop & loop cable tie. Secure cable bundles to horizontal supports and plywood backboard. Plastic tie wraps are not acceptable.

2.9 Do not deform the cable jacket when using fasteners. Test to see that the fastener is loose enough to rotate easily around the cable when pressed with medium finger pressure.

2.10 Cables shall be properly supported and protected from damage always and shall be installed in such a way as to ensure that cable will not deform over time.

2.11 Vertical riser cable shall be supported a minimum of three (3) times per floor. Supports shall be placed 1 m (3 ft) apart.

2.12 Allow no rough handling, kinking, denting or abrasion of the cable.

3 MATERIALS

3.1 Acceptable manufacturer of all end-to-end structured cabling systems shall be Systimax only.

3.2 Obtain components through one source from a single manufacturer.

3.3 Fibre Backbone Cabling shall have the following characteristics:

.1 Model of cable shall be *(See Appendix A for Part Numbers)*..

.2 Meet or exceed 50/125um requirements per TIA/EIA-568-B.

.3 UL and CSA rated as OFNR/FT4, on condition the cable is run within plenum rated corrugated loom tubing at all times.

.4 Capable of supporting up to 1 Gigabit fibre channel up to 900 m (1804 ft) at 850 nm.

.5 Capable of supporting up to 10 Gigabit fibre channel up to 550 m (1804 ft) at 850 nm.

.6 Minimum fibre strand count of 24.

.7 Fibre sub-units: colour coding as per TIA/EIA-568-B

.8 Jacket: printed at intervals stating cable code, manufacturer and length markings, aqua in colour.

3.4 Communication Room Fibre Patch Cords shall have the following characteristics:

.1 Model of cord shall *(See Appendix A for Part Numbers)*.LC/LC only.

.2 Cable characteristics shall match or exceed those of the backbone cable the cord is patching.

.3 UL and CSA rated as OFNR/FT4.

.4 Jacket: printed at intervals stating cable code, manufacturer, aqua in colour.

.5 Factory terminated LC (simplex) connector on both ends.

.6 Durability: 500 insertions.

3.5 Data Centre Fibre Patch Cords shall have the following characteristics:

.1 Model of cord shall be *(See Appendix A for Part Numbers)*. LC / LC only.

.2 Cable characteristics shall match or exceed those of the backbone cable the cord is patching.

.3 UL and CSA rated as OFNR/FT4.

.4 Jacket: printed at intervals stating cable code, manufacturer, aqua in colour.

.5 Factory terminated LC (simplex) connector on both ends.

.6 Durability: 500 insertions.

3.6 Fibre Patch Panels shall have the following characteristics:

.1 Models of patch panels shall be *(See Appendix A for Part Numbers)*..

.2 Shelves: *(See Appendix A for Part Numbers)*.- (houses up to 4 modules), *(See Appendix A for Part Numbers)*.- (houses up to 8 modules), *(See Appendix A for Part Numbers)*. - (houses up to 12 modules),

.1 Compatible with standard 19" rack.

.2 All plastic materials shall be fire-retardant, UL94V-0 rated.

.3 Black in color.

.4 Hinged front door

.5 Comes with trough cable manager.

.6 Top cover panel

.3 Modules: *(See Appendix A for Part Numbers)*.for communication rooms and for data centres.

.1 6 front mounted LC duplex adapters or 24 front mounted LC duplex adapters.

.2 Transmission performance characteristics shall match those of LazrSPEED 550.

.4 Splices: *(See Appendix A for Part Numbers)*. (for up to 32 splices), *(See Appendix A for Part Numbers)*. (for up to 64 splices), *(See Appendix A for Part Numbers)*. (for up to 96 splices),

4 FIELD QUALITY CONTROL

4.1 Refer to 'Testing of Communications Systems' section.

COMMUNICATION HORIZONTAL CABLING CAT 6

1 SCOPE OF WORK

1.1 Include detailed design, manufacturer, supply and installation of communication cabling as described in these performance specifications and summarized in the following elements of the work:

.1 The scope of work included within the section includes data and voice end-to-end structured cabling between the communication room and the work are

.2 **Supply an End-to-End Certified Structured Cabling System installed by a Systimax Value Added Reseller for the systems described in these specifications.**

2 DESIGN AND PERFORMANCE REQUIREMENTS

2.1 Design, manufacturer, supply and installation of communication cabling shall comply with the following standards, unless otherwise stated:

- Canadian Electric Code
- Ontario Building Code
- TIA/EIA-568-B.1 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements
- TIA/EIA-568-B.1-1 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 1 – Minimum 4-pair UTP and 4-pair ScTP Patch Cable Bend Radius
- TIA/EIA-568-B.1-2 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 2 – Grounding and Bonding Requirements for Screened Balanced Twisted-Pair Horizontal Cabling
- TIA/EIA-568-B.1-3 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 3 – Supportable Distances and Channel Attenuation for Optical Fibre Applications by Fibre Type
- TIA/EIA-568-B.1-4 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 4 – Recognition of Category 6 and 850 nm Laser-Optimized 50/125 um Multimode Optical Fibre Cabling
- TIA/EIA-568-B.1-5 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 5 – Telecommunications Cabling for Telecommunications Enclosures
- TIA/EIA-568-B.2 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components
- TIA/EIA-568-B.2-1 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 1 – Transmission Performance Specifications for 4-pair 100 Ohm Category 6 Cabling

- TIA/EIA-568-B.2-2 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 2
- TIA/EIA-568-B.2-3 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 3 – Additional Considerations for Insertion Loss and Return Loss Pass/Fail Determination
- TIA/EIA-568-B.2-4 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 4 – Solderless Connection Reliability Requirements for Copper Connecting Hardware
- TIA/EIA-568-B.2-5 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 5
- TIA/EIA-568-B.2-6 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 6 – Category 6 Related Component Test Procedures
- BICSI – Telecommunication Distribution Methods Manual
- BICSI – Information Transport Systems Installation Manual

2.2 All work area jacks shall be housed in wall recessed outlets specifically dedicated to a particular work area, unless a 'MUTOA' section is included in the specification package. When a 'MUTOA' section is included, they shall only be used in open office concepts using modular furniture, unless stated otherwise.

2.3 Voice and Data outlet requirements shall be as follows:

.1 Each workstation shall consist of two data ports, all within one outlet.

.2 Each meeting room and conference room shall consist of two data ports, all within one outlet, located on each of the walls within the room.

.3 Each office large enough to house a separate meeting table shall contain a second outlet containing two data ports. Located local to the meeting table.

.4 Each fax machine, printer station and photocopier station shall consist of two data ports, all within one outlet.

2.4 Data ports contained within one outlet shall be arranged as follows:

- 1st data at the top
- 2nd data on the bottom

2.5 No data outlets shall be required for wireless access points, unless a 'wireless access point' section is included in the specification package.

2.6 Each jack shall require a dedicated horizontal cable. The splitting of pairs within a cable between different jacks is not permitted.

2.7 All ports shall be directly cabled back to a cabinet mounted patch panel located within the local communication room on the same floor, unless a 'consolidation point' section is included in the specification package.

2.8 Provide 1.5 m (5 ft) of horizontal cable slack within the communication room and 3 m (10 ft) of horizontal cable slack within the ceiling space above the work area outlet. All cable slack shall be stored in a neat tie wrapped extended loop or figure of eight. Cable shall not be stored in a bundled loop.

2.9 Horizontal cable permanent link shall not exceed 90 m (295 ft.); this length shall include the cable slack. This length is based on a patch cord length not exceeding 5 m (16 ft.). Should the patch cord length exceed 5 m (16 ft.), then the permanent link shall be reduce to match the following equation result:

- Permanent cable length = 102 - (Total combined length of patch cords * 1.2)

2.10 Outlet may be re-located up to 3 m (10 ft.) at the cost of the contractor if notified prior to installation. This shall not affect the cable slack lengths.

2.11 Maintain minimum bend radii of four times the cable diameter for twisted pair cable.

2.12 Do not exceed the maximum cable pulling force of 110 N (25 lbs.) for twisted pair cable.

2.13 Neatly bundle cable in logical bundles with minimum 3/4" Velcro or hoop & loop cable tie. Secure cable bundles to horizontal supports and plywood backboard. Plastic tie wraps are not acceptable. Where tie-wraps are used in a plenum space, only UL listed plenum rated tie-wraps shall be used.

2.14 Do not deform the cable jacket when using fasteners. Test to see that the fastener is loose enough to rotate easily around the cable when pressed with medium finger pressure.

2.15 The twist of the individual pairs shall be maintained up to the point of termination. The maximum amount of untwisting in a pair as a result of termination shall be no greater than 13 mm (0.5 in).

2.16 The maximum amount of cable jacket that shall be removed as a result of termination shall be no greater than 25 mm (1 in).

2.17 All twisted pair terminations shall use a T568A wire map.

2.18 Cables shall be properly supported and protected from damaged always and shall be installed in such a way as to ensure that cable will not deform over time.

2.19 Where cables are exposed to potential damage, split loom tubing shall be used.

2.20 Allow no rough handling, kinking, denting or abrasion of the cable.

2.21 Where there are unused port positions in a faceplate, a blank insert shall be provided.

2.22 Where cables are run in cable tray, neatly bundle and tie-wrap all cables. Separate voice, data and fibre cables into individual bundles.

2.23 Patch cord lengths and counts shall be as follows:

.1 Each patch cord length used within a communication room shall be either 0.6 m (2 ft.) or 1.2 m (4ft) or 2.1 m (7ft) long, the appropriate length shall be based on the specific cabinet layout.

.2 Each patch cord length used within a work area shall be either 4.2 m (14 ft.) or 7.6 m (25 ft.) long, the appropriate length shall be based on the specific furniture layout.

.3 Patch cords shall always be sized to provide a neat and professional installation and include adequate slack for routing through vertical and horizontal cable management.

.4 Patch cord counts shall include 10% spare of each length.

3 MATERIALS

3.1 Acceptable manufacturer of all end-to-end structured cabling systems shall be Systimax only.

3.2 Obtain components through one source from a single manufacturer.

3.3 Voice and Data Horizontal cabling shall have the following characteristics

.1 Model of cable shall be *(See Appendix A for Part Numbers)*.

.2 Cable shall meet or exceed Category 6 requirements per TIA/EIA-568-B.

.3 Conductors: 4-pair 23 AWG solid copper

.4 UL and CSA rated as CMP/FT6.

.5 Capable of supporting up to 1 Gigabit Ethernet.

.6 Insulation: colour coding as per TIA/EIA-568-B

.7 Jacket: printed at intervals stating cable code, AWG, manufacturer and length markings, blue in colour for data and white in color for voice.

3.4 Data and Voice Work Area Jacks shall have the following characteristics:

.1 Model of jack shall be *(See Appendix A for Part Numbers)*.

.2 Meet or exceed Category 6 requirements per TIA/EIA-568-B.

.3 8-pin, RJ45

.4 All plastic materials shall be fire-retardant, UL94V-0 rated.

.5 Data jacks shall be blue in color and voice jacks shall be slate grey.

.6 Durability: 750 insertions

3.5 Data and Voice Patch Cords shall have the following characteristics:

.1 Model of cord shall be *(See Appendix A for Part Numbers)*.

.2 Meet or exceed Category 6 requirements per TIA/EIA-568-B.

.3 Conductors: 4-pair 24 AWG stranded copper

.4 UL and CSA rated as CMR/FT4.

.5 Insulation: colour coding as per TIA/EIA-568-B

.6 Jacket: printed at intervals stating cable code, AWG, manufacturer, grey in colour for voice and blue in colour for data.

.7 Factory terminated RJ45 connector on both ends.

.8 Durability: 750 insertions.

3.6 Copper Data and Voice Patch Panels shall have the following characteristics:

.1 Model of patch panel shall be *(See Appendix A for Part Numbers)*.

.2 48-port, 2U or 24-port, 1U

.3 Compatible with standard 19” rack.

.4 Jacks shall meet or exceed Category 6 requirements per TIA/EIA-568-B. Category 6A for wireless.

.5 Jacks shall be 8-pin, RJ45.

.6 All plastic materials shall be fire-retardant, UL94V-0 rated.

.7 Jacks shall be (See Appendix in C for colours).

.8 Durability: 750 insertions.

3.7 Wall faceplates shall be *(See Appendix A for Part Numbers)*.2, 4-port, white in colour.

3.8 Furniture faceplate shall be *(See Appendix A for Part Numbers)*.2, 4-port, white in colour.

4 FIELD QUALITY CONTROL

4.1 Refer to ‘Testing of Communications Systems’ section.

COMMUNICATION CONSOLIDATION POINTS

1 SCOPE OF WORK

1.1 Include detailed design, manufacturer, supply, installation and inspection of consolidation points as described in these performance specifications and summarized in the following elements of the work:

.1 The scope of work included within the section includes consolidation point configurations within a horizontal cable run.

2 DESIGN AND PERFORMANCE REQUIREMENTS

2.1 Design, manufacturer, supply and installation of consolidation points and related items shall comply with the following standards, unless otherwise stated:

- Canadian Electric Code
- Ontario Building Code
- TIA/EIA-568-B.1 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements
- TIA/EIA-568-B.1-1 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 1 – Minimum 4-pair UTP and 4-pair ScTP Patch Cable Bend Radius
- TIA/EIA-568-B.1-4 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 4 – Recognition of Category 6 and 850 nm Laser-Optimized 50/125 um Multimode Optical Fibre Cabling
- TIA/EIA-568-B.1-5 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 5 – Telecommunications Cabling for Telecommunications Enclosures
- TIA/EIA-568-B.2 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components
- TIA/EIA-568-B.2-1 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 1 – Transmission Performance Specifications for 4-pair 100 Ohm Category 6 Cabling
- TIA/EIA-568-B.2-2 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 2
- TIA/EIA-568-B.2-3 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 3 – Additional Considerations for Insertion Loss and Return Loss Pass/Fail Determination
- TIA/EIA-568-B.2-4 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 4 – Solderless Connection Reliability Requirements for Copper Connecting Hardware

- TIA/EIA-568-B.2-5 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 5
- TIA/EIA-568-B.2-6 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 6 – Category 6 Related Component Test Procedures
- TIA/EIA-569-B Commercial Building Standard for Telecommunication Pathways and Spaces
- TIA/EIA-606-A Administration Standard for Commercial Telecommunication Infrastructure
- CSA-T527 Grounding and Bonding for Telecommunications in Commercial Buildings
- BICSI – Telecommunication Distribution Methods Manual
- BICSI – Information Transport Systems Installation Manual
- CISCA – Ceiling and Interior Systems Construction Association

2.2 Consolidation points shall be located in fully accessible and permanent locations. Consolidation point must not be located in an obstructed area.

2.3 The consolidation point shall be sized to have a minimum of 40% spare capacity for future additions.

2.4 The consolidation point shall be located at least 15 m (50 ft) from the local communication room and horizontal cross-connect.

2.5 A consolidation point located within the ceiling space or raised access floor shall follow the following rules:

.1 All items installed within a plenum space shall be UL listed as plenum rated or be completely enclosed within a plenum rated container.

.2 Ceiling space or raised access floor space must be fully accessible without moving building fixtures, equipment, or heavy furniture or disturbing building occupants. Heavy furniture is defined as 45 kg (100 Ib) or more as per TIA/EIA-569-B.

.3 The ceiling or floor tile shall be clearly and permanently labelled as concealing a consolidation point.

.4 Shall not contain any active equipment.

.5 Shall be bonded to the nearest communication grounding busbar with a minimum 6 AWG.

.6 Cable entering and exiting the consolidation point shall pass through plenum rated fire foam.

.7 Shall be located along side a main communication pathway such as a cable tray.

2.6 When consolidation points are located within the office space they shall be mounted to a permanent building structure.

2.7 A consolidation point shall only be used for making direct connections to communication outlets. A consolidation point shall never be used as a cross-connect location, for patching, or for direct connections to active equipment with patch cords.

3 **MATERIALS**

3.1 Acceptable manufacturer of all end-to-end structured cabling systems shall be Systimax only.

3.2 Obtain components through one source from a single manufacturer.

3.3 Consolidation points shall have the following characteristics:

.1 Model of consolidation point shall be M48 Zone Wiring Box only.

.2 Accommodates up to 48 M-series jacks.

.3 UL listed for plenums spaces

.4 Twelve 19 mm (0.75 inch) knockouts for use with conduits.

.5 Removable cover.

4 **FIELD QUALITY CONTROL**

4.1 Refer to ‘Testing of Communications Systems’ section.

COMMUNICATION WIRELESS ACCESS POINT OUTLETS CAT6A

1 **SCOPE OF WORK**

1.1 Include detailed design, manufacturer, supply, installation and inspection of wireless systems as described in these performance specifications and summarized in the following elements of the work:

.1 The scope of work included within the section includes wireless access point outlet configurations.

2 **DESIGN AND PERFORMANCE REQUIREMENTS**

2.1 Design, manufacturer, supply and installation of wireless access point outlet and related items shall comply with the following standards, unless otherwise stated:

- Canadian Electric Code
- Ontario Building Code
- TIA/EIA-568-B.1 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements
- TIA/EIA-568-B.1-1 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 1 – Minimum 4-pair UTP and 4-pair ScTP Patch Cable Bend Radius
- TIA/EIA-568-B.1-4 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 4 – Recognition of Category 6 and 850 nm Laser-Optimized 50/125 um Multimode Optical Fibre Cabling
- TIA/EIA-568-B.1-5 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 5 – Telecommunications Cabling for Telecommunications Enclosures
- TIA/EIA-568-B.2 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components
- TIA/EIA-568-B.2-1 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 1 – Transmission Performance Specifications for 4-pair 100 Ohm Category 6 Cabling
- TIA/EIA-568-B.2-2 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 2
- TIA/EIA-568-B.2-3 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 3 – Additional Considerations for Insertion Loss and Return Loss Pass/Fail Determination
- TIA/EIA-568-B.2-4 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 4 – Solderless Connection Reliability Requirements for Copper Connecting Hardware
- TIA/EIA-568-B.2-5 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 5

- TIA/EIA-568-B.2-6 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 6 – Category 6 Related Component Test Procedures
- TIA/EIA-569-B Commercial Building Standard for Telecommunication Pathways and Spaces
- TIA/EIA-606-A Administration Standard for Commercial Telecommunication Infrastructure
- BICSI – Telecommunication Distribution Methods Manual
- BICSI – Information Transport Systems Installation Manual
- CISCA – Ceiling and Interior Systems Construction Association

2.2 All horizontal and backbone cabling related to wireless access points shall confirm to the appropriate specification section included in this package.

2.3 Horizontal cable permanent link shall not exceed 80 m (262 ft), this is due to the extended length of the access point patch cord.

2.4 Two data outlets shall be installed per wireless access point.

2.5 Data outlets in 2.4 shall be terminated to a SYSTIMAX 24-port patch panel in the local LAN room, used specifically for wireless outlet data drops. (W-01, W-02, etc)

2.6 No power outlet shall be required; all power to the access point shall be via Power over Ethernet (PoE) – (by others).

2.7 Each outlet shall be located above the T-bar ceiling mounted to the structural ceiling and consist of two data jacks housed in a two-port metallic faceplate mounted to a metallic single gang surface mount box. One 19 mm (0.75 in) grommet lined hole shall be used for all cables.

2.8 Every effort shall be made to enclose all non-plenum rated items within the metallic box.

2.9 Two outlets in a single assembly shall be placed in a cell like pattern to cover the entire usable area of the building (usable area does not include washrooms, changing rooms, stairs, electrical or mechanical rooms). Spacing of these outlets shall be based on the following table:

	Cell diameter of a 54 Mbps access point
Open space (warehouse)	46 m (151 ft)
Semi Open area (cubicle area)	32 m (105 ft)
Closed Office	22 m (72 ft)

2.10 One 4.2 m (14 ft) or 7.6 m (25 ft) plenum rated patch cord shall be included for every outlet. The appropriate length shall be based on the specific location of the access point, and as dictated by the City of Brampton IT division.

3 **MATERIALS**

3.1 Acceptable manufacturer of all end-to-end structured cabling systems shall be Systimax only.

3.2 Obtain components through one source from a single manufacturer.

3.3 Data horizontal cabling shall be **CAT6A** all other horizontal cable specified in other sections.

3.4 Patch cord shall match performance characteristics specified in other sections, with the following physical differences:

.1 Two (2) 4.2 m (14 ft) or 7.6 m (25 ft) in length

.2 UL and CSA rated as CMP/FT6.

.3 Red in color

4 **FIELD QUALITY CONTROL**

4.1 Refer to ‘Testing of Communications Systems’ section.

COMMUNICATION MUTOA OUTLETS

1 SCOPE OF WORK

1.1 Include detailed design, manufacturer, supply, installation and inspection of Multi-User Telecommunications Outlet Assembly (MUTOA) as described in these performance specifications and summarized in the following elements of the work:

.1 The scope of work included within the section includes MUTOA configurations within a work area.

2 DESIGN AND PERFORMANCE REQUIREMENTS

2.1 Design, manufacturer, supply and installation of MUTOAs and related items shall comply with the following standards, unless otherwise stated:

- Canadian Electric Code
- Ontario Building Code
- TIA/EIA-568-B.1 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements
- TIA/EIA-568-B.1-1 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 1 – Minimum 4-pair UTP and 4-pair ScTP Patch Cable Bend Radius
- TIA/EIA-568-B.1-4 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 4 – Recognition of Category 6 and 850 nm Laser-Optimized 50/125 um Multimode Optical Fibre Cabling
- TIA/EIA-568-B.1-5 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 5 – Telecommunications Cabling for Telecommunications Enclosures
- TIA/EIA-568-B.2 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components
- TIA/EIA-568-B.2-1 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 1 – Transmission Performance Specifications for 4-pair 100 Ohm Category 6 Cabling
- TIA/EIA-568-B.2-2 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 2
- TIA/EIA-568-B.2-3 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 3 – Additional Considerations for Insertion Loss and Return Loss Pass/Fail Determination
- TIA/EIA-568-B.2-4 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 4 – Solderless Connection Reliability Requirements for Copper Connecting Hardware
- TIA/EIA-568-B.2-5 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 5

- TIA/EIA-568-B.2-6 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 6 – Category 6 Related Component Test Procedures
- TIA/EIA-569-B Commercial Building Standard for Telecommunication Pathways and Spaces
- TIA/EIA-606-A Administration Standard for Commercial Telecommunication Infrastructure
- CSA-T527 Grounding and Bonding for Telecommunications in Commercial Buildings
- BICSI – Telecommunication Distribution Methods Manual
- BICSI – Information Transport Systems Installation Manual

2.2 MUTOA's shall be used in open office concepts, for modular furniture designs only, unless stated otherwise.

2.3 MUTOA's shall be located in fully accessible locations on building columns or permanent walls. MUTOA's shall never be installed in ceiling spaces, under access floors or in obstructed areas.

2.4 The MUTOA shall be sized to have a minimum of 40% spare capacity for future additions.

2.5 A MUTOA shall only be used for making direct connections to work area equipment. A MUTOA shall never be used as a cross-connect location.

2.6 Patch cords connected to a MUTOA shall never exceed 22 m (72 ft) in length; this is based on a horizontal cable length not exceeding 70 m (230 ft). Refer to the horizontal cable section of the specification for specifics.

3 MATERIALS

3.1 Acceptable manufacturer of all end-to-end structured cabling systems shall be Systimax only.

3.2 Obtain components through one source from a single manufacturer.

3.3 MUTOA shall have the following characteristics:

.1 Model of MUTOA shall be M224 Zone Wiring Box only.

.2 Accommodates up to 24 M-series jacks.

.3 Removable cover.

.4 White in colour.

4 FIELD QUALITY CONTROL

4.1 Refer to 'Testing of Communications Systems' section.

TESTING OF COMMUNICATIONS SYSTEMS

1 SCOPE OF WORK

1.1 Include detailed inspection, testing and administration of communication system as described in these performance specifications and summarized in the following elements of the work:

.1 The scope of work included within the section includes testing, identification and administration of an end-to-end structured cabling system and its pathways and spaces.

2 DESIGN AND PERFORMANCE REQUIREMENTS

2.1 Inspection, testing and administration of communication system shall comply with the following standards, unless otherwise stated:

- Canadian Electric Code
- Ontario Building Code
- TIA/EIA-568-B.1 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements
- TIA/EIA-568-B.1-1 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 1 – Minimum 4-pair UTP and 4-pair ScTP Patch Cable Bend Radius
- TIA/EIA-568-B.1-2 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 2 – Grounding and Bonding Requirements for Screened Balanced Twisted-Pair Horizontal Cabling
- TIA/EIA-568-B.1-3 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 3 – Supportable Distances and Channel Attenuation for Optical Fibre Applications by Fibre Type
- TIA/EIA-568-B.1-4 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 4 – Recognition of Category 6 and 850 nm Laser-Optimized 50/125 um Multimode Optical Fibre Cabling
- TIA/EIA-568-B.1-5 Commercial Building Telecommunication Cabling Standard – Part 1: General Requirements – Addendum 5 – Telecommunications Cabling for Telecommunications Enclosures
- TIA/EIA-568-B.2 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components
- TIA/EIA-568-B.2-1 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 1 – Transmission Performance Specifications for 4-pair 100 Ohm Category 6 Cabling
- TIA/EIA-568-B.2-2 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 2
- TIA/EIA-568-B.2-3 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 3 – Additional Considerations for Insertion Loss and Return Loss Pass/Fail Determination

- TIA/EIA-568-B.2-4 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 4 – Solderless Connection Reliability Requirements for Copper Connecting Hardware
- TIA/EIA-568-B.2-5 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 5
- TIA/EIA-568-B.2-6 Commercial Building Telecommunication Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components – Addendum 6 – Category 6 Related Component Test Procedures
- TIA/EIA-568-B.3 Commercial Building Telecommunication Cabling Standard – Part 3: Optical Fibre Cabling Components Standard
- TIA/EIA-568-B.3-1 Commercial Building Telecommunication Cabling Standard – Part 3: Optical Fibre Cabling Components Standard – Addendum 1 – Additional Transmission Performance Specifications for 50/125 um Optical Fibre Cables
- TIA/EIA-569-B Commercial Building Standard for Telecommunication Pathways and Spaces
- TIA/EIA-758-A Customer-Owner Outside Plant Telecommunications Infrastructure Standard
- TIA/EIA-942 Telecommunications Infrastructure Standard for Data Centres
- CSA-T527 Grounding and Bonding for Telecommunications in Commercial Buildings
- BICSI – Telecommunication Distribution Methods Manual
- BICSI – Information Transport Systems Installation Manual
- BICSI - Customer Owner Outside Plant Design Manual

3 MATERIALS

NIL

4 FIELD QUALITY CONTROL

4.1 Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests.

4.2 Test procedures and test equipment shall comply with the following standards (in their latest draft including all addendums):

.1 TIA/EIA-568-B

.2 TIA/EIA TSB-140

.3 TIA/EIA-526-14-A

.4 TIA/EIA-526-7-A

4.3 The copper test equipment testing Category 5e cable shall comply with the accuracy requirements for Level III field testers and Category 5e cabling as defined in the above standards. All software shall be the latest versions, and licensed.

4.4 The copper test equipment testing Category 6 cable shall comply with the accuracy requirements for Level III field testers and Category 6 cabling as defined in the above standards. All software shall be the latest versions, and licensed.

4.5 The copper test equipment testing Category 6A cable shall comply with the accuracy requirements for Level IIIe field testers and Category 6A cabling as defined in the above standards. All software shall be the latest versions, and licensed.

4.6 The optical fibre test equipment shall comply with the accuracy requirements for field testers and fibre optic cabling as defined in the above standards. The OTDR shall operate within the range of 850 nm +/- 30 nm and 1300 nm +/- 20 nm for multimode fibre and 1310 nm +/- 10 nm and 1550 nm +/- 20 nm for singlemode fibre testing.

4.7 All installed cable runs shall be tested and must pass the requirements of the standards defined above. Any failing link shall be diagnosed and corrected. The corrective action shall be followed with a new test to prove that the corrected link meets the performance requirements. The passing result of the tests for all links shall be provided in the test results documentation.

4.8 All Category 5e, 6 and 6A cable links shall be tested for channel link performance and the following parameters:

- T568A wire map for continuity on all pairs
- Length – using an accurate NVP value, the pair with the longest electrical delay shall be used for the maximum length.
- Insertion Loss
- NEXT Loss must be tested from both ends of the cabling
- ELFEXT must be tested from both ends of the cabling
- Propagation delay and delay skew
- Return Loss must be tested from both ends of the cabling
- PSNEXT must be tested from both ends of the cabling
- Power Sum ELFEXT must be tested from both ends of the cabling
- ANEXT must be tested from both ends of the cabling (for Cat 6A only)

4.9 All fibre cable shall be tested before installation while still on the reel for attenuation at both 850 nm and 1300 nm for multimode and 1310 nm and 1550 nm for singlemode to ensure that it meets or exceeds the manufacturer stated performance. The contractor shall provide a soft copy of the test results to the Communications Consultant. The Communications Consultant must approve this report prior to any installation activity.

4.10 All fibre cable links shall be tested for channel link performance for the following parameters:

- End-to-end attenuation tested at both 850 nm and 1300 nm for multimode to ensure predicted system performance.
- A-B Polarity where duplex connectors are used
- OTDR signature trace documentation for as-built records

4.11 Testing will be considered completed once records show that all installations meet the 100% pass rate.

SYSTIMAX STANDARDS SPECIFICATION GUIDELINES

1.0 TEST RESULTS

1.1.1 Cabling Contractor is required to submit test results in native tester format to the City of Brampton. Cabling Contractor is to provide the software required to view the results.

1.1.2 The report should be divided into sections by building floors

1.1.3 The report should indicate for each cable when it was tested successfully, the result, and the length.

1.1.4 The entire report must be signed by an authorized person for the Communications Cabling Contractor and a Registered Communication Distribution Designer (RCDD) at the end of the project.

1.1.5 The test result documentation is to be submitted to the City of Brampton for review no later than 5 working days following the completion of the installation.

2.0 AS-BUILT DRAWINGS

2.1.1 Communications Cabling Contractor is required to provide as-built drawings of the cable installation for all cabling included in this specification. All drawings to be provided to City of Brampton at the end of the project for any changes due to on-site conditions.

2.1.2 The as-built drawings are to include, but are not limited to, the following:

1. Cable numbers on the floor plans.
2. Changes on the floor plans.
3. Cable routing on the floor plans.
4. Rack Elevation drawings and changes.
5. Backboard Elevation drawing and changes.
6. Riser Routing Drawing.

2.1.3 Communications Cabling Contractor to provide one (1) soft copy in AutoCAD 2014 format and six (6) plotted copies for the City of Brampton after the City of Brampton 's final review and acceptance of the drawings.

2.1.4 Within 30 working days after approval, the Communications Cabling Contractor is to distribute one copy of the plotted copies to each of the telecommunications closets

3.0 CHANGE NOTICES

3.1.1 All change notice pricing will include, by line item, a detailed breakdown including :

1. Part number
2. Unit cost
3. Labour Units
4. Labour Cost as per this document.
5. HST
6. Mark-ups for overhead and profit
7. Total Price for the change notice

3.1.2 Labour cost and mark-ups will apply for the duration of the project.

3.1.3 Change Notices are to reference the City of Brampton Change Notice Number or Site Instruction. Work is not to proceed without prior approval.

4.0 MANDITORY REQUIREMENTS

4.1.1 Cabling contractor must be registered as CommScope SYSTIMAX Value Added Re-Seller (VAR) (Prestige, Authorized, Authorized Installer) as of the date of the Tender closing.

4.1.2 Provide a proof of company's CommScope's SYSTIMAX Solutions VAR Certification including expiry date and duration of experience.

4.1.3 Provide a copy of SYSTIMAX SCS Design & Engineering Certification including expiry date for each Project Manager designated to work on the City of Brampton sites.

4.1.4 Provide a copy of SYSTIMAX SCS Installation and Maintenance including expiry date for each installer designated to work on the City of Brampton sites.

4.1.5 Provide a copy of RCDD's Certification including expiry date for each designer designated to work on the City of Brampton site. Must be able to sign off on as-built documentation.

4.1.6 A 20 Year Systimax Certification Warranty on cabling shall be provided to the City of Brampton no later than 30 working days following the completion of the installation.

APPENDIX A – APPROVED MATERIALS LIST

Section	Material	Manufacture	Model
270528			
	Cable Tray	Flextray	
	Cable Tray	Cablofil	
	Sling Support System	Erico Caddy Cablecat	
271100			
	Floor standing cabinets	RF Mote	RFM-303083
	Floor standing cabinets	RF Mote	RFM-303059
	Wall mounted cabinet	RF Mote	RFM-3022-WM
	Wall mounted cabinet	RF Mote	RFM-3036-WM
	Wall mounted cabinet	RF Mote	RFM-3048-WM
	6" Extender Brackets	RF Mote	RFM-6X-WM
	6" Extender Brackets	RF Mote	RFM-6X-WM-36
	6" Extender Brackets	RF Mote	RFM-6X-WM-48
	UPS	APC	SMX1500RM2UNC **(City Supplied and Installed)**
271313			
	Voice Backbone Cable	Systimax	Plenuum 2010
	Wiring Block	Belden	BIX
271323			
	Fibre BackBone Cable	Systimax	LazrSPEED 550 - Plenum rated
	Fibre Patch Panel	Systimax	600G2-1U-MOD-SD-360
	Fibre Patch Cords	Systimax	FEXLCLC42-MXF0XX
	Shelves	Systimax	360G2-1U-MOD-SD
	Shelves	Systimax	360G2-2U-MOD-SD
	Shleves	Systimax	360G2-4U-MOD-SD
	Modules	Systimax	360DP-12LC-LS
	Modules	Systimax	360DP-24LC-LS
	Splices	Systimax	RS-2AF-16SF
	Splices	Systimax	RS-4AF-16SF
	Splices	Systimax	SW-6AF-16SF
271513			
	Horizontal Cable (**Data)**	Systimax	GigaSPEED XL 2071E
	Horizontal Cable **(WIRELESS)**	Systimax	GigaSPEED XL 2091B / Alternate 2091SD
	Jack (Data) / Jack (Wireless)	Systimax	MGS400 (DATA) / MGS600-XXX (WIRELESS)
	Patch Cords **Floor Racks** for wireless see 271544	Systimax	CPC3312-0xFyyy
	Patch Cords **Wall Mounts** for wireless see 271544	Systimax	MINO6-XX
	Patch Panel	Systimax	CPP-UDDM-M-1U-24 / CPP-UDDM-M-2U-48
	Data Jacks for M2000	Systimax	MGS400-XXX

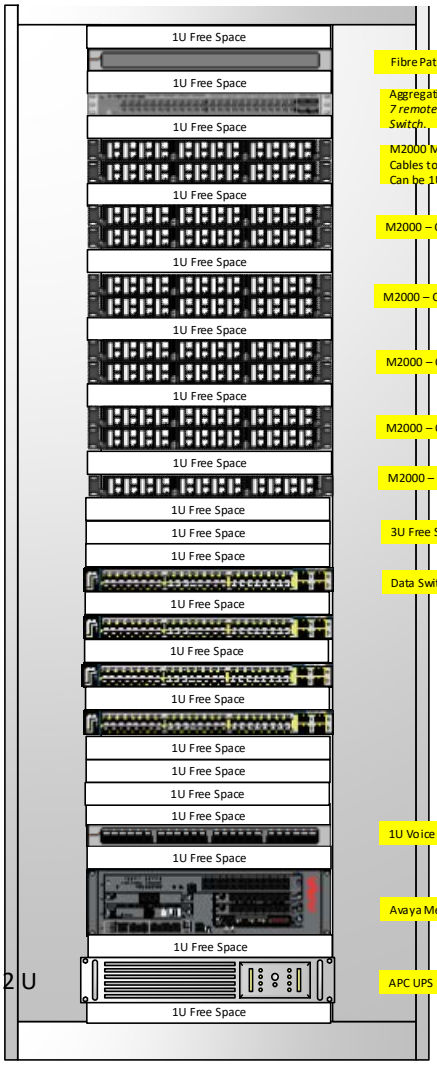
Section	**Material**	**Manufacture**	**Model**
271513	Wall faceplates	Systimax	M12LE-266
cont.	Wall faceplates	Systimax	M13LE-266
	Wall faceplates	Systimax	M16LE-266
	Wall faceplates	Systimax	M13SP
	Wall faceplates	Systimax	M16SP
	Furniture faceplate	Systimax	M13C-262
271520			
	Consolidation point	Systimax	M48 Zone Wiring Box
271544			
	Dual Port Surface Box	Systimax	M202 Plenum SMB-262
	Patch Cable for Ceiling	Systimax	CPCSSY2-07F015 (Plenum Rated)
	Patch Cable for Ceiling	Systimax	CPCSSY2-07F025 (Plenum Rated)
	Patch Cable for Ceiling	Systimax	CCA-CAT6A-PLENUM (Plenum Rated)
	Patch Cords Floor Racks	Systimax	CPCSSX2- (Red)
	Patch Cords Wall Mounts	Systimax	CO199K2- (Red)
271545			
	MUTOA	Systimax	M224 Zone Wiring Box
OTHER	Wire Mold	Wire Mold	V750 (Colour to match wall being installed on)

APPENDIX B – TYPICAL LAN ROOM LAYOUTS

City of Brampton IT Cabinet Design

Main LAN Room A with Aggregation Switch

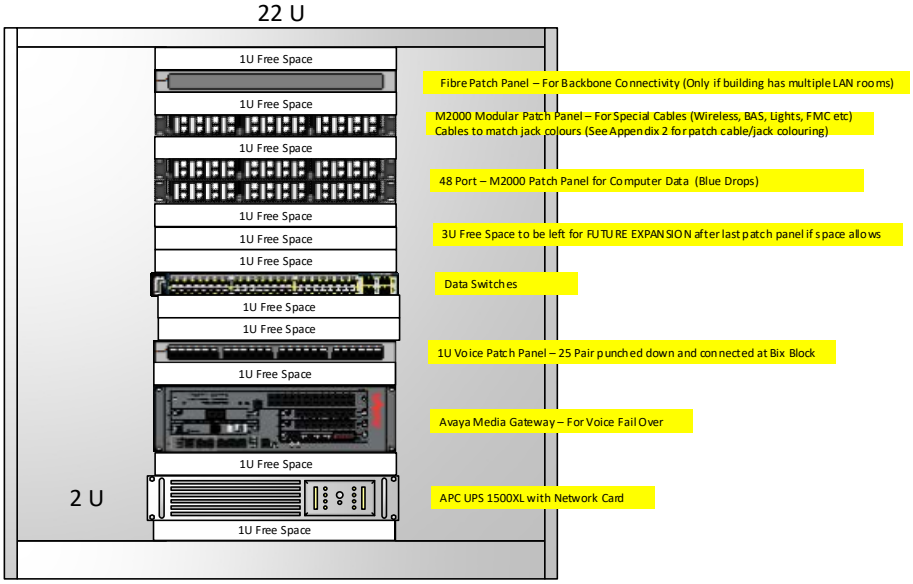
Part Number for Cabinet: Refer to Appendix A for approved Materials



City of Brampton IT Wall Mount Design

Main LAN Room A

Part Number for Cabinet: Refer to Appendix A for approved Materials

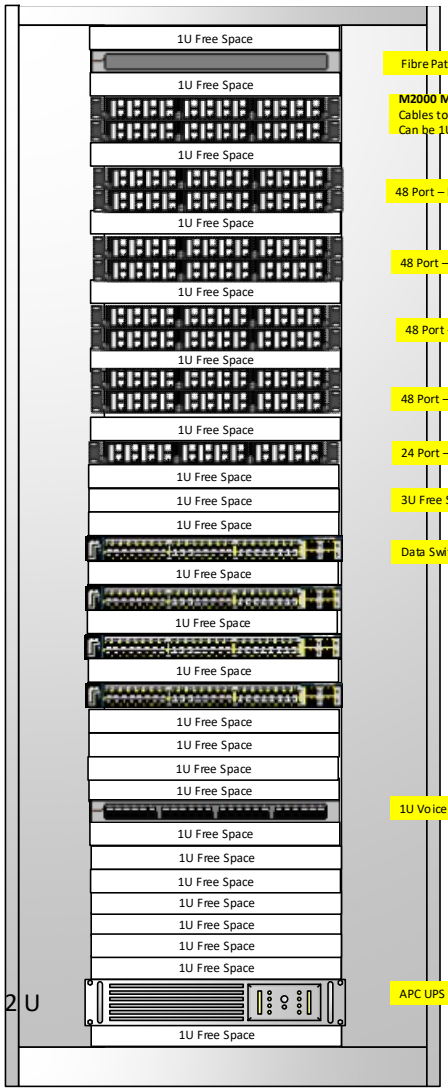


Please note: When designing wall mount cabinets, the patch cables used in these cabinets will be a different part number, please pay attention.

City of Brampton IT Cabinet Design

Remote LAN Room (B,C,D etc)

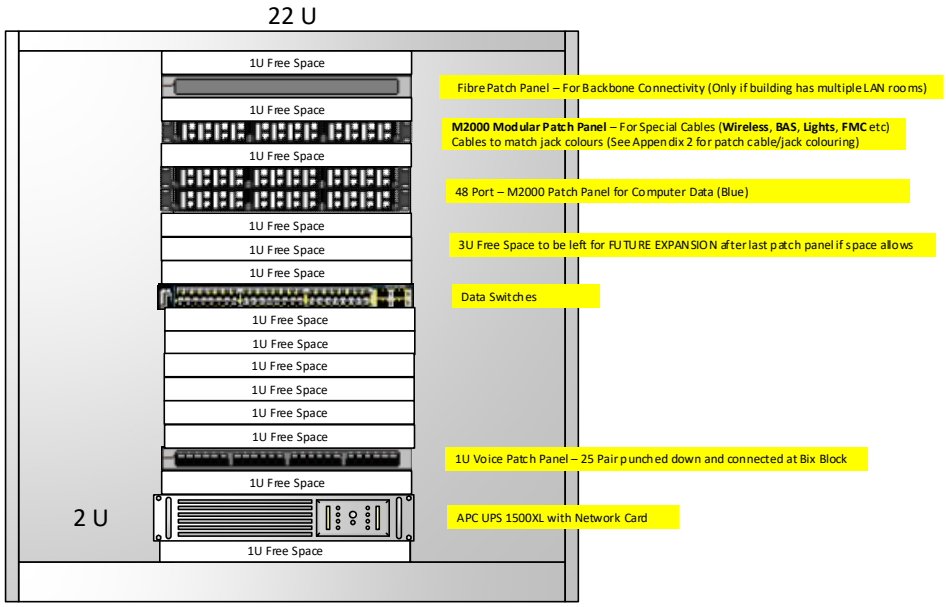
Part Number for Cabinet: Refer to Appendix A for approved Materials



City of Brampton IT Wall Mount Design

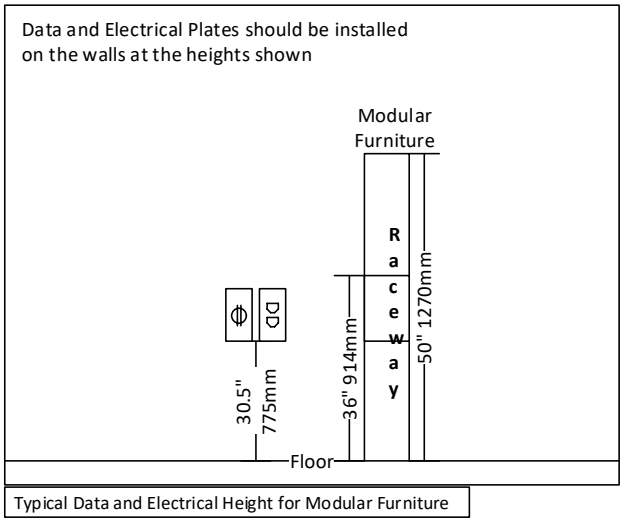
Remote LAN room (B,C,D etc)

Part Number for Cabinet: Refer to Appendix A for approved Materials

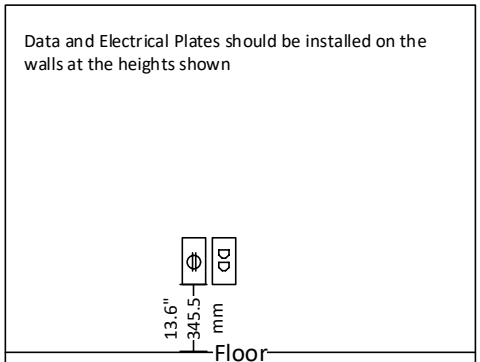


Please note: When designing wall mount cabinets, the patch cables used in these cabinets will be a different part number, please pay attention.

APPENDIX C – OUTLET MOUNTING HEIGHTS AND PATCH CABLE COLOURS



Typical Data and Electrical Height for Modular Furniture



Typical Data and Electrical Height for Meeting Rooms

All Cables terminating into patch panels are to be Blue in Colour with the exception of security cabling.

Red Patch Cables will be used for:
Wireless and UPS (Red Jacks in M2000 Patch Panel)

Green Riser/Patch Cables will be used for:
Security ONLY

Blue Patch Cables will be used for:
All Data Drops (Computers)

Grey Patch Cables will be used for:
All Voice related Devices including Avaya Gateway

Orange Patch Cables will be used for:
All Monitoring Devices
BAS, FMC, Brine, Fuel, Electric Charging, People Counter etc.
(Orange Jacks in M2000 Patch Panel)

Purple Patch Cables will be used for:
AV Devices
(Purple Jacks in M2000 Patch Panel)

IT Network Services Department - MF	**Typical Cable Runs / Patch Cable Colouring**	Jan 2019 V1.1	BRAMPTON Flower City

PART 4
PA/SOUND SYSYTEM SPECIFICATION

CASSIE CAMPBELL COMMUNITY CENTRE - DOME

1610 Sandalwood Pkwy

Brampton, Ontario

PA/Sound System Specification

R NATHAN AND ASSOCIATES

Brampton, Ontario

Rev 0

Submitted on: December 4, 2024

TW Project Number: 02215

TABLE OF CONTENTS

1. GENERAL CONDITIONS

1.1. Project Information

1.1.1. *Introduction*

1. This specification is provided to the bidders to submit a proposal for the PA/Sound system products, functionality and connectivity at the Cassie Campbell Community Centre new Doom project in Brampton, Ontario and from here on shall be referred to as CCCC-D in this section. These specifications are to be read in conjunction with the Consultants design drawings and all documents provided by the project team.

2. Review Owners requirements included with these documents for conflicting statements made in this section one of the AV specification. Provide RFI for clarification of any conflicts.

3. Bidders are expected to provide detailed design, supply all products, services, installation, software and programming, testing, commissioning and training for a complete and functional system as intended in this document. All products and components for the complete system may not be listed in this documentation. It will be the responsibility of the AV Contractor to provide all requirements.

4. The following PA/Sound systems shall be provided for the identified rooms and areas.

5. The building identified in this document is new with plans for a PA system to be provided int eh Dome and adjacent reception, locker and washroom areas.

    - Loudspeakers
    - PA Horns/speakers
    - Microphone/Line audio input plates
    - Sound System Controller

1.1.2. *Identification*

1. The term “Owner” or “CCCC-D” or “City” or “CoB” as it is used in this Document, refers to the City of Brampton, Brampton, Ontario.

2. The term “PA/Sound System Contractor” or “AV Contractor” or “Bidder” as it is used in this Document, refers to the Contractor directly responsible for providing the PA/Sound systems specified herein. Reference to other Contractors does not modify the responsibility of the AV Contractor to perform all the work required by the project contract documents.

3. The term “Systems Designer” or “AV Consultant” or “Consultant” as it is named in this document refers to R. Nathan and Associates.

4. The term “Install”, “Supply”, and “Provide” means the AV Contractor shall supply and install, inclusive of all labour, materials, necessary components or add-ons, software, programming, connections, installation, testing and commissioning, training and documentation for the item or items referred to in the specification.

5. The term “AV” means audio-visual also applies to the “PA” systems scope of work.

6. The term “Sub-Contractor” means any firm, person or freelance worker that is not under the direct payroll as defined by the Laws of Canada and gainfully employed full-time by the AV Contractor. This includes any Contractors that are required to perform work, such as control system programming, wire pulling, electrical and millwork. Approval in writing to change the list of sub-Contractors included with the original bid, e.g. to add a new resource, must be obtained from the Owner prior to implementing the change.

1.1.3. *Substitutions*

1. Equipment makes and model specified in this document is provided for information purposes only. All equipment is stated in terms of performance requirements. It is the AV Contractors' responsibility to provide representative models that meet the functional and technical requirements of the project. Substitutions for different models after the project is awarded will be considered. Sufficient documentation is required to show that the proposed substitution is equivalent (or better) in terms of function and performance. The Owner has the sole discretion as to whether the substitution will be accepted.

1.1.4. *Drawing List*

1. The PA/Sound system drawings shall be read in conjunction with, and form part of these specifications. The PA/Sound Systems block drawings illustrate conceptual system configuration only. The AV Contractor shall provide a detailed system wiring diagram inclusive of but not limited to all equipment identified by manufacturer make and model, wiring diagram including wire type and numbering, endpoint devices identified by input and output locations, local power distribution, integration with Owner's network requirements, AV equipment mounting details for all wall and, ceiling mounted systems. Other detail and layout drawings for devices installed in and under table shall be provided by the AV Contractor.
2. Request CAD files from the Designers as required to develop detail construction AV drawings.

1.1.5. *References*

1. The following references are to be used as guidelines for the work performed.

    - EIA RS-310-C, Racks, Panels and Associated Equipment
    - CSA C22.1-94, Canadian Electrical Code Part I (current edition, Safety Standard for Electrical Installations)
    - CSA Standard T527-94, Grounding and Bonding for Telecommunication in Commercial Buildings
    - ANSI/EIA/TIA-607: Commercial Building Grounding and Bonding Requirements for Telecommunications
    - TIA/EIA-568-B.1 and TIA/EIA-569-A, Category 6 Cabling Standards
    - "Controlling the Temperature inside Equipment Racks" – Middle Atlantic
    - IEEE 802.3af – Wired Ethernet
    - BICSI©/InfoComm© PA/Sound Design Reference Manual
    - InfoComm© (1) A/V Installation Handbook (2) PA/Sound Best Practices (current edition)

1.1.6. *Governing Bodies*

1. The PA/Sound systems shall conform to the highest quality standards. The following list provides a general indication of the industry organizations with published technical standards and is not intended to be all-inclusive.

    - AES Audio Engineering Society
    - EBU European Broadcast Union
    - EIA Electronic Industry Associations
    - IEEE Institute of Electrical and Electronic Engineers
    - InfoComm International

- NAB National Association of Broadcasters
- NEMA National Electrical Manufacturers Association
- NSCA National Systems Contractors Association
- NTSC National Television Standards Committee
- SMPTE Society of Motion Picture and Television Engineers

1.2. Project Scope

1.2.1. *Schedule*

1. The installation of the PA/Sound systems, testing and commissioning shall be installed as directed by these specification and drawings and as instructed by the Owner's representatives.

1.2.2. *Summary of Work*

1. The project includes supply all equipment and material, engineering, manufacturing, programming, pre-build and final installation of all PA systems described herein.
2. In addition to the AV Contractor providing the services and materials described herein, the AV Contractor shall deliver the following services and perform the following on-site work;
    - Co-ordinate all PA system installation and components with the City's project lead. The AV Contractor will be entering a work area under the control of the City;
    - Co-ordinate power, DATA and other infrastructure requirements with the construction team. Ensure all AV system related electrical infrastructure are suitably implemented to support all AV related cabling and components;
    - Attend weekly site meetings, organize, chair and minute all AV project meetings;
    - Co-ordinate and ensure all AV system installed in tables are correctly implemented to house AV devices;
    - Co-ordinate control systems and digital display screen with the Systems Designer. Expect revisions to meet Owner's requirement;
    - Test, commission and report deficiencies to the Systems Designer;
    - Co-ordinate all AV infrastructure required for wall boxes, and AV controllers prior to installation;
    - Co-ordinate and ensure all structural support, blocking and infrastructure required to support all AV components is existing;
    - Provide final device installation and system configurations after construction site "dust free" hand-over;
    - Unless otherwise directed, all AV cables shall be supplied and expedited by the AV Contractor and shall be FT6 and shielded twisted pair where twisted CAT-6 cables are required. Provide FT6 .

1.2.3. *AV Contractor Performance*

1. Provide complete and working systems to comply with operational capabilities, design and standards of quality stated herein. Furnish all equipment, labour and material required to provide the specified systems, unless otherwise noted herein. It is the AV Contractors responsibility to deliver complete working systems as intended by these documents and as instructed by the City's representatives.
2. If the systems do not fulfill all aspects of this Specification, make any adjustments or any other changes required to bring the installation into conformance with the specification at no additional cost to the Owner.

3. Work in accordance with the best trade practices, fabricate and install all items in accordance with manufacturers' recommendations and the specifications herein. Co-ordinate and consult with the Systems Designer to provide an installation to industry best practices.

4. Fully test and align the systems as outlined in this Specification and according to accepted trade practices to the satisfaction of the Systems Designer.

5. Correct deficiencies at no cost to the City. Should there be violations or noncompliance to the Codes, correct these at no cost to the Owner. Correct the violations within ten days of receiving notice.

1.2.4. *Quality of Installation*

1. The workmanship with reference to this project is to be of the highest industry standards applicable. This applies to all AV work including the Millwork and Electrical.

2. Provide properly trained, qualified, professional installation technicians and trades people throughout the duration of this project. Submit a copy of qualification and proven experiences, Certified Technology Specialists (CTS) designer, Biamp Digital Signal Processor (DSP) and other engineering expertise's with bid document.

3. Observe and obey all building codes applicable, safety rules & regulations, and the general rules of the facility as directed. See Owners requirements included with these documents which supersede any conflicting statements made in this section of the AV specification. Provide RFI where conflicts are identified.

4. All equipment must be clean and tested before final acceptance by the Consultant and the City.

1.2.5. *License of Software and Programs*

5. Register all control, Digital Signal Processing (DSP) and any programming tools to the City. Provide a soft copy of "all" programming including compiled and none compiled source code and GUI to the City.

1. All system programming shall become the property of the City. Any changes or adjustments to any programming will be updated immediately and provided to the City..

1.2.6. *LEED Requirements*

1. In general, the green initiatives were considered during the design and the specification of AV equipment. Provide energy star/energy efficient and ULC listed equipment where possible.

1.2.7. *Permits, Codes and Regulations*

1. Obtain at no additional expense to the City all permits, registrations, licenses, and insurance necessary to execute the work in compliance with all applicable regulations.

2. Perform the work in compliance with all relevant codes and regulations.

1.2.8. *Materials Control*

1. Supply secured metallic job box (es) for all parts and tools. The City is not responsible for loss of specified system components until permanently fastened to the building or signed over to the City.

2. All equipment supplied shall be new stock, unless otherwise noted. Where a specified equipment model is deemed to be discontinued at the time of tender, provide the replacement model equal to or greater than the specified model.

3. Deliver the equipment to the site and provide all hoists and scaffolds necessary to install the equipment.

4. Visually inspect all equipment for damage or defects prior to installation. Report all damaged or defective materials to the Systems Designer and the City.

5. Provide to the Systems Designer and the Owner all statements and correspondence from suppliers and manufacturers concerning defects or delays.

1.2.9. *WSIB, Insurance and Safety*

1. Provide proof of good standing with the WSIB. Pay WSIB costs as per Ontario law for all workers including Sub-Contractors and Freelance Workers.
2. Provide up to date WSIB Clearance Certificates during the progress of the project.
3. Fulfill the requirements of the Workplace Hazardous Materials Information System (WHMIS) for storage, handling, use and disposal of any hazardous materials. Promptly inform let the General Contractor of any materials that may be considered hazardous during the term of the project.
4. Work in a professional and safe manner. Provide equipment such as ladders, extension cords, electric and hand tools, material lifts, personnel lifts and any equipment required for the project. Operate this equipment in a proper and safe manner according to the WSIB and appropriate authorities having jurisdiction. There shall be no use of the Owner's equipment during the process of the installation of this project.
5. Follow the Owner's safety protocols and receive training prior to entering the site as required.

1.2.10. *Site Access*

1. Comply with the City's rules concerning:
   - Acceptable hours to perform work to minimize disruptions of daily operations
   - Site procedures – for example: sign in (if applicable)
   - Security Procedures – for example: background check and security clearance (if applicable)
   - Parking location, if applicable, fees shall remain the AV Contractors responsibility.
   - Material Storage; the AV Contractor shall remain solely responsible for material security.
   - Follow the Owners instruction for use of Sanitary Facilities
   - Garbage disposal and associated fees; if applicable, fees are at AV Contractors expense. Remove all garbage from site. Maintain a clean work environment at all times
2. Upon acknowledgement of Substantial Performance of the Work, access to the site will be granted only at the discretion of the Owner.

1.2.11. *Conduct of Work*

1. The use of impact tools for cutting concrete or for installation of inserts and the use of powder, shot or power-actuated tools is not permitted unless written permission is obtained from the Owner prior to commencing.
2. Ensure replacement and / or restoration to original condition any damage or alteration to the building and its contents, e.g. floor, ceiling, walls, furniture, caused by the installation process. Any damage or disfigurement shall be remedied at the AV Contractor's expense.
3. Co-ordinate with the Owner on any sensitive activities, such as high-SPL testing, or special requirements.
4. The AV Contractor shall confirm all dimensions, distances and placement prior to purchasing and installation of equipment. Report any discrepancies to the Systems Designer prior to installation.
5. The AV Contractor shall maintain an orderly work area and ensure conditions meet industry standards and statutes for safety and work procedures.

1.2.12. *Removal and Disposal of Waste*

1. Remove and properly dispose of all waste products. Make every effort possible to recycle all waste items such as cardboard, metal, plastic etc.

1.2.13. *Extra Work*

1. Prior written authorization is required to perform any work outside a fixed price contract(s). The AV Contractor assumes the risk of proceeding without prior written authorization.
2. Advise the Owner of any extra work that is required to allow fixed price contract work to proceed. This shall be done with adequate warning to allow arrangements to be made so that work is not delayed.

1.2.14. *Schedule*

1. Acceptances of the PA/Sound system, the systems design and performance are at the sole discretion of the AV Consultant and the Owner.
2. All submittals shall be made in a timely manner. Allow two weeks for review and two weeks for possible resubmission. Submissions are not to jeopardize the project schedule.

1.2.15. *Reviews*

1. The work will be declared substantially complete when it is fully functional, ready for operation by the Owner and has been tested, commissioned and signed off by the Systems Designer and Owner.
2. The work shall be deemed complete when:
    - Systems are fully functional
    - Systems have been tested, commissioned and approved by the Systems Designer and Owner
    - System manuals and as built drawings have passed review and acceptance by the Systems Designer
    - All work stipulated in Part three of this document has been completed
    - The Systems are ready for operation by the Owner
    - All deficiencies have been rectified and signed off by the Systems Designer and Owner

1.3. Submittals

1.3.1. *Shop Drawings and As-Built Information*

1. Within two weeks of contract award submits construction drawings for review. All drawings are to be submitted to the AV Consultants.
2. Approval drawings are reviewed documents for conformance with the project design concepts and these specifications. As part of the Approval process, only compliance with information given in the contract documents is reviewed.
3. The returned submittal will have annotations, amendments and / or comments. These must be corrected where noted, and if modifications are needed or if additional equipment is required for the system to function as intended, there will be no changes to the contract value. Make corrections in a timely manner. Corrections or comments noted by the Systems Designer during this process do not waive compliance with the requirements as demonstrated in the drawings and specification documents.
4. For each submittal provide one hard copy and one soft copy. All submissions are to be complete unless approved by the Systems Designer prior to submission. Partial submissions will not be accepted and will be returned for completion.

5. Drawings shall be neat and organized to show all information including cable-numbering scheme and detail drawings for custom millwork modifications for PA devices. As part of the construction drawing process the AV Contractor shall request final building design AutoCAD files from the architect. All AV devices shall be to scale, located in the exact location where devices will be installed on wall and ceiling. This is especially necessary to coordinate AV components with ceiling and other fixtures such as lighting, sprinklers, air-flow systems, etc. Submit soft copy of drawings in PDF and AutoCAD format. Drawings are to be a minimum size of Architectural D. Final system as-built shall be provided to the Owner in AutoCAD, PDF and one printed.

1.3.2. *Test Report*

1. Provide test reports for the system prior to the commissioning by the AV Consultant. If necessary, arrange for the manufacturer professional representative to visit the site, tune and test the system. This shall be at no additional cost to the Owner.

2. Failure to provide reports in a timely manner may result in the postponement of commissioning, in the sole discretion of the AV Consultant.

1.3.3. *System Manual*

1. Provide one hard copy and one soft copy in digital format of the systems manuals to the Owner.

2. All facility infrastructure and systems drawings shall be revised to “As Built”, submit to Owner in digital and hard copy submission (includes wiring and numbering schemes, cable and equipment).

1.4. Post Installation

1.4.1. *Training*

1. Submit an agenda to the Owner and Systems Designer for review prior to scheduling each training sessions.

2. Instruct the Owner's representatives on the operation, general assistance and care of the systems for no less than 4 hours. Formally organise training time with the Owner representatives for;

    a. Property management and staff

    b. IT management

    c. AV Vendor responsible for the systems operations if necessary.

3. As a portion of this instruction, have complete equipment manuals and a basic operation instructional document for the system available for review with the Owner’s representatives.

1.4.2. *Acceptance and Commissioning*

1. Perform all systems testing; adjustments and fine-tuning required to optimizing the overall performance and functionality of the system. Coordinate and include the City’s user group in all final tuning and optimizing of each system. Submit a report to the Systems Designer detailing the tests and optimizations performed and the names or each individual present during the tuning. Include with this report, or under separate cover, a project deficiency list. This is required prior to scheduling final commissioning and acceptance.

2. The AV Contractor' Project Manager shall sign all reports prior to issuance to the Systems Designer.

3. Once the Systems Designer has received and accepted the AV Contractor's reports on system testing, commissioning and deficiencies, the Systems Designer and/or the Owner will conduct a final commissioning and acceptance session with the AV Contractor. Final commissioning is the testing and inspection of all systems and components completed and operating as design and specified and to the Owners expectation with no deficiencies.

4. During the final commissioning and acceptance session, the AV Contractor may also be required to repeat any portion or portions of the testing.

5. Prior to final systems acceptance the City may do a complete dry run with all systems. The AV Contractor shall note that the City will be using all systems in the identical way as they would during various meetings. The AV Contractor will be required to fully participate in these dry run tests (budget 4 hours). Acceptances by the Systems Designer, in writing, shall denote substantial performance.

6. Should the work not be substantially complete at the time of the first inspection, the AV Contractor is responsible for any consulting and transportation costs incurred during subsequent inspection or inspections.

7. If the system does not meet the design and performance requirements specified herein, the AV Contractor shall make adjustments, or any other changes required to achieve compliance at no additional cost to the City.

1. Prior to final acceptance by the Owner, after notifying the AV Contractor, the Owner may require use of the system for testing or other purposes. The AV Contractor shall not waive any responsibility because of this temporary use of the system, and it shall not be construed as evidence of acceptance.

1.4.3. *Warranty*

8. Warrant all work as defined by this specification for a period of one year from the date of substantial performance at no cost to the Owner. Warranty certificate shall be submitted as part of the Operating Manuals. The warranty shall cover equipment and defects resulting from faulty components, workmanship, installation or incorrect calibration. Replacements and repairs shall be made without cost to the Owner. Replacement of faulty equipment, programming and repairs shall be completed within 24 hours from the time the vendor is contacted by the City.

    a. Provide a separate price for annual maintenance services. Services shall include replacing and repairing of all equipment, components, programming and tuning the systems as required by the City.

    b. Annual maintenance services shall be directly contracted with City. Separate annual maintenance price shall be included with the bid package to the GC as an option for the City consideration but not to be included in total project cost to the GC.

9. Should any manufacturer offer a warranty longer than the warranty provided under this contract, notify the Owner of these durations and include all information about this extended warranty in the system manual.

10. Should manufacturer warranty work need to be performed outside of the AV Contractors warranty period, additional costs incurred for removal, shipping and re-installation of equipment are subjected to the terms of separate agreement between the AV Contractor and the City and is not included in this contract.

11. All custom programming shall be warranted against faults and deficiencies for the duration of the installation warranty commencing at date of substantial performance. All necessary changes under this warranty are to be at no cost to the Owner.

12. All supplied equipment shall be obtained through lawful and manufacturer authorized distribution channels in Canada and the warranty shall be supported in the jurisdiction of the Owner. Under no circumstances are “Grey Market” or “Refurbished” items acceptable.

13. During the first-year warranty period the City shall contact the AV Contractor directly and inform the GC of such contact for service request. The AV Contractor shall respond within 4 hours by phone. The AV Contractor shall be onsite within 48 hours for all onsite repairs and services.

2. SYSTEM DESCRIPTION

2.1. General

2.1.1. *Introduction*

1. The PA systems speakers, horns and controllers shall be deployed in all areas as identified on drawings and as instructed by the Owner's contract documents. The identified areas are equipped with a sound system for voice announcement and music. This document may not identify all areas and rooms by room numbers or individual room names and must be read in conjunction with the architectural floor plans and all AV drawings for exact number of rooms, loudspeaker quantity and equipment locations.

2.2. System Configuration and Control System

2.2.1. *Audio Control*

1. The PA/sound system controllers are wall mounted at reception and in the Dome. The controllers shall control the loudness and muting of the loudspeaker system. The Dome controller shall also provide routing of local audio input from microphone and local consumer line level sources.

2.3. THE PA SYSTEM

2.3.1. *General*

1. The PA/Sound requirements shall be heard in the reception lobby, washrooms and inside the Dome as illustrated on the audio-visual (EAV and AV) drawings.
2. The system shall be connected back to the exiting Cassie Campbell Community Centre (CCCC) PA system by way of an IP network receiving and transmitting device. This allows for voice announcements and background music from the existing system to be played back inside these 2 new building.
3. A local microphone shall be provided at reception for making local pages and voice announcements to all loudspeakers in the reception building and the Dome as required.
4. A volume controller shall be located at the reception for adjusting the volume of the CCCC existing incoming audio or completely turning off the loudspeakers in the reception area and the Dome when required.
5. Provide audio over network transmitter and receiver. Install and configure as required for audio from the CCCC existing sound system to be heard in the dome and reception area. Modification to the CCCC sound system programming is not required. The output from the existing system can be a split output by providing an audio splitter from an existing active output then onto the audio network transmitter. Coordination is required with the CCCC operators and the IT group.
6. The AV Contractor shall provide all cables, patch cords and all devices for a full and complete working system as illustrated in this document and on the drawings.
7. The AV Contractor shall coordinate all work with the Owner's, the project team and the CCCC AV and IT management prior to the commencement of any part of the work. Failure to coordinate may result a complete do over of the work at the cost of the AV Contractor.
8. The following equipment and devices shall be provided. The AV Contractor shall provide make and models to suite the requirements of the project.
9. Equipment

Description	Model or equivalent	Quantity
Provide loudspeakers. It shall be complete with all requirements for honing from ceiling structure as required	Pendant speakers as required	See drawings
Horn speakers	Horn speakers as required	See drawings
Power Amplifiers	70v and 8ohm amplifiers as required	See drawings
Audio Digital Signal Processor (DSP)	Complete with all required in/output, expanders, network and control interface as required	See drawings
Push to talk paging microphone at reception	TOA or other as required	One is required
Microphone and line level audio input	Provide line balancing audio plate as required	See drawings
Audio Controller with input selector and volume controller	One in dome and one at reception. Provide requirements	2
PoE+ Network switch for the PA system	Provide requirements	See drawings
Provide IP based audio transmitter and receiver	Provide requirements	See drawings
Cables, adaptors, transmitters, receivers as required for a complete solution	AV Contractor to provide, install and coordinate requirements where required.	As required
Provide a 36-RU floor standing AV equipment cabinet complete with sides, rack, top and a locking front panel.	Provide requirements	1
Provide surge protectors, vents and lank panels for the AV rack	Provide requirements	As required.

2.4. EXECUTION

4.1 EXAMINATION

1. Examine all existing infrastructure provided to support the PA/Sound equipment for compliance in which that related work is specified, and determine if conditions affecting performance of the work of this Section are satisfactory. Do not proceed with work of this section until unsatisfactory conditions have been corrected in a manner acceptable to structural support, surfaces, back boxes, power, voice and data outlets. Provide requirements as stated in this and other project related documents.

4.1 INSTALLATION OF PA/SOUND SYSTEMS

1. The AV Contractor shall prepare detailed design/installation drawings and submit to the Consultant for review prior to start of work. The submission shall include all documentation as required to identify full system design intent, its operation, included system components, and installation requirements and requirements as specified for sound systems and video systems.

2. The AV Contractor shall coordinate electrical requirements where suitable infrastructure is not provided as required to support the PA/Sound systems as stated in this document and on the PA/Sound systems of drawings.
3. Provide specified various AV system components to serve the various areas. Program and install systems in accordance with manufacturer's recommendations and previous requirements specified in Part 3.
4. Connect components with required cabling. Co-ordinate AC power cable and wiring installation with trades responsible for respective work.
5. Instruct the Owner's representative on operating and maintenance of the systems.
6. Provide all FT6 system wiring and install in accordance with certified "REVIEWED" wiring schematic shop drawings. Exact wiring types must be confirmed with the system manufacturers and approved by the Consultant.
7. There shall be no splicing of wiring provided for this project. All wires shall maintain a continuous from device to processing to displays, etc.
8. All work shall be performed in accordance to the manufacturer's instructions and requirements.
9. The integrated systems shall be tested during the installation process so that any problems can be detected and corrected as they occur. Evaluate the following:
    - Safe rigging practices including safety cables.
    - Safe grounding practices - each component is earth grounded through its AC cord, rack rails or both, and not produce audible hum.
    - Hums resulting from ground currents.
    - Proper system polarity.
    - Susceptibility to radio frequency interference.
    - Susceptibility to electromagnetic interference.
    - Proper system gain structure.
    - Consistency and accuracy of coverage.
10. Confirm the exact requirements and locations of the equipment with the CoB Project Lead and AV Consultant prior to rough-in.
11. Refer to the system device location on the AV drawings.
12. Quantities for devices shall be as per the AV drawings.

End of AV Spec Section