Oakwood Library

Masonry and Stair Restoration

932 Highway 7, Oakwood, ON

TECHNICAL SPECIFICATIONS AND DRAWINGS

Prepared for:

City of Kawartha Lakes
26 Francis Street,
Lindsay, ON K9V 5R8

Prepared by:

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Division 00 - Procurement and Contracting Requirements

Division 01 - General Requirements

Division 02 - Existing Conditions

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1.0 Drawings

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

Drawing No.	Drawing Title	Date
	Cover Page and General Notes	August 2025
R1.1	Key Plan	August 2025
R2.1	North Part Elevation and West Elevations	August 2025
R2.2	South Part Elevation	August 2025
R3.1	Sections and Details	August 2025
R3.2	Door Schedule And Detail	August 2025
S1.1	North Stair Demolition/ Restoration Plans	August 2025
S1.2	South Stair Demolition/ Restoration Plans	August 2025
S2.1	Sections and Details	August 2025
S2.2	Sections and Details	August 2025

END OF SECTION

1.0 GENERAL

Work under this Contract includes wholesale and localized repairs of deteriorated masonry brick, stone and mortar, reconstruction of north elevation entrance exterior stairs, localized concrete repairs at south elevation entrance exterior stair, railing replacement, and replacement of failed building envelope sealants as shown on the Drawings, at the building located at 932 Hwy 7, in the City of Kawartha Lakes in the Province of Ontario.

1.1 Description of Existing Structure

.1 The property consists of a storey building with a single level basement beneath the building. The property is located south of Highway 7. The main entrance of the building is at the north elevation and a second primary entrance is located at the south elevation. The exterior wall of the building primarily consists of brick masonry cladding and interior painted gypsum board with stone details. The glazing system consists of metal-framed windows with double-glazing units. The roofing above the building is composed of sloped asphalt shingle roofing.

1.2 Description of Work

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

.2 In particular, the work includes but is not necessarily limited to the following:

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

.2 Removal of the deteriorated bottom courses of the existing masonry brick wall at the north and south entrance vestibules as shown on the drawings. Temporarily support above-grade brick masonry and replace with new architectural concrete masonry units.

.3 Localized masonry repairs including mortar joint repointing, brick replacement, stone repairs, and masonry tie installation as indicated on the drawings.

.4 Building envelope sealant replacement at locations shown on the drawings

.5 Removal and disposal of the existing north entrance stair structure, including guardrails, handrails, foundation walls, footing, etc., and construction of new reinforced cast-in-place concrete entrance stair structures, complete with fabrication, supply, installation and load testing of new guardrails and handrails, FADS upgrades, etc. as shown on the Drawings.

.6 Localized concrete repairs at south concrete entrance stair as indicated on the Drawings and where directed by the Consultant.

.7 Removal of existing handrail and fabrication, supply, installation, and load testing of new guardrails and handrails at south entrance stairs, as shown on the Drawings.

.8 Installation of new hard and soft landscaping elements (i.e concrete curbs, sidewalks/slabs-on-grade, topsoil and sod, etc.) around the new stair structures, as shown on the Drawings.

.9 Wholesale preparation and repainting of existing doors, where shown on the drawing (3 total).

.10 Repair all areas damaged by construction activity; specifically, the Contractor shall repair all damage resulting from the Construction to the satisfaction of the Consultant including repair of finishes, replacement of landscaping features, etc. that have been damaged in accordance with the Contract Documents which have been damaged.

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

1.3 Work Sequence

.1 The Work areas will be available as identified by City of Kawartha Lakes. Contractor to confirm date of mobilization. All work outlined in these specifications is to be complete as specified by City of Kawartha Lakes.

1.4 Construction Schedule

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

.1 Start date and completion date for each portion of the work.

.2 Start and completion dates for envelope repairs for each phase of work based on estimated quantities in Bid Form.

.3 Start and completion of waterproofing work coordinated with concrete repair schedule and patch curing.

.4 Coordination of other repair items (door refinishing, landscaping and stair reconstruction, guardrail installation, etc.) with the envelope repairs.

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

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

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

END OF SECTION

1.0 GENERAL

1.1 Contractor's Use of Site

.1 Building is to remain open throughout the course of the Work. Contractor has complete and sole use and access to designated work areas, between hours of work as per the Owner's requirements, unless otherwise stipulated by the Owner during the course of the Work.

.2 Coordinate work schedule with the Owner to minimize disruption of the site and building . No work shall be performed until approved by Owner.

.3 It is Contractor's responsibility to ensure the building remains operational at all times and to perform work as required to keep exits and entrances available to building users at all times. Contractor to coordinate with Owner/building users during construction.

.4 Provide the Owner with a schedule that lists all parking spaces to be occupied or restricted at least five working days prior to occupying or restricting those spaces.

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

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

.7 Hoarding and dust protection is to be provided around each area of work in accordance with Section 01 56 00. Each phase of work is to be sealed to prevent the release of construction dust into other areas.

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

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

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

.11 It is the Contractor's responsibility to temporarily relocate, stockpile, protect and reinstate existing equipment, features, fixtures, etc.as required to perform the work.

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

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

.14 Maintain access to stairwells and entrances/exits. Under no circumstances shall these areas be obstructed unless otherwise approved by Owner.

.15 Maintain access to storage and mechanical rooms at all times.

.16 Move stored products or equipment that interfere with operation of the building, Owner, or residents.

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

.18 Protect existing light standards, walls, plants, finishes, windows, doors, etc.

.19 Protect all utilities, gas mains, electrical conduit, etc. that must remain in service throughout the construction period.

.20 During transportation of materials or equipment through occupied areas, protect the public, property, and finishes from damage. All damage caused by the Contractor is to be repaired or rectified at Contractor's expense.

.21 Make allowance in price to cover all costs of temporary removal and replacement or relocation of existing electrical wiring and mechanical hardware required for completion of the Work.

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

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

.24 Use Highway 7 for delivery and removal of material for duration of Project. Disposal bins, supply trucks, etc. are to be located on the parking lot at east of the building. Contractor is responsible for all required permits.

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

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

1.2 Hours of Work

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

.2 All noise generating Work shall be limited to the hours of 9:00 AM to 7:00 PM Monday through Saturday.

.3 Every two weeks, an updated schedule will be provided for hours of noise generating work that are permitted beyond the hours stated above.

.4 Contractor has access to areas with quiet work proceeding around the clock seven days a week, if desired.

1.3 Effect on Building and Site

.1 Schedule operations to minimize interruption of the normal use of the site and building, and to comply with laws, by-laws, ordinances, rules, and regulations relating to the Work.

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

END OF SECTION

1.0 GENERAL

1.1 Substitution of Materials Prior to Bid Closing

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

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

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

1.2 Request for Approval of Alternatives

.1 A Bidder or Supplier of a product or system may apply for approval of their product or system as an alternative up to seven (7) calendar days prior to bid closing. The Consultant will advise applicants of the status of their request prior to bid closing.

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

.1 Project name and number

.2 Specification sections affected by the proposed alternative

.3 Product technical data sheets

.4 Supplier installation instructions and requirements

.5 Supplier warranty and warranty requirements

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

.7 Installation history, including:

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

.2 Description of project and product usage

.3 Owner and consultant

.8 Test data

1.3 Approval of Alternatives

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

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

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

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

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

END OF SECTION

1.0 GENERAL

1.1 Project Coordination

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

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

1.2 Notification for Field Review

.1 Notify the Consultant at least 24 hours in advance for field review. No work shall be covered or concealed until reviewed by the Consultant unless informed that a field review will not be performed. Such review does not absolve the Contractor from their responsibility to perform the work in accordance with the Contract Documents.

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

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

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

1.3 Superintendence

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

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

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

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Administration of Project Meetings

.2 Pre-Construction Meetings

.3 Progress Meetings

1.2 Administration of Project Meetings

.1 Consultant will preside at meetings.

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

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

.2 Consultant will

.1 Schedule and administer project meetings unless otherwise noted.

.2 Prepare agenda for meetings.

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

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

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

1.3 Pre-Construction Meeting

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

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

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

.4 Agenda to include the following:

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

.2 Schedule of Work, progress scheduling.

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

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

.5 Delivery schedule of critical equipment.

.6 Site security.

.7 Contemplated change orders, procedures, approvals required.

.8 Take over procedures, acceptance, warranties.

.9 Monthly progress claims, administrative procedures, holdbacks.

.10 Appointment of inspection and testing agencies or firms.

.11 Insurance, transcript of policies.

1.4 Progress Meetings

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

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

.3 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

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

.4 Progress, schedule during succeeding work period.

.5 Corrective measures and procedures to regain projected schedule.

.6 Revisions to construction schedule.

.7 Review of off-site fabrication delivery schedules.

.8 Review submittal schedules; expedite as required.

.9 Maintenance of quality standards.

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

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

.12 Other business.

END OF SECTION

1.0 GENERAL

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

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

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

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

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

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

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

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

1.1 Submission Requirements

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

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

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

.1 Delete information not applicable to project.

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

.3 Provide certification of compliance to applicable codes.

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

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

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

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Identification and quantity of each shop drawing, product data, and sample.

.5 Other pertinent data.

.6 Submission shall include:

.1 Date and revision dates.

.2 Project title and number.

.3 Name and address of:

.1 Subcontractor.

.2 Supplier.

.3 Manufacturer.

.4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

.5 Details of appropriate portions of Work as applicable:

.1 Fabrication.

.2 Layout, showing dimensions, including identified field dimensions and clearances.

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

.7 Operating weight.

.8 Wiring diagrams.

.9 Single line and schematic diagrams.

.10 Relationship to adjacent work.

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

1.2 Shop Drawings

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

.1 Brick repairs temporary shoring and bracing

.2 Excavation temporary shoring and bracing

.3 Concrete reinforcement

.4 Concrete formwork

.5 Guardrails and handrails

.6 Miscellaneous Metals

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

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

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

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

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

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

1.3 Product Data

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

.2 Submit electronic copies of product data.

.3 Sheet Size: 215 x 280 mm.

.4 Delete information not applicable to project.

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

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

1.4 Samples

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

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

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

1.5 Mock-Ups

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

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

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

END OF SECTION

1.0 GENERAL

1.1 Temporary Utilities

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

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

1.2 Electrical Power

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

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

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

1.3 Water Supply

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

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

1.4 Temporary Lighting

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

.2 Illumination must be provided and maintained on all floors and stairs affected by the Work.

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

1.5 Temporary Telephone

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

1.6 Temporary Fire Protection

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

1.7 Temporary First Aid Facilities

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

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

1.8 Temporary Sanitary Facilities

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

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

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

1.9 Temporary Field Offices and Sheds

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

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

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

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

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

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

1.10 Temporary Barriers and Enclosures

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

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

.3 Keep site clear of unauthorized signs.

.4 Provide barriers with required warning lights and signs.

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

.6 Remove hazards requiring barriers as soon as possible.

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

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

1.11 Temporary Heating and Ventilation

.1 Provide and maintain supplementary heating as required to maintain sufficient application and curing temperatures.

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

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

1.12 Security

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

1.13 Protection of Work During Close-Down

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

END OF SECTION

1.0 GENERAL

1.1 Work Included

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

1.2 Walk-Through Inspection of Site

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

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

.3 If written notice is not given within five days of commencement of Work, it will be assumed that the Contractor has reviewed the site and has accepted the condition of the property as being free of damage.

.4 Any damages not listed as part of the written notice of clause 1.2.1 above found after the completion of the work will be the sole responsibility of the Contractor to rectify. These rectifications shall be completed in a timely and satisfactory manner.

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

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

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

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

.3 Provide means for protecting occupied areas below the Work from water leakage between removal and reinstallation of building envelope components

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

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

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

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

1.4 Construction Signage

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

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

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

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

.1 No parking, directional arrows, etc.

.2 Keep Out: Work in Progress

.3 Caution: Work Overhead

.5 Signage will be required at all access gates and entrances to the work area. This signage shall consist of the standard “Danger Do Not Enter” sign with an additional sign (special order) indicating that the area is temporarily under construction, and we are sorry for the inconvenience.

.6 Signage is required at all stairwell entrances to the work area. Signs to indicate that this entrance is temporarily closed for construction.

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

.1 Building renovation in progress - sorry for the inconvenience

.2 Caution - watch for moving vehicles

.3 This Area Closed for Construction – Do Not Enter

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

.9 All signage is to be securely fastened directly to hoarding or, if signage is required and hoarding is not available, the signs are to be securely fastened to two screw jack (post shores) which are fully tightened to the slab soffit and slab surface. Signs and posts are to be installed in such a manner that projections that may cause public injury are not created.

1.5 Construction Barriers and Enclosures

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

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

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

.4 Work areas are to be completely enclosed to keep dust generated by construction activity from escaping into other areas of site or interior areas.

.5 The Contractor is responsible for any damage to mechanical equipment, motors, , fire alarm system/devices, etc. resulting from dust contamination.

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

.1 6’-0” High, Full Fabric Chain Link Fencing (i.e. Fast Fence) Enclosures

.1 This system consists of 6’ high fencing. A continuous sheet of poly-weave tarping or filter fabric is to be installed at the fencing. System must be securely ballasted or anchored to prevent overturning due to impact and wind loads

.7 The Contractor shall be responsible to maintain the condition of hoarding and for additional painting of hoarding required to cover graffiti.

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

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

.10 Simple barriers required to control traffic (i.e. not enclosing work areas) are to consist of screw jacks at maximum 8'-0" centres with nylon webbing (4'-0" high snow fence) between each screw jack. Jacks are to be fully tightened to the structure and nylon webbing is to be securely fastened to all jacks. Directional signs will also be required.

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

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

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

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

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

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

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

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

.1 Filter cloth in all floor drains within the work area.

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

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

.4 Where applicable, protect sprinkler heads with polyethylene or filter cloth to prevent dust build up.

.3 Provide for protection of vehicles in or near parking areas and payment for cleaning or damage to vehicles.

1.8 Protection of Existing Exposed Facilities

.1 Protect existing lighting system from damage or remove and re-install upon completion of repairs.

.2 If Contractor wishes to use existing lighting system as an alternate to installing temporary light, Contractor shall assume all responsibility for damages incurred.

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

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

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

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

.7 Any damage to existing surfaces or finishes to remain caused by the construction shall be repaired by the Contractor at no cost to the Owner.

1.9 Overloading

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

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

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

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

1.10 Fire Protection

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

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

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

.4 Tarpaulins to be fire-resistant.

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

1.11 Overhead Protection

.1 The Contractor shall erect and maintain pedestrian walkway including roof and side covers, complete with electrical lighting, to protect the public and property from injury or damage.

.2 Minimum extent of overhead protection as designated on drawings.

.3 Minimum unobstructed overhead height of 2.4 m. Minimum unobstructed width of at least 2 m greater than the combined width of access doors and side lights at entrances. Minimum length shall provide protection for a clear distance of 10 m horizontally from the nearest swing stage.

.4 Overhead protection shall be capable of supporting any load likely to be applied to it, and capable of supporting a load of at least 2.4 kN/m^2.

.5 Install and provide adequate temporary lighting within the entire length of the overhead protection. Type, quantity, and attachment of light fixtures to be approved by Owner.

.6 Apply plywood panels to sides, vertically flush and butt-jointed. Paint sides of plywood enclosures in colour(s) selected by Owner, with one coat primer to CGSB 1-GP-59M and one coat exterior paint to CGSB 1-59M + Amdt-Aug-84.

.7 All overhead protection and enclosures to be marked with safety signage.

.8 All overhead enclosures and protection to be maintained daily, keeping them clean, orderly, and graffiti free.

.9 Remove temporary facilities from site promptly when directed by Owner.

1.12 Site Enclosures

.1 The Contractor shall erect and maintain site enclosures to completely enclose the Work area, to protect the public and property from injury or damage.

.2 Minimum extent of site enclosure as designated on drawings.

.3 Minimum site enclosure construction shall consist of:

.1 6’ high full fabric chain link fence enclosure with double swing gates. Chain link fence to consist of 2” x 9 gauge galvanized chain link mesh with polyethylene privacy stalling, colour to Owner’s approval. Support to be 1-7/8”, 0.090 wall line posts with top and bottom 9 gauge wire rails. Terminal posts to be 3-1/2” OD Schedule 40 pipe.

.1 Obtain approval from Owner on anchoring posts. Site must be returned to original state after removal.

.4 Apply plywood panels to sides, vertically flush and butt-jointed Paint sides of plywood enclosures in colour(s) selected by Owner, with one coat primer to CGSB 1-GP-59M and one coat exterior paint to CGSB 1-59M + Amdt-Aug-84.

.5 All enclosures are to be marked with safety signage.

.6 All enclosures and protection are to be maintained daily, keeping them clean, orderly, and graffiti free.

.7 Remove temporary facilities from site promptly when directed by Owner.

END OF SECTION

1.0 GENERAL

1.1 Manufacturer's Instructions

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

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

1.2 Delivery, Storage, and Handling

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

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

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

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

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

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

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

1.3 Materials

.1 Use new products unless otherwise specified.

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

END OF SECTION

1.0 GENERAL

1.1 Description of Work Included

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

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

1.2 General Requirements

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

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

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

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

1.3 References

.1 Waste Control Regulation - Ontario Environmental Protection Act

1.4 Materials and Equipment

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

1.5 Prior to Construction

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

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

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

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

1.6 Waste Removal and Cleaning During Construction

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

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

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

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

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

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

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

.8 Do not dispose of project waste and material in the drainage system.

1.7 Final Cleaning

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

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

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

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

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

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

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

.8 Sprinkler system components, where present, that have been coated with paint, cement paste, or other foreign materials shall be replaced at no additional cost to the Owner.

END OF SECTION

1.0 GENERAL

1.1 Take Over Procedure

.1 Contractor's Review

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

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

.2 Consultant's Review

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

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

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

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

.3 Final Review

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

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

.4 Certificate of **Substantial Performance**

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

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

.1 The requirements of the Construction Lien Act.

.2 The requirements of the Workers Compensation Act.

.3 All other contractual requirements.

.5 Total Performance

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

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

.6 Release of Holdback

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

END OF SECTION

1.0 GENERAL

1.1 Warranty / Guaranty Period

.1 Provide a three-year minimum warranty for all Work of Contract commencing on date of Substantial Performance or Ready-for-Takeover and ending two years thereafter.

.2 Extended and/or product warranties beyond the minimum period are **within each technical section.**

1.2 Remedial Work Under Guaranty/Warranty

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

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

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

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

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

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

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

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

END OF SECTION

1.0 GENERAL

1.1 Record Drawings

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

.2 The Contractor shall maintain accurate project record drawings on one set of white prints throughout the course of the Work that indicate deviations from the Contract Documents in red ink.

.3 Record following information:

.1 Field changes of dimensions and details.

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

.3 Deviation from electrical and mechanical installations shown on Drawings.

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

.5 Type, approximate size, and location of structural repairs, delaminations, etc.

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

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

.5 Add “AS-BUILT RECORD” at each drawing title block.

.6 Contractor shall submit both sets of “as-built” record drawings to the Consultant prior to submission of the final progress payment application.

.7 Project record drawings shall be available for reference purposes and review by the Consultant at all times. Provide reproducible prints to the Consultant or Owner upon request.

.8 If the Project is completed without significant deviations from the Contract Documents, a written declaration may be submitted to the Consultant in lieu of project record drawings.

1.2 Operation and Maintenance Manuals

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

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

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Installation of hoarding/dust protection and shoring around the Work as indicated on phasing drawings in accordance with Section 01 56 00.

.2 Provide all labour, material, equipment, and supervision required to remove and dispose of all material and debris resulting from removal of deteriorated brick and stone masonry, mortar joints, sealants, the existing above-grade concrete stairs, landings, and foundations, etc., as indicated on the Drawings and where confirmed by Consultant.

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

2.0 PRODUCTS

Not applicable.

3.0 EXECUTION

3.1 Inspection

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

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

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

3.2 Preparation

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

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

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

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

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

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

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

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

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

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

.10 Provide temporary shoring and bracing for walls, foundation walls, and columns prior to and during demolition.

.11 Submit details of proposed bracing for Consultant review prior to commencing work.

.1 Details to be designed and stamped by Registered Professional Engineer in Province of Ontario.

3.3 Demolition

.1 Remove and dispose of material and debris resulting from the removal of elements noted herein. Leave a clean, smooth and sound surface suitable for placement of new material to approval of Consultant.

.2 Remove and dispose of material and debris resulting from removal of the existing stair and landing structures, including guardrails and handrails, and hard and soft landscaping features surrounding the structures, etc.

.3 Remove and dispose of material and debris resulting from removal of the existing deteriorated brick masonry units and mortar joints, as indicated on the project drawing and where directed by the Consultant.

.4 Remove and dispose of material and debris resulting from removal of soils and granular subgrades in accordance with Contract Documents.

.5 Remove existing mechanical and electrical services associated with areas to be demolished. Removal of these services is to be accomplished prior to commencing demolition work outlined in Contract Documents.

.6 Remove concrete slabs to be demolished using sawcutting techniques.

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

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

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

.10 Where new concrete is to be applied to existing concrete, leave surface clean and sound.

.11 All required re-painting due to damage overspray, etc. is Contractor’s responsibility.

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

3.4 Cutting and Remedial Work

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

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

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

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

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

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

3.5 Waste Disposal

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

.2 Existing drainage systems, site sewers, etc. are not to be used to dispose of project wastes and/or materials.

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

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, material, equipment, supervision, and services necessary to prepare localized stair concrete repair areas and place new concrete repair material.

.2 Contractor may elect to use pre-packaged concrete materials in lieu of ready-mix concrete material at the localized stair concrete repair areas due to the locations requiring expedited application of sealer, size of localized concrete repair areas, etc. Use of pre-packaged concrete materials shall not result in a change to the Contract Price.

1.2 Repair Quantity Determination

.1 Length and width shall be measured to the nearest 25 mm (1”).

1.3 References

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CSA A23.1/CSA A23.2	Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
.4	CSA A3000	Cementitious Materials Compendium
.5	ASTM C260/C260M	Standard Specification for Air-Entraining Admixtures for Concrete
.6	ICRI 310.2R	Selecting and Specifying Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair

1.4 Performance Requirements

.1 Repaired concrete surfaces shall not scale or crack excessively.

.2 Concrete repair materials shall not spall or debond from existing concrete.

.3 Concrete repair materials shall achieve a minimum compressive strength of 20 MPa within 24 hours.

1.5 Submittals

.1 Submit manufacturer's product specifications and data sheets for the following products:

.1 Cement slurry bonding agent

.2 Rapid cure delamination repair concrete material

.3 Top surface patch material

.2 Submittals to be provided for review by the Consultant a minimum of two weeks prior to placement or use of products.

.3 Do not commence placement of repair products until review is complete and proposed products and procedures are accepted by Consultant.

.4 If requested by Consultant, provide a certificate signed by the Contractor and pre-packaged material manufacturer certifying the following:

.1 Surfaces to receive pre-packaged material were acceptable and satisfactory to receive the materials per the manufacturer’s requirements and these Specifications. Application of pre-packaged materials shall imply acceptance of surfaces.

.2 Pre-packaged materials were installed in accordance with manufacturer’s written instructions and these Specifications.

1.6 Qualifications

.1 Use only qualified concrete placers and finishers, with a minimum of two years’ experience in similar work.

2.0 PRODUCTS

2.1 Materials

.1 Portland Cement: Type GU to CSA A3000.

.2 Aggregate: Natural stone to CSA A23.1.

.3 Water: Potable and to CSA A23.1.

.4 Air Entraining Agents: To ASTM C260/C260M.

.5 Chemicals Admixtures: To CSA A3000. Calcium chloride is not permitted.

.6 Pozzolanic Mineral Admixtures: To CSA A3000.

.7 Curing Materials: To CSA A23.1.

.8 Blended Hydraulic Cementing Material: Type 10SF to CSA A3000.

.9 Supplementary Cementing Material: To CSA A3000.

.10 Superplasticizing Admixture: To CSA A3000.

2.2 Bonding Agent

.1 Contractor to provide manufacturer's recommended bonding agent, if applicable, prior to placement of repair material.

2.3 Pre-Packaged Concrete Repair Materials

.1 Proportion patch materials with specially graded aggregate to give the following properties in accordance with CSA A23.2:

	Description	Requirements
.1	Compressive Strength (24 hours)	20 MPa minimum
.2	Compressive Strength (7 days)	30 MPa minimum
.3	Flexural Strength (7 days)	5 MPa minimum
.4	Slant/Shear Bond Strength (7 days)	5 MPa minimum
.5	Linear Shrinkage	0.08% maximum
.6	Rapid Chloride Permeability	less than 1,000 coulombs

.7 Thermally compatible with concrete substrate under all applicable service conditions.

.2 The patch materials listed below may conform to the specified properties and linear shrinkage requirements. Manufacturer's latest product data sheets for proposed patch materials shall demonstrate that the patch material conforms to the specified requirements. Where product data is incomplete, manufacturer is to provide supplementary independent test data that demonstrates conformance.

.3 Patch Materials:

	Product Name	Manufacturer
.1	MasterEmaco T1060	Master Builders Solutions
.2	MasterEmaco T1061	Master Builders Solutions

	Product Name	Manufacturer
.3	CPD Rapidcrete	CPD
.4	Eurocrete	Euclid Chemical
.5	Versaspeed	Euclid Chemical
.6	HP-S6	King
.7	HP-S10	King
.8	MS-S6	King
.9	MS-S10	King
.10	Structuroc H	Solhydroc

2.4 Repair Materials for Reduced Curing Period

.1 Approved product for surface delamination repairs requiring extra-fast curing period:

	Product Name	Manufacturer
.1	VersaSpeed	Euclid Chemicals
.2	MasterEmaco T 415	Master Builders Solutions
.3	MasterEmaco T 430	Master Builders Solutions

2.5 Admixtures

.1 Use only compatible admixtures and add to mix in strict accordance with manufacturer's written instructions.

.2 Use of calcium chloride not permitted.

2.6 Non-Shrink Grout

.1 Premixed compound consisting of non-metallic aggregate, cement, and water reducing and plasticizing agents, of pouring consistency, capable of developing compressive strength of 35 MPa at 28 days.

.2 Non-shrink grout materials:

	Product Name	Manufacturer
.1	In-Pakt Construction	King
.2	Sika Grout 212	Sika Canada Inc.
.3	Masterflow 100	Master Builders Solutions

	Product Name	Manufacturer
.4	CPD Non-Shrink Grout (Pre-Mix)	CPD Construction Products

2.7 Evaporation Reducer

.1 Monomolecular film to be applied to the surface of screeded concrete to combat rapid drying conditions. Application required on silica fume concrete placed in direct sunlight, high winds, heated interiors, and interior or exterior low humidity conditions. Conform to manufacturer's recommended procedures and application rates.

.2 Approved Products:

	Product Name	Manufacturer
.1	Masterkure ER 50	Master Builders Solutions

3.0 EXECUTION

3.1 Concrete Surface Preparation

.1 All concrete surfaces to receive new concrete repair material shall have a minimum No. 6 CSP per ICRI 310.2R and be thoroughly abrasive-blast prior to concrete placement to remove laitance, debris, and loose aggregate.

.2 Clean all existing concrete surfaces to receive new concrete of foreign material, dust, debris, grease, and oil as directed by Consultant. Emulsifiers shall be required for surfaces containing grease or oil.

.3 Contractor to notify Consultant to review surfaces prior to concrete placement.

3.2 Concrete Placement – Surface Repairs

.1 Prepare patch surface, mix patch material, and apply, finish, and cure in strict accordance with the more stringent requirements of the Contract Specifications and manufacturer's written instructions.

.2 The patch area shall be thoroughly wetted as required to achieve a saturated surface dry (SSD) state prior to placing concrete repair material.

.3 Puddles of free water shall be blown from the patch area and the surface is to be permitted to dry to a saturated surface dry (SSD) state prior to application of cement slurry.

.4 If required by manufacturer, apply a bonding agent to the surface of the concrete just prior to placing new concrete. The bonding agent shall be scrubbed into the concrete to fully saturate the surface but not allowed to puddle.

.5 Pre-wet filter fabric, burlap, or cotton mats shall be available on site prior to placement of concrete to allow for immediate placement overtop of new concrete patches after their initial set.

.6 Prepare pre-packaged concrete mix per manufacturer's specifications.

.7 Contractor to confirm the minimum and maximum application lift thickness prior to placement of concrete. If required and permitted by the manufacturer, the concrete repair material can be extended with aggregate.

.8 Contractor to submit proposed aggregate extension mix design to the Consultant prior to proceeding with Work.

.9 Place new dense concrete thoroughly compacted and vibrated into place to ensure good bond.

.1 Ensure reinforcing steel is secured in place and is not disturbed during placement.

.2 Vibrators are to be used for consolidation purposes only and are not to be used to an extent that causes segregation of the concrete.

.3 Internal vibrators shall conform to CSA A23.1 Clause 7.2.5.2 and Table 19: Internal Vibrators for Various Applications.

.4 Vibrators shall be inserted into concrete perpendicular to concrete surface.

.5 Vibrators shall be inserted such that zones of consolidation always overlap.

.10 Concrete surfaces to be flush with existing surfaces, free of voids and cracks, and have a uniform surface and transition to the existing surface.

.11 Finish concrete in accordance with CSA A23.1/A23.2. Initial finish shall be completed before any bleeding or free water is present on the surface of the concrete. Final finishing shall commence after the bleed water has disappeared and when the concrete has stiffened sufficiently to prevent the working of excess mortar to the surface. Do not add water to finish.

.12 Do not overwork concrete surface. Wood float finish is acceptable.

.13 Do not use steel trowels with air-entrained concrete. For air-entrained concrete, the surface can be further levelled and consolidated with a magnesium bull float for larger repairs or a magnesium trowel for smaller repairs. One or more passes shall be made at suitable time intervals to obtain a level finish free of float marks. Do not work bleed water on the concrete surface into the concrete during finishing.

.14 Cure in accordance with the more rigorous requirements of this Section and manufacturer's written instructions.

.15 Do not allow traffic on newly placed repair patches until 75% of the specified 28-day strength has been reached.

3.3 Concrete Mixing and Placing

.1 Concrete shall be machine mixed unless otherwise stipulated by the manufacturer. Mixing and placing shall be in accordance with CSA A23.1.

.2 Concrete shall be conveyed from the mixer to the place of deposit by methods that will ensure the required quality of concrete. Equipment for conveying the concrete shall be of such size and design as shall ensure a practically continuous flow of concrete at the delivery end without separation of materials.

.3 Concrete shall be deposited in the forms as near as practicable to its final position to avoid re-handling.

.4 Depositing shall be continuous throughout each division and the concrete shall be placed and worked so that a uniform texture will be produced.

.5 No concrete shall be placed later than one half hour after leaving the mixer. No re-tempered concrete shall be allowed.

.6 Mix concrete in accordance with the manufacturer's written instructions.

3.4 Compaction and Vibration

.1 Concrete shall be consolidated by means of sufficient vibrators of adequate size operated by competent workers.

.2 The use of vibrators to transport concrete shall not be allowed.

.3 Concrete shall be thoroughly worked around reinforcement, around embedded items, and into corners.

.4 Compaction and vibration is to eliminate all air and stone pockets that may cause honeycombing, pitting, or planes of weakness.

3.5 Concrete Curing

.1 Ensure manufacturer's recommended curing conditions are maintained over the patch area. The more stringent curing conditions between the manufacturer’s written instructions and those outlined in this section will govern unless otherwise agreed upon by the Consultant in writing.

.2 Initiate surface concrete repair wet curing as soon as possible after the concrete has sufficiently set, and no later than 30 minutes after finishing.

.1 Minimum acceptable wet curing method on slab surfaces is installation of pre-saturated filter fabric, burlap, or cotton mats that are covered with soaker hoses and plastic sheeting. Overlap wet-curing mats 150 mm and ballast in place without marring the concrete surface.

.2 Wet curing procedures to be in accordance with manufacturer’s written requirements, but shall be no less than a one-day period at a minimum temperature of 10°C. Water shall not be permitted to evaporate from the concrete surfaces at any time within the wet cure period.

.3 Prevent airflow in the space between the wet-curing mats and the plastic sheeting. Protect wet-curing assembly from freezing during cold weather.

.3 Vertical surfaces are also to be wet cured for a duration of seven days by either:

.1 Maintaining formwork in place with form ties loosened and water applied to run down the inside form face after the concrete has hardened to keep the repair surfaces wet.

.2 Removing formwork from vertical surfaces and providing fog misting, light water spray, or application of wet burlap covered with polyethylene to keep the repair surfaces continually wet.

.4 The use of chemical curing compounds is not permitted.

.5 Protect concrete from the harmful effects of heat, cold, running or surface water, and mechanical shock.

.6 Do not place concrete when air temperature is below 10°C, or without implementing provisions to ensure proper curing of concrete when, in the opinion of the Consultant, there is a possibility of air temperature falling below 10°C. These provisions shall be reviewed by the Consultant and conform to the requirements of CSA A23.1.

.7 Maintain concrete material and forms between 15°C and 32°C until concrete placement whenever the surrounding air is below 5°C. No frozen material or material containing ice shall be used. All existing concrete, reinforcement, forms, and ground that the concrete will contact is to be free from frost.

.8 Maintain a curing temperature above 10°C for a minimum of 24hrs or longer to ensure proper concrete curing per manufacturer requirements. Under no circumstances may dry heat be used. Provide means to humidify the air within the heated enclosure and ensure that moisture requirements for curing are maintained.

.9 Do not allow traffic onto patch until material has adequately cured to its specified 24-hour compressive strength.

.10 The Consultant will have cause to not certify payment for repairs undertaken without adequate wet-curing procedures or that become surface dry during the specified curing period.

3.6 Inspection and Testing

.1 Testing is to conform to CSA A23.2.

.2 Inspection and testing to be conducted by a testing agency designated by the Owner. The Owner will pay costs of inspection and testing described in this section.

.3 Contractor to inform testing agency 72 hours in advance of concrete placement.

.4 Testing shall include:

.1 Preparation and testing of concrete grout cubes or cylinders for compressive strength.

.2 Review manufacturer product data sheets submitted by the Contractor.

.3 Submission of test results to the Owner, the Consultant, and the Contractor.

.4 A minimum of one set of concrete grout cubes (9 cubes) or cylinders (4 cylinders) shall be taken for compressive strength testing for each concrete patch material used each day unless otherwise directed by Consultant. Concrete test samples are to be placed in an area with similar curing conditions to that of the cast concrete.

.5 Testing procedures for concrete shall conform to the following requirements:

.1 Compression tests on concrete shall be carried out in accordance with CSA A23.1 and A23.2. Strength test on approved grout shall consist of nine grout cubes with three cubes tested at seven days and the remainder tested at 28 days. For cylinders, strength tests shall be undertaken on one cylinder each at 3 and 7 days with the remaining two tested at 28 days.

.6 The Contractor shall provide at no additional costs to the Owner:

.1 Samples of all material required for testing.

.2 Cooperation with the execution of concrete testing which shall include protection against injury or loss of grout cubes or cylinders.

.3 Access for the testing agency to test and/ or inspect materials.

.4 Site storage facilities meeting requirements of CSA A23.2 for concrete test specimens prior to removal to laboratory.

.7 Contractor shall pay for costs of additional testing as follows:

.1 If Contractor fails to notify testing agency in event of pour cancellation.

3.7 Field Quality Control

.1 The Consultant shall evaluate bonding of fresh patch material to existing concrete after the fresh patch material has cured sufficiently.

.2 The evaluation shall be performed by sounding, using a "chain-drag" or other techniques.

.3 Hollow sounds detected in repair area provide reason to suspect inadequate bonding. Contractor to remove and repair these areas where requested by the Consultant at no additional cost to the Contract.

3.8 Rejection of Defective Work

.1 The Consultant shall have the right to order additional concrete testing of any portion of repairs in accordance with CSA A23.1 if previous testing demonstrates non-conformance with specified requirements. The testing agency shall be selected by the Consultant and shall deal directly with the Consultant. Payment for costs associated with the additional concrete testing will be at the Contractor's expense.

.2 Where it is the Consultant's opinion that material or workmanship fails to meet the specified requirements, the work shall be replaced or repaired to the approval of the Consultant at no additional cost to the Owner.

.3 Failure to meet compressive strength requirements based on compression testing of concrete cylinders will result in drilling of additional core samples at the Contractor's expense. Failure of these additional samples will require the work to be replaced or repaired to the approval of the Consultant at no additional cost to the Owner.

3.9 Record Drawings

.1 Maintain accurate records of the location, size, and concrete placement date for each repair area.

.2 Records to be kept up-to-date and made available to Consultant throughout the duration of the Work.

.3 Prior to Substantial Performance of the Work, provide a plan showing location, size, and date of concrete repairs.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to prepare localized stair concrete repair areas (south stair) and place new concrete repair material as outlined in this Section.

1.2 Repair Quantity Determination

.1 Length and width shall be measured to the nearest 25 mm (1”).

1.3 References

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not reference by Code.

.2 Ontario Building Code

.3	CSA A23.1/CSA A23.2	Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
.4	CSA A3000	Cementitious Materials Compendium
.5	ASTM C260/C260M	Standard Specification for Air-Entraining Admixtures for Concrete
.6	ICRI 310.2R	Selecting and Specifying Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair

1.4 Performance Requirements

.1 Concrete repair surfaces shall not scale or crack excessively.

.2 Concrete repair materials shall not spall or debond from existing concrete.

1.5 Submittals

.1 Submit all mix designs, product specifications, and manufacturer's recommendations for Consultant review a minimum of two weeks prior to placement or use of products.

.2 Submit details of proposed methods of concrete curing and provisions for weather protection for Consultant review a minimum of two weeks prior to placement.

.3 Submit manufacturer's product data sheets for proposed curing compounds, admixtures, and corrosion inhibitors.

.4 Do not commence placement of concrete until review is complete and proposed products and procedures are accepted by Consultant.

1.6 Qualifications

.1 Use only qualified concrete placers and finishers, with a minimum of two years' experience in similar work.

2.0 PRODUCTS

2.1 Materials

.1 Portland Cement: Type GU to CSA A3000.

.2 Aggregate: Natural stone to CSA A23.1.

.3 Water: Potable and to CSA A23.1.

.4 Air Entraining Agents: To ASTM C260/C260M.

.5 Chemicals Admixtures: To CSA A3000. Calcium chloride is not permitted.

.6 Pozzolanic Mineral Admixtures: To CSA A3000.

.7 Curing Materials: To CSA A23.1.

.8 Blended Hydraulic Cementing Material: Type 10SF to CSA A3000.

.9 Supplementary Cementing Material: To CSA A3000.

.10 Superplasticizing Admixture: To CSA A3000.

2.2 Mix Design Requirements – Concrete Slab-On-Grade (South Stair Repair Ar eas)

.1 Normal weight "ready mixed" Portland cement concrete mixed in accordance with Section 4, Durability Requirements, Class of Exposure C-2 of CSA A23.1, with the following requirements:

	Description	Requirements
.1	Compressive Strength (28 days)	32 MPa minimum
.2	Air Content	5.0% to 8.0%

	Description	Requirements
.3	Aggregate Size	20 mm
.4	Slump	
	- Prior to Superplasticizer	50 mm maximum ± 20 mm
	- After Superplasticizer	125 mm maximum ± 25 mm
.5	Water/Cementing Materials Ratio	0.45 maximum
.6	Cement Content	335 kg/m^3 minimum
.7	Cement – Type GU	Normal Portland Cement
.8	Concrete Density	Normal weight (2,360 kg/m^3)

.2 Non-chloride based plasticizers shall be used to facilitate concrete placement. Costs associated with the use of such materials shall be included in the contract price. Plasticizer shall be compatible with the air entrainment agent.

.3 The use of fly ash shall not be permitted.

.4 Note that although a maximum slump is specified, the Contractor shall endeavour to provide concrete at the minimum slump that permits placement and handling.

.5 Mix design is the responsibility of the Contractor.

.6 Ready mix concrete is to be used unless otherwise approved by Consultant.

.7 No concrete shall be placed later than two hours (120 min) after leaving mixer. No re-tempered concrete shall be allowed.

.8 Addition of water to the concrete mix shall not be permitted on-site. The Contractor shall be permitted to adjust only the quantities of superplasticizer and air entraining agent on-site.

.9 The Contractor shall use superplasticizers to facilitate concrete placement and must demonstrate to the satisfaction of the Consultant that such admixtures will have no deleterious effect on the durability or strength of the proposed concrete mix (i.e. freeze/thaw durability).

2.3 Air Entrainment

.1 Air entraining chemical admixtures shall be according to ASTM C260. Ensure chemical admixtures are compatible with each other and that they will not negatively impact performance of the concrete.

.2 The total fresh air content of air entrained concrete will be tested via the pressure method with an air meter prior to the placement of concrete in accordance with CSA A23.2.

.3 Air content in hardened concrete shall meet the requirements of CSA A23.1 and this specification and, if directed by the Consultant, will be tested and determined in accordance with ASTM C457 as outlined in CSA A23.1.

2.4 Cement Slurry Bonding Agent

.1 Cement slurry grout consisting of a mixture of one part cement to one part fine aggregate and enough water to make a “heavy cream” consistency. Aggregate to conform to CSA A23.1 Clause 4.2.3.

2.5 Evaporation Reducer

.1 Monomolecular film to be applied to the surface of the screeded concrete to combat rapid drying conditions. Application required on silica fume concrete placed in direct sunlight, high winds, heated interiors, and interior or exterior low humidity conditions. Conform to manufacturer’s recommended procedures and application rates.

.2 Approved Product:

	Product Name	Manufacturer
.1	MasterKure ER 50	Master Builders Solutions

3.0 EXECUTION

3.1 Concrete Surface Preparation

.1 All concrete surfaces to receive new concrete shall have a minimum No. 6 CSP per ICRI 310.2R and be thoroughly abrasive-blast prior to concrete placement.

.2 Clean all existing concrete surfaces to receive new concrete of foreign material, dust, debris, grease, and oil as directed by Consultant. Emulsifiers shall be required for surfaces containing grease or oil.

.3 Notify Consultant to review surfaces prior to concrete placement.

3.2 Concrete Placement - Ready-Mixed Concrete

.1 The patch area shall be thoroughly wetted for a minimum of three hours, and longer where required to achieve a saturated surface dry (SSD) state, prior to placing of concrete.

.2 Puddles or free water shall be blown from the patch area and the surface permitted to dry to a saturated surface dry (SSD) state prior to application of cement slurry.

.3 Apply a cement slurry bonding agent to the surface of the concrete just prior to placing new concrete.

.4 The cement slurry bonding agent shall be broomed or scrubbed into the concrete surface within the repair area to fully saturate the surface but not to be allowed to puddle.

.5 Pre-wet fabric, burlap, cotton mats, or pre-approved alternative shall be available on site prior to placement of concrete to allow for immediate placement overtop of new concrete patches after their initial set.

.6 Place new dense concrete thoroughly compacted and vibrated into place to ensure good bond.

.1 Ensure embedded reinforcement is secured in place and is not disturbed during placement.

.2 Vibrators are to be used for consolidation purposes only and are not to be used to an extent that causes segregation of the concrete.

.3 Internal vibrators shall conform to CSA A23.1 Clause 7.2.5.2 and Table 19: Internal Vibrators for Various Applications.

.4 Vibrators shall be inserted into concrete perpendicular to concrete surface.

.5 Vibrators shall be inserted such that zones of consolidation always overlap.

.7 Concrete surfaces to be flush with existing surfaces, free of voids and cracks, and have a uniform surface and transition to the existing surface.

.8 Finish concrete in accordance with CSA A23.1/A23.2. Initial finish shall be completed before any bleeding or free water is present on the surface of the concrete. Final finishing shall commence after the bleed water has disappeared and when the concrete has stiffened sufficiently to prevent the working of excess mortar to the surface. Do not add water to finish.

.9 Do not overwork concrete surface. Wood float finish is acceptable.

.10 Do not use steel trowels with air-entrained concrete. For air-entrained concrete, the surface can be further leveled and consolidated with a magnesium bull float for larger repairs or a magnesium trowel for smaller repairs. One or more passes shall be made at suitable time intervals to obtain a level finish free of float marks. Do not work bleed water on the concrete surface into the concrete during finishing.

.11 If mechanical floats are to be used for final finishing of larger air entrained concrete surfaces, the mechanical floating of the concrete surface shall commence as soon as the concrete surface has reached initial set and will support the weight of a power float machine equipped with magnesium float blades and the operator.

.12 Cure concrete as outlined in this section.

.13 Do not allow traffic on newly placed repair patches until 75% of the specified 28-day strength has been reached.

3.3 Concrete Mixing and Placing

.1 Concrete shall be machine mixed. Mixing and placing shall be in accordance with CSA A23.1.

.2 Concrete shall be conveyed from the mixer to the place of deposit by methods that will ensure the required quality of concrete. Equipment for conveying the concrete shall be of such size and design as shall ensure a practically continuous flow of concrete at the delivery end without separation of materials.

.3 Concrete shall be deposited into patch repairs as near as practicable to its final position to avoid re-handling.

.4 Depositing shall be continuous throughout each division and the concrete shall be placed and worked so that a uniform texture will be produced.

.5 No concrete shall be placed later than one half hour after leaving the mixer. No re-tempered concrete shall be placed.

3.4 Compaction and Vibration

.1 Concrete shall be consolidated by means of sufficient vibrators of adequate size operated by competent workers.

.2 The use of vibrators to transport concrete shall not be allowed.

.3 Concrete shall be thoroughly worked around reinforcement, around embedded items, and into corners.

.4 Compaction and vibration is to eliminate all air and stone pockets that may cause honeycombing, pitting, or planes of weakness.

3.5 Concrete Curing

.1 Incorporate fog-mist curing methods or evaporation retarder in order to prevent loss of moisture from concrete repair surfaces in all rapid drying conditions. In these conditions, fog-mist curing shall be initiated immediately after initial finishing, and continued until concrete is covered with wet-curing mats. Rapid-drying conditions may include any of the following:

.1 High concrete ambient temperatures

.2 Low humidity

.3 High winds

.4 Direct sunlight

.5 Heated interiors during cold weather.

.2 Initiate surface concrete repair wet curing as soon as possible after the concrete has sufficiently set, and no later than 30 minutes after finishing.

.1 Minimum acceptable wet curing method on slab surfaces is installation of pre-saturated filter fabric, burlap, or cotton mats that are covered with soaker hoses and plastic sheeting. Overlap wet-curing mats 150 mm and ballast in place without marring the concrete surface.

.2 Wet curing procedures are to keep the concrete surfaces continuously wet for a period of at least 10 consecutive days at a minimum temperature of 10°C. Do not permit water to evaporate completely from the concrete surfaces at any time within the wet cure period.

.3 Prevent airflow in the space between the wet-curing mats and the plastic sheeting.

.3 Vertical surfaces are also to be wet cured for the duration of the 10-day wet-curing period by either:

.1 Maintaining formwork in place with form ties loosened and water applied to run down the inside form face after the concrete has hardened to keep the repair surfaces wet.

.2 Removing formwork from vertical surfaces and providing fog misting, light water spray, or application of wet burlap covered with polyethylene to keep the repair surfaces continually wet.

.4 Provide the Consultant with proposed fog-curing and wet-curing procedures at least 2 weeks prior to concrete placement. Any revisions to the proposed procedures must be submitted to the Consultant for review a minimum of one week prior to concrete placement.

.5 The use of chemical curing compounds is not permitted.

.6 Protect concrete from the harmful effects of heat, cold, running or surface water, and mechanical shock.

.7 Do not place concrete when air temperature is below 10°C, or without implementing provisions to ensure proper curing of concrete when -- in the opinion of the Consultant -- there is a possibility of air temperature falling below 10°C. These provisions shall be reviewed by the Consultant and conform to the requirements of CSA A23.1.

.8 Maintain concrete material and forms between 15°C and 32°C until concrete placement whenever the surrounding air is below 5°C. No frozen material or material containing ice shall be used. All existing concrete, reinforcement, forms, and ground that the concrete will contact is to be free from frost.

.9 Maintain a curing temperature above 10°C for 10 days or longer to ensure proper concrete curing. Under no circumstances may dry heat be used. Provide means to humidify the air within the heated enclosure and ensure that moisture requirements for curing are maintained.

.10 Do not allow traffic onto patch until material has adequately cured to 75% of its specified 28-day compressive strength.

.11 The Consultant will have cause to not certify payment for repairs undertaken without adequate wet-curing procedures or that become surface dry during the specified curing period.

3.6 Inspection and Testing

.1 To conform to CSA A23.2.

.2 Inspection and testing to be conducted by a testing agency designated by the Owner. The Owner will pay costs of inspection and testing described in this section.

.3 Contractor to inform testing agency 72 hours in advance of concrete placement.

.4 Testing shall include:

.1 Preparation and testing of concrete cylinders for compressive strength.

.2 Establishment of slump and the percentage of entrained air for each concrete truck, unless otherwise directed by Consultant.

.3 Review of concrete mix designs submitted by the Contractor.

.4 Bond testing of concrete repair patches to existing concrete where designated by the Consultant.

.5 Submission of test results to the Owner, Consultant, and Contractor.

.6 A minimum of one set (4 cylinders) of concrete cylinders shall be taken for compressive strength testing of concrete patch material used each day unless otherwise directed by Consultant. Concrete cylinders are to be placed in an area with similar curing conditions to that of the cast concrete.

.5 Testing procedures for concrete shall conform to the following requirements:

.1 Compression tests on concrete shall be carried out in accordance with CSA A23.2 and A23.1 except that a Strength Test shall consist of four test cylinders and one cylinder shall be tested at the age of 3 days, the second cylinder shall be tested at the age of 7 days, and the remaining two at an age of 28 days.

.2 Slump and air entrainment test shall be conducted at the time of sampling concrete for compressive tests and shall be conducted in conformity with CSA A23.2. Slump and air entrainment tests shall be performed on all loads used each day.

.6 The Contractor shall provide at no additional costs to the Owner:

.1 Samples of all material required for testing.

.2 Cooperation with the execution of concrete testing, which shall include protection against injury or loss of cylinders.

.3 Access for the testing agency to test and/ or inspect materials.

.4 Site storage facilities meeting requirements of CSA A23.2 for concrete test specimens prior to removal to laboratory.

.7 Contractor shall pay for costs of additional testing as follows:

.1 Additional standby time required due to late delivery by concrete supplier.

.2 Additional slump and/or air tests if first tests indicate that concrete properties are outside of specified requirements and the Contractor wishes to modify the mix and retest. All modifications are to be approved by the Consultant.

.3 If the Contractor fails to notify the testing agency of pour cancellation.

3.7 Field Quality Control

.1 The Consultant shall evaluate bonding of fresh patch material to existing concrete after the fresh patch material has cured sufficiently.

.2 The evaluation shall be performed by acoustical sounding, using a "chain-drag" or other techniques.

.3 Hollow sounds detected in repair area provide reason to suspect inadequate bonding. Contractor to remove and replace these areas where requested by the Consultant at no additional cost to the Contract.

3.8 Rejection of Defective Work

.1 The Consultant shall have the right to order additional concrete testing of any portion of repairs in accordance with CSA A23.1 if previous testing demonstrates non-conformance with specified requirements. The testing company shall be selected by the Consultant and shall deal directly with the Consultant. Payment for costs associated with the additional concrete testing will be at the Contractor's expense.

.2 Where it is the Consultant's opinion that material or workmanship fails to meet the specified requirements, the work shall be replaced or repaired to the approval of the Consultant at no additional cost to the Owner.

.3 Failure to meet compressive strength requirements based on compression testing of concrete cylinders will result in drilling of additional core samples at the Contractor's expense. Failure of these additional samples will require the work to be replaced or repaired to the approval of the Consultant at no additional cost to the Owner.

3.9 Record Drawings

.1 Maintain accurate records of the location, size, and concrete placement date for each repair area.

.2 Records are to be kept up-to-date and made available to the Consultant for review throughout the duration of the Work.

.3 Prior to Substantial Performance of the Work, provide a plan showing location, size, and date of concrete repairs.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to design, supply, install, maintain, and remove structural shoring and bracing systems as required to support the building structure, landscaping, earthworks, and masonry elements during performance of the Work.

.2 Structural shoring and bracing must be provided as indicated in shoring shop drawings prepared by a specialty Professional Engineer.

.3 Structural shoring and bracing costs are included in the Contract Price.

1.2 Submittals

.1 Provide shoring shop drawings that include a shoring design and layout designed by a specialty Professional Engineer licensed to practice in Ontario a minimum of two weeks prior to starting demolition Work. Specialty Professional Engineer is to be retained by the Contractor at no additional cost to the Owner.

.1 Shoring shop drawings are to include shoring layouts for supporting the building structure, earthworks, landscaping elements, masonry during randomly located masonry repairs, and lateral wall bracing if required.

.2 Shoring layout and shop drawings shall depict arrangement of equipment for shoring, showing installation details, timber cribbing, member types, and spacing of connections.

.3 Shoring layout and shop drawings shall be designed, sealed, and signed by specialty Professional Engineer.

.2 Shoring shop drawings are to be reviewed by the Consultant for the effect on the base structure and accepted prior to installation of shoring.

.3 Shoring shop drawing submission excludes any shoring specifically detailed on the Drawings.

.4 Submit documentation of field inspections and certifications required from specialty Professional Engineer, as specified by this Section, and Contract Documents.

1.3 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3 CSA S269.1 Falsework and Formwork

.4 CSA S269.2 Access Scaffolding for Construction Purposes

.5 CSA S350 Code of Practice for Safety in Demolition of Structures

2.0 PRODUCTS

2.1 Equipment and Materials

.1 Unless otherwise specified by Contract Documents, use only commercially manufactured shoring and bracing systems.

.2 Minimum capacity of commercially manufactured equipment as follows:

.1 Post shores with a minimum capacity of 24 kN at 2.5 m height

.2 Standard scaffold frames with a minimum capacity of 22 kN per leg.

.3 Heavy-duty scaffold frames with a minimum capacity of 44 kN per leg.

.3 Manufactured shoring systems shall consist of pre-engineered steel or aluminium components, designed and produced specifically for structural shoring, and installed in accordance with manufacturer’s recommendations.

.4 Shoring members need not be new materials. Previously used materials are acceptable, provided that they are in good repair, unbent, and undamaged.

.5 Use of “scaffolding” equipment (i.e. where not specifically intended for use as structural shoring of heavy loadings), wood shoring or bracing members, or tube-and-coupler assemblies require preapproval by the Consultant or Specialty Professional Engineer

.1 Use of wood materials shall be limited to wedges and shims, where not supporting vertical loading and where not subject to shrinkage or potential deterioration in wet conditions or long-term application.

.6 Design of shoring members or structural steel members and components that are not of a pre-manufactured system shall be in accordance with provisions of governing Building Code and Standards for specific material of member.

3.0 EXECUTION

3.1 Structural Shoring

.1 Support the building structure, earthworks, landscaping elements, masonry, etc. during the Work. Supply, install, and maintain all shoring and bracing in accordance with approved shop drawings and as necessary to prevent movement, settlement, or damage to the structure, services, and property.

.2 Specialty Professional Engineer who designed shoring systems shall inspect installation and provide written certification that shoring and bracing systems and components, as installed, meets intent of their design and compliance with project criteria.

.3 Provide additional shoring prior to removals where the Consultant or specialty Professional Engineer deems it necessary to prevent movement, settlement, or damage to the structure, services, and property based on identified demolition/ repair locations.

.4 Provide additional shoring and bracing at the Contractor’s expense where it is necessary to support stockpiled rubble and equipment.

.5 Formwork shoring requirements are in addition to structural shoring requirements.

.6 Install and arrange shoring and bracing in a manner that prevents sharp projections that may cause personnel injury.

.7 Modify the position of shoring and bracing elements if requested by the Consultant or specialty Professional Engineer at no additional cost to Owner.

.8 Manage and maintain shoring and bracing systems by regularly inspecting and checking installed shoring and bracing components to ensure that supports, fastenings, wedges, ties, and parts are secure.

.9 Do not strip shores until concrete repair material has reached 75% of design strength, and not sooner than seven days after concrete placement. Further, do not strip shores until it is safe to do so and without risk of movement, settlement, or damage of elements to remain.

3.2 Bracing

.1 Install a lateral bracing system for excavations sufficient to support lateral forces produced by the grade beyond where required and in accordance with the Occupational Health and Safety Act of Ontario.

.2 The lateral bracing drawings are to form part of the required engineered shop drawing submission.

.3 Bracing system is to remain in place until it is safe to remove systems without risk of movement, settlement, or damage of elements to remain.

.4 Contractor is responsible for the management and maintenance of bracing and for removal of all bracing upon completion of contract.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to remove and dispose of sound and unsound concrete from stair surfaces (full depth) where directed by Consultant and as described herein.

2.0 PRODUCTS

2.1 Equipment

.1 Provide hand-held jackhammers for concrete removal that are capable of efficiently removing sound and unsound concrete without causing excessive or unwanted removal.

.2 Maximum jackhammer size is 15 kg. Light chipping hammers are to be used where the Consultant deems it necessary to reduce the amount of concrete breakage. Maximum light chipping hammer size is 7 kg. The use of light chipping hammers is at no additional cost to the Owner.

.3 Equipment located outside shall be mufflered or placed within an acoustic enclosure to produce maximum operating noise levels of 70 dBa at 3.0 m. Noise levels are also to be in accordance with all local and municipal by-laws and regulations.

.4 Use "silenced" compressors.

.5 Compressors and all diesel-powered equipment are to be fitted with a diesel exhaust scrubber.

3.0 EXECUTION

3.1 Full Slab Depth Concrete Removal

.1 Remove concrete in areas that are already spalled or that produce a hollow sound under a hammer test, which indicates the presence of concrete delaminations. The areas shall be initially located by the Contractor and marked on the concrete surface with a durable marking medium that can be removed from the surface if necessary (i.e. removable red-coloured paint, lumber crayon, chalk and protect surface, etc.). The Consultant will then review the markings and mark out the actual area of concrete to be removed.

.2 Use light chipping hammers at patch perimeters to minimize damage to sound concrete.

.3 Upon exposure of visibly corroded or debonded reinforcement, additional concrete removal shall be performed until reinforcement appears to be rust-free for a minimum length of 75 mm and perimeter of designated area is sound or until otherwise directed by the Consultant.

.1 This concrete removal shall not proceed until authorized by Consultant.

.2 Contractor shall not receive payment for concrete removals not authorized by nor considered necessary to Consultant.

.4 Excess or unnecessary concrete removal to be at no extra cost to the Contract.

.5 Outline patch area with a 13-mm deep vertical sawcut at surface of slab as close as possible to limits of concrete already removed. Reduce sawcut depth if necessary to avoid cutting reinforcement to remain. Remove concrete to sawcut taking precautions to avoid damaging sawcut edge. Edges with spalls or chips will be rejected and shall be re-sawcut at Contractor's expense.

.6 Call for review by Consultant to confirm acceptability of patch preparation prior to cleaning of reinforcement. After concrete removal has been complete, a final check adjacent to the areas shall be made by the Contractor to determine any additional spalling or delamination which may have occurred. Contractor shall mark out these areas and notify Consultant to make a review.

.7 Remove additional concrete required to provide adequate development and/or lap for new reinforcing steel required as directed by the Consultant.

3.2 Existing Exposed Electrical Services

.1 The Contractor shall perform temporary removal, replacement, or relocation of existing electrical wiring, conduit, equipment, fixtures, or hardware in designated concrete repair areas as required for completion of the Work.

.2 All exposed conduit, fixtures, attached devices, fire system piping, pull stations, fire extinguishers, mechanical system components, louvers and ducts are to be protected or Contractor to correct damages at their own expense. The Contractor shall promptly report any damage to the Owner and the Consultant.

.3 Prior to commencing the Work, the Contractor shall contact the Owner to locate all protective or alarm systems and sensors. All services shall be protected against damage or interruption. The Contractor shall provide the Owner with minimum 48 hours advance notice of any necessary interruption. All claims resulting from damage shall be the responsibility of the Contractor.

3.3 Existing Embedded Electrical Services

.1 It is the Contractor's responsibility to ensure that all potential areas of embedded, buried, or hidden conduit, cables, systems, services, etc. be identified and that all high voltage systems located in the area of work are switched off to prevent possible injury. Coordinate requirements with Owner.

.2 The Contractor shall take the utmost caution during concrete removal operations in order to prevent damage to embedded, buried, or hidden conduit, cables, systems, services, etc. Any damage caused to such items will be immediately reported to the Owner and Consultant. In no instance will damaged or deteriorated conduit, cables, systems, services, etc. be covered up by the Contractor without specific approval from the Owner.

.3 Contractor to repair or abandon damaged embedded, buried, or hidden conduit, cables, systems, services, etc. at the discretion of the Consultant. Owner to pay for repairs provided that damage did not result from Contractor's negligence.

.4 Contractor to coordinate required repairs with designated Electrical Sub-Contractor. Contractor shall designate Electrical Sub-Contractor for the Work.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to clean and prepare existing reinforcement exposed within concrete and masonry repair areas and where otherwise designated by the Consultant.

.2 Provide all labour, materials, equipment, supervision, and services necessary to supplement corroded or damaged reinforcement with new reinforcing steel and accessories, including supply, fabrication, handling, and placing.

1.2 Reference Standards

.1 All Reference Standards are latest editions referenced by the building code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3 CSA A23.1/CSA A23.2 Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete

.4 CSA G30.18 Carbon Steel Bars for Concrete Reinforcement

.5 ACI Manual of Standard Practice for Detailing – 28th Edition

.6 CSA W186 Welding of Reinforcing Bars in Reinforced Concrete Construction

.7 Reinforcing Steel Institute of Canada (RSIC) Manual of Standard Practice

.8 SP-71 (08) ASTM Standards in 318-08

1.3 Product Handling

.1 Protect reinforcement in a manner that prevents excessive rusting and fouling with dirt, grease, form oil, and other bond-breaking coatings.

.2 Reinforcement shall be free from excessive corrosion, mud, oil or other coatings that adversely affect its bonding capacity at the time concrete is placed.

2.0 PRODUCTS

2.1 New Concrete Reinforcement and Accessories

.1 Refer to Specification Section 03 20 00 – Concrete Reinforcement.

3.0 EXECUTION

3.1 Preparation - Reinforcement in Place

.1 Exposed reinforcement and steel shall be completely cleaned of cement paste, corrosion, oil, and contaminants. Dry abrasive-blast clean to near-white blast, completely cleaned of all grease, oil, dirt, mill scale, cement paste, debonded epoxy, etc. Additional cleaning shall be performed if subsequent corrosion occurs after initial cleaning.

.2 Wire brush, grinding, and similar hand-cleaning methods shall not be permitted in lieu of abrasive-blast cleaning of reinforcement, unless approved by the Consultant.

.3 The Contractor may elect to cut, remove, and replace damaged or corroded reinforcement with new reinforcement in lieu of cleaning existing exposed reinforcement, subject to approval of the Consultant. Provide required tension lap splices with existing cleaned reinforcement at no additional cost to the Owner and Consultant’s approval.

3.2 Installation

.1 Replace or supplement damaged or severely corroded reinforcement exposed in concrete delamination repair patches with new plain reinforcement where existing reinforcing steel has a section loss of 20% or greater.

.2 Replace or supplement damaged or severely corroded reinforcement where otherwise directed by the Consultant.

.3 Replacement or supplemental reinforcing bars shall be the same bar size or greater than the original bar.

.4 Additional concrete removal may be required to allow for placement of supplemental reinforcing bars. The length of the supplemental bars shall be equal to the length of the deteriorated segment of the existing bars, plus the required lap splices at each end. Splicing requirements shall be in accordance with indicated Reference Standards. Supplemental bars shall be placed parallel to, and approximately 20 mm from, the existing bars.

.5 Additional concrete removal required for supplemental reinforcement placement will be paid by Owner except where Contractor elects to replace bars in lieu of abrasive-blast cleaning.

.6 Reinforcement that is fully exposed in repair areas for the entire bar length shall be removed and replaced with new reinforcement of the same bar size or greater at no additional cost to the Owner.

.7 Accurately place supplemental reinforcement and secure existing reinforcement exposed in the delamination repair patches to maintain original design layout.

.8 Reinforcement shall be firmly tied and supported by bar supports and side form spacers to ensure proper concrete cover and spacing within allowable tolerances before and during concrete placement.

.9 Bar supports shall be sufficient in number and strength to carry the reinforcement they support and prevent displacement by workers or equipment before and during concrete placement.

.10 Bars shall be tied at all intersections where spacing is greater than 250 mm in each direction and at alternate intersections where spacing is less than 250 mm in each direction.

.11 Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, and embedded items. If bars are moved more than one bar diameter, or enough to exceed specified tolerances, the resulting arrangement of bars shall be subject to Consultant's approval.

3.3 Welding

.1 Any welding of reinforcing steel shall be in accordance with CSA W186.

.2 Copies of the Canadian Welding Bureau approved welding procedure and certificate of current operator qualification shall be submitted to the Consultant prior to commencement of welding.

3.4 Inspection and Testing

.1 No concrete shall be placed until Consultant has reviewed reinforcing in-place. Provide minimum 72 hours of notice of time when reinforcement will be substantially in place and ready for Consultant's review.

END OF SECTION

1.0 General

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to design, supply, erect, maintain, and strip all formwork and falsework for poured-in-place concrete shown or indicated on the Contract Drawings and Specifications.

1.2 Reference Standards

.1 All Reference Standards are latest editions referenced by the building code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CSA A23.1/CSA A23.2	Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
.4	CSA S269.1	Falsework and Formwork
.5	ACI SP-004	Formwork for Concrete
.6	ACI 347	Recommended Practice for Concrete Formwork
.7	CSA O86	Engineering Design in Wood (Limit States Design)
.8	CSA O121	Douglas Fir Plywood
.9	CSA O153	Poplar Plywood

1.3 Submittals

.1 Submit shop drawings for falsework and formwork that indicate the method, sequence, and schedule of construction shoring, stripping, and re-shoring.

.2 Indicate formwork and falsework design data, including design loads, for Consultant review. Consultant review does not relieve the Contractor of responsibility for formwork and safety during construction.

.3 Shop drawings submittals shall bear the stamp and signature of a qualified Professional Engineer registered or licensed in the Province of Ontario.

1.4 Handling Requirements

.1 Protect formwork materials before, during, and after installation. Protect installed work and materials of other Sections.

.2 In the event of damage, make required repairs or replacements to Consultant's requirements at no additional cost to the Owner.

2.0 PRODUCTS

2.1 Formwork Materials

.1 Form Material:

.1 Exposed Surfaces: Use metal forms, plywood forms, or plywood lined forms of sufficient structural strength. Plywood to be to CSA O121 or CSA O153. Plywood lining to be new GIS exterior grade fir plywood manufactured with waterproof glue.

.2 Unexposed Surfaces: Use metal forms, plywood forms, or wood lumber. Plywood to be to CSA O121 or CSA O153. Wood lumber to be to CSA O86.

.3 Plywood and Wood Formwork Materials: Material to be to CSA S269.1. Material is to be free from warping and sawn straight so that lines and shapes are accurately retained.

.4 Formwork for unexposed surfaces shall be made with a good grade of lumber or plywood and fitted so that there is no leakage of mortar.

.2 Ties and Spreaders:

.1 Form ties shall be adjustable in length to permit tightening of forms. Use only the snap-off type of form tie that will leave no metal within 25 mm of the concrete surface after removal. Twisted wire form ties are not acceptable.

.3 Form Release Agent:

.1 Form release agent shall be a Consultant-approved chemical agent that is not an oil-based product.

3.0 EXECUTION

3.1 Formwork

.1 Lines and Levels

.1 Verify lines and levels before proceeding with work and ensure that dimensions agree with the Drawings.

.2 Coordinate forming and setting of recesses, chases, sleeves, inserts, bolts, etc.

.2 Design

.1 Design, construct, and erect formwork in accordance with CSA A23.1, CSA S269.1, ACI 347R, and all applicable construction safety regulations at the Place of Work.

.2 Build forms sufficiently strong and rigid to sustain the weight or fluid pressure of the concrete without noticeable deflection. Ensure forms are fitted sufficiently tight to prevent mortar leakage.

.3 The Contractor shall be responsible for design and construction of falsework.

.4 Do not exceed the safe live load of the structure, considering the strength and age of the concrete, with any construction or shoring loads.

.5 Provide 20 mm x 20 mm chamfer strips at exposed corners or edges of slabs.

.3 Construction:

.1 Construct forms so that the finished concrete will conform to the shape and dimensions shown on the Drawings.

.2 Construct forms so that they may be dismantled and removed without damaging the concrete.

.3 Set shores on wedges or use adjustable shores so they may be removed without causing undue strains in the concrete.

.4 Provide temporary openings at the bottom of wall forms to facilitate cleaning and review. Use water to flush out cuttings, shavings, debris, snow and ice, and foreign matter. Ensure that water and debris fully drain to the exterior through clean-out ports, and close the openings with a patch, flush on the inside.

.5 Notify the Consultant when formwork is completed and cleaned to allow for review.

.4 Treatment of Forms:

.1 Install form release agent on form surfaces and allow to dry before placing reinforcing steel, anchoring devices, and embedded parts.

.2 Keep untreated forms wetted down to prevent shrinkage before placing concrete and wet surfaces without allowing ponding at time of placing concrete.

.5 Alignment:

.1 Provide suitable means for checking the alignment and elevation of formwork and check frequently during concrete placement.

.2 Carry out corrective wedging as required until concrete is in place.

.3 Remove concrete that becomes misaligned during placing to satisfaction of Consultant.

.4 Align forms to ensure movement and deflections of the finished product are confined.

.5 Tolerances for all concrete work shall conform to the requirements of CSA A23.1 and ACI 347.

.6 Make allowances for settlement of forms, closure of form joints, and elastic shortening of forms.

.6 Stripping:

.1 Do not remove shoring or strip formwork until the concrete has gained sufficient strength to carry dead loads and construction loads that are likely to be imposed. Notify the Consultant before removing formwork.

.2 Remove falsework progressively in accordance with CSA S269.1. Ensure that no shock loads or unbalanced loads are imposed upon the structure during removal.

.3 Loosen forms carefully using a method that prevents spalling and damage to the concrete surface and edges. Do not use wedge pry bars, hammers, or other tools against exposed concrete surfaces.

.4 Leave forms loosely in place for protection until curing requirements are complete.

.5 Completely remove forms from within void spaces. Provide temporary openings, if necessary.

.6 Remove metal spreader ties on exposed concrete by removing or snapping off inside the wall surface. Point up and patch the resulting pockets flush to surrounding areas.

.7 Re-Use of Formwork:

.1 Forms may be re-used after adequate cleaning if the surfaces are not cracked or roughened. The formwork shall be trimmed and properly patched to provide a smooth surface.

3.2 Inserts and Embedded Items

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

.2 Accurately locate and set in place items that are to be cast directly into concrete slabs and walls. Coordinate forming and setting of ties, anchor bolts, accessories, inserts, recesses, openings, sleeves, etc., as required by work of other Sections.

.3 No sleeves, ducts, pipes, or other openings shall pass through concrete elements unless detailed on the Drawings or otherwise approved by the Consultant.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to supply and install new reinforcing steel as shown or indicated in all the Contract Drawings and Specifications, including accessories such as hanger bars, spirals, wire ties, support bars, chairs, spacers, supports, or other devices required to position reinforcing properly.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not reference by Code.

.2 Ontario Building Code

.3	CSA A23.1/CSA A23.2	Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
.4	CSA A23.3	Design of Concrete Structures
.5	CSA G30.5	Welded Steel Wire Fabric for Concrete Reinforcement *(Withdrawn)*
.6	CSA G30.18	Carbon Steel Bars for Concrete Reinforcement

.7 American Concrete Institute (ACI) Manual of Standard Practice for Detailing Reinforced Concrete Structures

.8 Reinforcing Steel Institute of Canada (RSIC) Manual of Standard Practice

.9	SP-71	ASTM Standards in 318-08
.10	CSA W186	Welding of Reinforcing Bars in Reinforced Concrete Construction

1.3 Submittals

.1 Mill Tests:

.1 Upon request, provide the Consultant with a certified copy of mill tests of steel supplied, showing physical and chemical analysis, minimum two weeks prior to commencing reinforcing work.

.2 Shop Drawings:

.1 Prepare shop drawings for concrete reinforcement, bar support and accessories in accordance with RSIC Manual of Standard Practice.

.2 If requested by the Consultant, submit shop drawings in accordance with the General Requirements.

.3 Shop drawings shall clearly indicate bar sizes, grades, spacing, location, bending details, quantities of reinforcing mesh, bar supports, mechanical splices, accessories, and identifying code marks to permit correct placement without reference to structural drawings.

.4 Placing drawings and bar lists will be reviewed for number and size of bars only. The Consultant's review of reinforcing shall be a visual inspection of in-situ work as required to determine general conformity to the engineering drawings. The Consultant’s review shall in no way relieve the Contractor of their responsibility for carrying out the Work in accordance with the drawings.

.5 Substitution of imperial reinforcing sizes and grades will only be accepted if drawings showing imperial sizes are submitted to the Consultant for review. Approval must be obtained before any work is commenced.

1.4 Product Delivery, Storage, and Handling

.1 Store and protect reinforcement in a manner to prevent excessive rusting and fouling with dirt, grease, form-oil, and other bond-breaking coatings.

.2 Reinforcement at the time concrete is placed shall be free from excessive rusting, mud, oil, or other coatings that adversely affect its bonding capacity.

2.0 PRODUCTS

2.1 Materials

.1 Reinforcing steel bars shall conform to CSA G30.18 (grade 400 MPa) unless otherwise specified herein or on the drawings. Plain finish.

.2 Reinforcing bars to be welded shall conform to CSA G30.18.

.3 Welded wire fabric shall conform to CSA G30.5. Sizes and gauges as shown on the Drawings.

.4 Bar supports shall conform to ACI 316 unless otherwise approved by the Consultant.

.5 Chairs, bolsters, bar supports, and spacers shall be epoxy coated or plastic. The use of pebbles, pieces of broken stone or brick, pipe, or wooden blocks will not be permitted.

.6 Tie wire for coated reinforcing shall be plastic-coated.

.7 Mechanical splices are not permitted.

2.2 Fabrication

.1 Fabricate reinforcing to CSA A23.1 and reviewed shop drawings.

.2 Fabricate reinforcing steel within the following tolerances:

.1	Sheared length plus or minus	25 mm
.2	Depth of truss bar plus or minus	10 mm
.3	Outside dimension of stirrups, ties and spirals, plus or minus	10 mm
.4	Other bends plus or minus	25 mm

.3 Colour-code each bar to correspond with code mark appearing on bar list.

.4 Ship bundles of bar reinforcement clearly identified in accordance with bar lists.

.5 Bars shall not be field bent, straightened, or re-bent, except where indicated or authorized by the Consultant. When field bending is authorized, bend without heat, applying slow and steady pressure. Replace bars that develop cracks or splits.

.6 Splicing of reinforcing bars, unless indicated on the drawings, is prohibited except with the written approval of the Consultant. Such splices shall conform to the splice length for that class of splice according to CSA A23.3. Splices, where possible, shall be staggered.

3.0 EXECUTION

3.1 Installation

.1 Reinforcement shall be accurately placed in the positions shown on the drawings, firmly tied, and supported by bar supports and side form spacers to assure proper concrete cover and spacing within allowable tolerances before and during placing of concrete.

.2 Bar supports shall be sufficient in number and strength to carry the reinforcement they support and prevent displacement by workers or equipment before and during concreting. Bars shall be tied at all intersections, except where spacing is less than 250 mm in each direction, when alternate intersections shall be tied.

.3 Bars shall be placed to the following tolerances unless noted otherwise.

.1 Clear concrete protection of reinforcement 5 mm ±.

.2 Where the depth of a flexural member or thickness of a wall is:

.1 200 mm or less 5 mm ±.

.2 larger than 200 mm but less than 600 mm 10 mm ±.

.3 600 mm or larger 20 mm ±.

Lateral spacing of these bars shall be within 30 mm ± of the specified spacing.

.3 For longitudinal location of bends and ends of bars 50 mm ±.

.4 As Item 3 at discontinuous ends of members 20 mm ±.

.5 Specified spacing between bars 10 mm ±.

.4 Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits or embedded items. If bars are moved more than one bar diameter or enough to exceed the specified tolerances, the resulting arrangement of bars shall be subject to approval of the Consultant.

3.2 Welding

.1 Any welding of reinforcing steel shall be in accordance with CSA W186.

.2 Copies of the Canadian Welding Bureau approved welding procedure and certificate of current operator qualification shall be submitted to the Consultant prior to commencement of welding.

3.3 Inspection and Testing

.1 No concrete shall be placed until the Consultant has completed their review of reinforcing in place. The Contractor shall provide a minimum of 72 hours notice of the time when the reinforcement will be substantially in place and ready for the Consultant’s review.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to prepare substrate surfaces and place new concrete material as indicated on the Drawings and as outlined in this Section, including:

.1 Production, mixing, handling, testing, transporting, placement, and curing of cast-in-place concrete material.

.2 Requirements for construction joints and slabs-on-grade.

.3 Fabricated components, anchor bolts, plates, and other inserts to be built into concrete.

.4 Incorporation of low-permeability silica-fume-enhanced concrete in ramp and landing structure.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CSA A23.1/CSA A23.2	Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
.4	CSA A23.3	Design of Concrete Structures
.5	CSA A3000	Cementitious Materials Compendium
.6	ASTM C1202	Standard Test Method for Electrical Indication of Concrete’s Ability to Resist Chloride Ion Penetration
.7	ASTM C260/C260M	Standard Specification for Air-Entraining Admixtures for Concrete
.8	ICRI 310.2R	Selecting and Specifying Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete RepairACI 305R Guide to Hot Weather Concreting

1.3 Work Installed but Furnished by Others

.1 Anchor bolts and other inserts for casting into concrete shall be supplied by applicable trades. Build in and/ or set these items and assume full responsibility for correct positioning.

1.4 Submittals

.1 Concrete Mix Design:

.1 The Contractor shall be responsible for mix designs per CSA A23.1 Table 11, Alternate 1. The minimum requirements are indicated within this Specification Section.

.2 Submit proposed mix designs to the Consultant a minimum of two weeks prior to placement for review. Do not proceed with concrete placement until the Consultant's review is complete and the mix design is in conformance with specified requirements.

.3 Concrete mix designs shall note concrete constituents by weight, the specified properties to be achieved, and the structural elements for which the mix is to be used.

.4 Provide concrete to meet the minimum structural design requirements and the minimum durability requirements defined in CSA A23.1 or indicated on the Drawings. The most severe exposure requirement governs between the indicated design requirements and those outlined in CSA A23.1.

.2 Concrete Test Results:

.1 Testing Agency to provide copies of test results directly to the Consultant, Owner, and Contractor.

.3 Transit Mix Delivery Slips and Placing Records:

.1 Maintain a record of the time and place of each concrete pour with the transit mix delivery slip that certifies the pour contents. Make the record available for viewing by the Consultant and Owner on request. Provide electronic copies of the record to the Consultant upon completion of the concrete placement work.

.4 Curing Procedures:

.1 Submit proposed methods and details of concrete curing and provisions for weather protection to the Consultant for review.

.5 Construction Joints:

.1 Submit planned locations and details of construction joints to the Consultant for review.

.6 Mix Design and Testing Requirements for Low-Permeability, Silica-Fume-Enhanced Concrete:

.1 Low permeability concrete shall meet the requirements of CSA S413. It shall have a Coulomb rating not exceeding 1500 after 56 days, based on three specimens tested in accordance with ASTM C1202 and CSA S413.

.2 Submit samples of proposed low-permeability concrete mixes for 28-day and 56-day permeability testing to confirm samples meet low-permeability requirements. The qualification of low-permeability concrete shall be established prior to construction.

.3 The Contractor shall be responsible to ensure that sufficient time is provided in the project schedule for testing and qualification of the low-permeability concrete mix.

.4 Samples will also be tested to ensure adequacy of slump, air content, and 28-day compressive strength.

.5 Submit mix designs for qualified concrete mixes with the 28-day and 56-day permeability testing results for Consultant's review a minimum of two weeks prior to placement.

.6 The constituents and proportions of the qualified concrete mix shall not be changed without the Consultant's approval.

2.0 PRODUCTS

2.1 General

.1 Cast-in-place concrete shall meet or exceed the minimum requirements outlined in the Reference Standards and the Contract Documents.

2.2 Materials

.1 Materials shall conform to the following requirements:

.1 Portland Cement: To CSA A3000.

.2 Aggregate: Natural stone to CSA A23.1.

.3 Water: Potable and to CSA A23.1.

.4 Blended Hydraulic Cementing Material: Type 10SF to CSA A3000.

.5 Air Entraining Agents: To CSA A3000.

.6 Chemical Admixtures: To CSA A3000. Calcium chloride is not permitted.

.7 Pozzolanic Mineral Admixtures: To CSA A3000.

.8 Silica Fume: To CSA A3000, Type U, with a minimum silicon dioxide content of 85%, a maximum silicon trioxide content of 1%, and a maximum ignition loss of 6%.

.9 Superplasticizing Admixtures: To CSA A3000.

.2 All concrete shall be normal weight except where specifically noted otherwise on the Contract Documents.

.3 Grout shall be non-expanding and non-shrink type with a minimum strength of 35 MPa at 28 days.

.4 Chemical curing compounds are not permitted.

2.3 Mix Proportion

.1 Concrete shall be homogeneous for all parts of the Work and, when hardened, shall have the required strength, resistance to deterioration, durability, abrasion resistance, water-tightness, appearance, and other specified properties.

.2 The supplier shall proportion concrete mixes to meet the cement type, compressive strength, class of exposure, maximum aggregate size, slump, air content, and admixture requirements specified herein.

.3 Proportioning mixing and delivery to the site shall meet the requirements of CSA A23.1.

.4 Add dispersing agent to concrete according to manufacturer’s recommendations.

.5 Do not add calcium chloride to concrete.

.6 Specified concrete requirements may require the use of superplasticizers, set retardants, or silica fume. Include for costs associated with the use of these materials in the contract price.

.7 Pump mix slump requirements shall also conform to the above and specified requirements, and the slump shall be tested prior to the addition of superplasticizers.

2.4 Footing, Foundation Wall, Stair, and Landing Concrete Mix: Silica Fume

.1 Normal weight "ready mixed" Portland cement/silica fume modified concrete mixed in accordance with CSA A23.1 class of exposure C-1 with the following requirements:

	Description	Requirements
.1	Compressive Strength (28 days)	35 MPa minimum
.2	Air Content	6.0% to 9.0%
.3	Aggregate Size	13 mm
.4	Slump	
	- Prior to Superplasticizer	50 mm maximum ± 20 mm
	- After Superplasticizer	125 mm maximum ± 25 mm
.5	Water/Cementing Materials Ratio	0.40 maximum
.6	Cement Content	335 kg/m^3 minimum
.7	Cement – Type GU	Normal Portland Cement
.8	Silica Fume – Type U	Minimum 7.5% Silica Fume by mass of cement (25 kg/m^3)
.9	Fly Ash – Type F or Type CI	Maximum 15% by mass of cement (45 kg/m^3) for Type F and 10% by mass of cement (30 kg/m^3) for Type C
.10	Concrete Density	Normal weight (2,360 kg/m^3)

.2 The intent of this mix design is to provide a low permeability, high electrical resistivity concrete mix with a coulomb rating less than 1500 when 28-day samples are tested using rapid chloride permeability testing.

.3 Non-chloride based plasticizers shall be used to facilitate concrete placement as required. Costs associated with the use of such materials shall be included in the contract price. Plasticizer shall be compatible with the air entrainment agent.

.4 Note that although a maximum slump is specified, the Contractor shall endeavour to provide concrete at the minimum slump that permits placement and handling.

.5 Mix design is the responsibility of the Contractor.

.6 Do not add calcium chloride to concrete.

.7 Addition of water to the concrete mix shall not be permitted on-site. The Contractor shall be permitted to adjust only the quantities of superplasticizer and air entraining agent on-site.

.8 No concrete shall be placed later than two hours after the time of batching. No re-tempered concrete shall be allowed.

.9 The Contractor shall use superplasticizers to facilitate concrete placement and must demonstrate to the satisfaction of the Consultant that such admixtures will have no deleterious effect on the durability or strength of the proposed concrete mix (i.e. freeze/thaw durability).

2.5 Sidewalk (Landscaping) and Curb Concrete Mix:

.1 Normal weight “ready mixed” Portland cement concrete mixed in accordance with Section 4, Durability Requirements, Class of Exposure C-2 of CSA A23.1, with the following requirements:

	Description	Requirements
.1	Compressive Strength (28 days)	32 MPa minimum
.2	Air Content	5.0% to 8.0%
.3	Aggregate Size	20 mm
.4	Slump	
	- Prior to Superplasticizer	50 mm maximum ± 20 mm
	- After Superplasticizer	125 mm maximum ± 25 mm
.5	Water/Cementing Materials Ratio	0.45 maximum
.6	Cement Content	335 kg/m^3 minimum
.7	Cement – Type GU	Normal Portland Cement
.8	Concrete Density	Normal weight (2,360 kg/m^3)

.2 Should the Contractor wish to employ superplasticizers to facilitate concrete placement, the Contractor must demonstrate to the satisfaction of the Consultant that such admixtures are non-chloride based and will have no deleterious effect on the durability or strength of the proposed concrete mix (i.e. freeze-thaw durability).

.3 Refer to Article 2.4 for additional requirements.

2.6 Air Entrainment

.1 Air entraining chemical admixtures shall be according to ASTM C260. Ensure chemical admixtures are compatible with each other and that they will not negatively impact performance of the concrete.

.2 The total fresh air content of air entrained concrete will be tested via the pressure method with an air meter prior to the placement of concrete in accordance with CSA A23.2.

.3 Air content in hardened concrete shall meet the requirements of CSA A23.1 and this specification and, if directed by the Consultant, will be tested and determined in accordance with ASTM C457 as outlined in CSA A23.1.

2.7 Cement Slurry Bonding Agent

.1 Cement slurry grout consisting of a mixture of one part cement to one part fine aggregate and enough water to make a “heavy cream” consistency. Aggregate to conform to CSA A23.1 Clause 4.2.3.

2.8 Evaporation Reducer

.1 Monomolecular film to be applied to the surface of the screeded concrete to combat rapid drying conditions. Application required on silica fume concrete placed in direct sunlight, high winds, heated interiors, and interior or exterior low humidity conditions. Conform to manufacturer’s recommended procedures and application rates.

.2 Approved Product:

	Product Name	Manufacturer
.1	MasterKure ER 50	Master Builders Solutions

2.9 Accessories

.1 Stair tread/ riser nosing:

.1 Non-slip silicon carbide material in anodized aluminum. Minimum 2-inch width. Approved products:

.1 Ecoglo S2-N30 Cast in Place Sair Nosing by Kinesik Engineered Products Inc. Black colour.

.2 Tonal contrast strip:

.1 Non-slip silicon carbide material in anodized aluminum. Minimum 2-inch width. Approved products:

.1 Ecoglo N20 Series Non Slip Strip by Kinesik Engineered Products Inc. Black colour.

.3 Tactile warning surfaces:

.1 To AASHTO M 333-16 (2020). Cast iron. Minimum 920mm width, length to match that indicated on the Drawings. Approved products:

.1 Advantage Cast Iron Tactile Walking Surface Indicator by Kinesik Engineered Products Inc. Onyx Black colour.

.4 Asphalt-impregnated fibre board:

.1 Compressible bitumen-impregnated joint filler to ASTM D994. 12.7mm (0.5 inches) thick, height to match thickness of slab-on-grade.

3.0 EXECUTION

3.1 General

.1 All phases of concrete work shall be in accordance with the standards unless otherwise specified herein or on the Drawings.

.2 Work shall be undertaken by workers who are skilled and experienced in their trade.

.3 Notify the Consultant at least 72 hours before concrete placement. No work is to proceed without such notification unless otherwise indicated by the Consultant in order to allow for proper coordination and review of the Work.

3.2 Mixing and Placing

.1 Concrete shall be machine mixed. Mixing and placing shall be in accordance with CSA A23.1.

.2 Pre-wet formwork and substrate surfaces prior to concrete placement. Ponding and standing water shall be removed from the formwork and substrate surfaces prior to concrete placement.

.3 Cement slurry used to prime a concrete pump shall be discarded and not placed into the structure. Dispose of cement slurry off site.

.4 Convey concrete from the mixer to the place of deposit by methods that ensure the required concrete quality. Equipment for conveying concrete shall be of adequate size and design to ensure a practically continuous flow of concrete at the delivery end without separation of material.

.5 Deposit concrete in the forms as nearly as practicable to its final position to avoid re-handling. Do not allow vertical free fall of materials to exceed 3 m utilizing special precautions that are approved by the Consultant.

.6 Continuously deposit concrete throughout each division and place and work the concrete to produce a uniform texture.

.7 Depositing shall be continuous until complete within each unit of operation approved by the Consultant, and shall be sufficiently rapid to ensure bonding of successive layers.

.8 No concrete shall be placed later than 30 minutes after leaving the mixer. Re-tempered concrete is not permitted.

.9 The time between batching and complete discharge shall not exceed 120 minutes.

3.3 Compaction

.1 All concrete shall be thoroughly consolidated by internal vibration during, and immediately after, depositing. Concrete shall be consolidated using sufficient vibrators of adequate size that are operated by competent workers who have been instructed in their use.

.2 The use of vibrators to move concrete horizontally shall not be permitted.

.3 Concrete shall be thoroughly worked around reinforcement, around embedded items, and into corners of forms eliminating all air or stone pockets that may cause honeycombing, pitting, or planes of weakness.

3.4 Curing (Non-Silica Fume Concrete)

.1 Concrete shall be kept continuously moist for a minimum period of seven days after depositing and initial set per CSA A23.1. Protect concrete against harmful effects of sunshine, drying winds, cold, running, or surface water, and mechanical shock. Curing compounds are not permitted unless otherwise agreed upon, in writing, by the Consultant.

.2 No concrete shall be placed when the air temperature is below 5°C or when -- in the opinion of the Consultant -- there is a possibility of it falling below 5°C, until the Consultant has reviewed provisions made to ensure proper curing. These provisions are to conform to CSA A23.1.

.3 Provide adequate equipment to protect concrete and concrete materials from freezing and near-freezing temperatures. Do not use frozen material or material containing ice.

.4 All concrete material and all reinforcement, forms, existing concrete, and ground that is to contact new concrete material shall be free from frost.

.5 All concrete material placed when the surrounding air is below 5°C shall have a temperature between 15°C and 32°C, and adequate means shall be provided to maintain a minimum material temperature of 21°C for 3 days or 10°C for 5 days unless high early strength concrete is used. In the case of high early strength concrete, the minimum temperature shall be 32°C for 2 days or 10°C for 3 days, unless longer curing periods are required to ensure proper curing of the concrete.

.6 Do not use dry heat to maintain adequate curing temperatures under any circumstances. Humidify the air within the enclosure to ensure that moisture requirements for curing are maintained.

.7 Do not use calcium chloride or other chemicals added to the concrete mix during placing to prevent freezing.

.8 Provide protective coverings on slab surfaces in extreme weather conditions – i.e. hot, windy, or freezing -- to prevent excessive evaporation or freezing.

3.5 Curing (Silica Fume Concrete)

.1 Incorporate fog-mist curing methods in all rapid-drying conditions to prevent loss of moisture from placed concrete surfaces. Rapid-drying conditions may include high concrete ambient temperatures, low humidity, high winds, direct sunlight, and heated interiors during cold weather. Fog-mist curing shall be initiated immediately in these conditions after initial finishing, and is to be continued until concrete is covered with wet-curing mats as outlined in the clause below.

.2 Incorporate wet curing on the concrete surfaces with pre-saturated mats as soon as possible after the concrete has sufficiently set and no later than 30 minutes after finishing.

.1 Wet curing procedures shall ensure the concrete surfaces are kept continuously wet for a minimum period of seven consecutive days at a minimum temperature of 10°C. No part of the concrete surface is permitted to dry any time within the wet cure period.

.2 Wet curing is to include, as a minimum, installation of pre-saturated filter fabric, burlap, or cotton mats that are covered with plastic sheeting. Provide soaker hoses where necessary to ensure the installation is kept continuously wet. Overlap wet-curing mats 150 mm and secure with ballast without marring the concrete surface.

.3 Prevent airflow between wet-curing mats and the plastic sheeting. Prevent freezing of the wet-curing assembly during cold weather.

.3 Review fog-curing and wet-curing requirements with the Consultant prior to new concrete placement. The Contractor must submit any proposed alternate curing methods to the Consultant for review a minimum of one week prior to concrete placement.

.4 Use of chemical curing compounds shall not be permitted.

.5 Concrete shall be protected from harmful effects of heat, cold, running or surface water, and mechanical shock.

.6 No concrete shall be placed when the air temperature is below 10°C or when -- in the opinion of the Consultant -- there is a possibility of its falling below 10°C, until the Consultant has reviewed provisions made to ensure proper curing. These provisions are to conform to CSA A23.1.

.7 Provide adequate equipment to protect concrete and concrete materials from freezing or near freezing temperatures. Do not use frozen material or material containing ice.

.8 All concrete material and all reinforcement, forms, existing concrete, and ground that is to contact new concrete material shall be free from frost.

.9 All concrete material placed when the surrounding air is below 5°C shall have a temperature between 15°C and 32°C, and adequate means shall be provided to maintain a minimum material temperature of 10°C for 10 days, unless longer curing periods are required to ensure proper curing of the concrete.

.10 Do not use dry heat to maintain adequate curing temperatures under any circumstances. Humidify the air within the enclosure to ensure that moisture requirements for curing are maintained.

.11 Make provisions to ensure proper protection of the concrete during mix production, delivery, field placement, and curing when the air temperature is above 27°C or when – in the opinion of the Consultant -- there is a possibility of it rising above 27°C during placing. Provisions shall conform to the requirements of CSA A23.1 and ACI 305R.

.1 The temperature of the placed concrete shall be as low as practicable. All practical means shall be employed by the Contractor for cooling aggregates, chilling batch water, and cooling concrete mix with ice or liquid nitrogen. Under extreme hot weather conditions, the Contractor shall schedule concrete placements at times other than daytime hours as necessary to protect the concrete during mix production, delivery, field placement, and curing.

3.6 Loading

.1 Do not permit undue loading on new structure by Contractor operations, materials, or equipment. Distribute loads to the approval of the Consultant.

3.7 Inserts and Embedded Items

.1 Provide all trades with sufficient advance notification of concrete placement to ensure provisions are made for openings, inserts, anchors and fasteners. Cooperate with all trades in the forming and setting of all bolts, dowels, inserts, etc. Ensure that all of these inserts are secure and not displaced during concrete placement.

.2 Provide all necessary chases, grooves, and reglets that are required for work of other trades. Set all bolts as shown or as required for mechanical equipment.

.3 Use plastic or galvanized metal junction boxes, fixture boxes, and other services cast in the concrete. Place electrical conduit in the centre of the slab after reinforcement placement.

.4 Embedded metal shall be fusion-bonded epoxy coated.

3.8 Construction Joints

.1 Submit the proposed location and detailing of construction joints not indicated on the Drawings to the Consultant for review.

.2 Construction joints shall be designed and located in a manner that minimizes impacts on the strength and appearance of the structure. Reinforcement shall continue through construction joints unless otherwise noted.

.3 Bearing strength shall be provided at the joint using mortises or keys formed in the concrete, by inclined reinforcement, or by other means satisfactory to the Consultant.

.4 If required, locate construction joints in walls at the level of floor members such that joints are not exposed. Allow at least two hours to elapse after depositing concrete in columns or walls before depositing concrete in the floor system.

.5 If required, locate construction joints in floor and landing systems at corners or turns. Make a provision for shear by using inclined reinforcement and keys, or as otherwise directed by the Consultant.

.6 Thoroughly wet the existing concrete surface at construction joints prior to placement of new concrete.

.7 Take special care in compacting new concrete at construction joints to avoid damage to joint detailing.

3.9 Tolerances

.1 Float and trowel the concrete surfaces to produce a smooth surface that does not vary more than 3 mm under a 3 m long straightedge.

3.10 Finishing

.1 Finishing shall conform to CSA A23.1 as a minimum. Take care during finishing to maintain any cambers specified on the Drawings.

.2 Finish surfaces as follows:

.1 Slabs to receive penetrating sealer: Swirl trowel non-slip surface.

.2 Curbs, sidewalks, ramps and other pedestrian areas: Light broom finish perpendicular to the direction of travel, non-slip surface.

.3 All other surfaces: Steel trowel, unless noted otherwise.

.3 Finished surfaces shall have gaps of 8 mm or less under a 3 m straight edge, unless noted otherwise. Only a single curvature is allowed within the 3 m distance.

.4 All formed surfaces shall be treated in accordance with CSA A23.1 as a minimum.

3.11 Openings Through Structural Work

.1 Inform the Consultant if any openings are required through completed parts of the structural work. No openings -- including cored sleeves -- shall be made through completed structural work without written authorization from the Consultant.

3.12 Patching and Cutting

.1 Patch defects that have occurred as a result of poorly consolidated concrete that the Consultant deems are of a minor nature – such as honeycombing, exposed reinforcement, deviations in formwork, and other defects – using materials and procedures approved by the Consultant. Remove defective areas to sound concrete and fill with an approved pre-manufactured repair material.

.2 Remove or cut back all bolts, ties, nails, or other metal not specifically required for construction purposes immediately after the removal of forms. Remove or cut back the items to a minimum depth of 25 mm from the surface of the concrete and patch with cement mortar. Mortar shall not be more than one hour old and is to be cured as outlined in Curing clauses above.

.3 Grind off or otherwise remove fins, ridges, and other imperfections from exposed concrete surfaces immediately after removal of forms. Remove segregated concrete aggregate to sound material. Repair these areas as directed by the Consultant.

.4 Obtain approval from the Consultant prior to drilling or coring holes through in-place concrete. Take precautions to ensure that no reinforcement is damaged.

3.13 Rejection of Defective Work

.1 Test portions of the structure where concrete tests do not conform to the requirements of the Contract Documents, or where conditions cause doubt about the safety of the structure in accordance with CSA A23.1 and CSA A23.2. Such tests shall be made at the expense of the Contractor and to the satisfaction of the Consultant.

.2 Replace or repair work where the Consultant deems that the material or workmanship fails to meet the requirements of the Contract Documents. This work shall be repaired to the approval of the Consultant at no additional cost to the Owner.

3.14 Testing

.1 Concrete testing is to be undertaken per CSA A23.1 unless noted otherwise. Testing methods shall conform to CSA A23.2.

.2 Testing agency will be selected and paid for by the Owner. The Contractor shall arrange and schedule all required testing with the testing agency.

.3 The Contractor shall notify the Consultant at least 72 hours in advance of concrete placement to allow the Consultant to review the Work.

.4 Contractor shall provide casual labour to obtain and handle sample materials for the testing agency field personnel. Provide suitable access to the Work for obtaining samples.

.5 Provide and maintain facilities for storage of concrete test cylinders for the first 24 hours after sampling.

.6 Take one concrete slump test and one concrete air entrainment test every truck. Cast three concrete cylinders for compressive strength testing each day of concrete pouring – test one moist-cured cylinder in 7 days and two in 28 days.

.7 Forward concrete test results to the Consultant, Owner, and Contractor. Include the following information:

.1 Project name

.2 Sampling date

.3 Supplier

.4 Delivery truck identification number

.5 Sampling and testing technician names

.6 Precise installation location of the sampled concrete batch

.7 Air and concrete temperatures

.8 Concrete design strength

.9 Admixtures

.10 Cement type

.11 Maximum aggregate size

.8 Testing agency personnel are not authorized to revoke, relax, enlarge, or release any requirements of the Specifications, nor to approve or disprove any portion of the Work.

.9 The Contractor shall pay the cost of additional testing required to demonstrate the adequacy of any concrete shown to not meet strength requirements during initial testing.

.10 The Contractor shall pay the cost of additional testing required to demonstrate the adequacy of any concrete member or patch placed before formwork and reinforcement have been reviewed by the Consultant.

END OF SECTION

1.0 GENERAL

1.1 Section Includes

.1 Visually review for deteriorated masonry. Testing/verification of masonry joint condition. Raking identified unsound joints.

.2 Preparation of masonry surfaces, including joint surface cleaning, flushing of voids and open joints, and masonry wetting.

.3 Repointing of identified masonry joints.

.4 Removal of loose portions on stone surface.

.5 Resetting of dislodged masonry units. Ensuring cure of mortar.

.6 Provide all labour, materials, equipment, and supervision necessary to install historic mortar as outlined in this Section as indicated on the drawings.

1.2 Measurement and Payment

.1 Work of this Section will be measured by Consultant and paid as follows:

.1 Pointing: Per sq. ft. of surface area of masonry, unless noted otherwise.

.2 Repair work: On a unit basis of elements repaired or replaced unless noted otherwise.

1.3 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CSA A23.1/A23.2	Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete
.4	CSA A371	Masonry Construction for Buildings
.5	CSA A179	Mortar and Grout for Unit Masonry
.6	CSA A370	Connectors for Masonry

.7	CSA A82	Fired Masonry Brick Made from Clay or Shale
.8	ASTM C144	Standard Specification for Aggregate for Masonry Mortar
.9	ASTM C207	Standard Specification for Hydrated Lime for Masonry Purposes
.10	ASTM C270	Standard Specification for Mortar for Unit Masonry
.11	ASTM C780	Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
.12	ASTM C1072	Standard Test Method for Measurement of Masonry Flexural Bond Strength
.13	CSA A3000	Cementitious Materials Compendium

.14 NPS Preservation Brief #2 – Repointing Mortar Joints in Historic Buildings.

.15 Standards and Guidelines for the Conservation of Historic Places in Canada.

1.4 Submittals

.1 Submit labelled samples of materials used on project for approval before work commences.

.2 Submit mortar design mix, product literature, and required ambient conditions.

.3 Submit two (2) samples of each type and colour of mortar to be used. Each sample shall be installed on the masonry to be used in the Work. Samples to be sufficient size and quantity to allow review of colour range.

.4 Submit mortar properties including:

.1 Mix proportions

.2 Compressive strength of mortar

.3 Mortar type

1.5 Installer Qualifications

.1 Work of this Section shall be performed by a single masonry trade contractor with:

.1 a minimum of ten (10) years experience in historic masonry work, and

.2 a good level of understanding of structural behaviour of masonry walls.

.2 Masons shall be journeymen and have:

.1 An Interprovincial Trade Certificate with ten (10) years minimum experience in historic stone and brick masonry work, and

.2 proof of licence or certification for propriety restoration mortars.

.3 Obtain written approval from Consultant prior to changes of qualified personnel.

.4 One thoroughly experienced, reliable and competent workman shall be in charge of all mortar mixing for the duration of the job.

.5 Execute all work of this Section under the continuous supervision and direction of a qualified mason.

1.6 Mock-Ups

.1 Construct a mock-up to show the following:

.1 Cut and cleaned mortar joint to required depth

.2 Filled and tooled joint

.3 Selected mortar colour

.2 Mock-up to be 300 mm x 300 mm area, for each masonry material, where directed by the Consultant, to demonstrate a full understanding of specified procedures, techniques, and formulations before work commences.

.3 Allow 48 hours for review of mock-up by Consultant before proceeding with repointing work.

.4 When accepted by Consultant, mock-up will demonstrate minimum standard for the work of this Section.

1.7 Delivery, Storage, and Handling

.1 Deliver, store, handle, and protect materials in accordance with written manufacturer's instructions.

.2 Store cementitious materials and aggregates in accordance with CSA A23.1.

.3 Store lime putty in plastic lined sealed drums.

.4 Keep material dry. Protect from weather, freezing, and contamination. Store above ground on raised platforms.

.5 When temperature is 10°C or less, store cements and sands for immediate use within heated enclosure.

.6 Ensure that manufacturer's labels and seals are intact upon delivery.

.7 Remove rejected or contaminated material from site.

2.0 PRODUCTS

2.1 Performance Requirements

.1 Average mortar compressive strength requirements:

.1 Hydraulic lime mortar for resetting and rebuilding: 7.2 MPa

.2 Hydraulic lime mortar for repointing: 3.1 MPa

2.2 Heritage Mortar

.1 Sand: To ASTM C144. Passing a 1.18 mm sieve.

.2 Water: Clean (free from salts and other impurities) and potable

.3 Hydraulic Lime for Resetting, Rewedding: Natural Hydraulic Lime NHL 3.5, available, or approved equal.

.4 Hydraulic Lime for Repointing: Natural Hydraulic Lime NHL 2, available from Daubois Inc., Cambridge, or approved equal.

.5 Hydraulic Lime for Rebuilding: Natural Hydraulic Lime NHL 5.0, or approved equal.

.6 Aggregate: Sharp, well-graded, washed masonry sand to CSA-A82.56.M1976 to match the colour, texture and range of particle sizes of samples of the existing mortar.

.7 Pigment: Inorganic mineral oxide type, available from Mason's Masonry Supply Ltd. T 416-324-2933 or Harcross Pigments T 416-251-1161

2.3 Heritage Mortar Manufacturer

.1 Hydraulic Lime:

.1 St. Astier Pure and Natural Hydraulic Lime by Daubois Inc., Cambridge, contact Sean Costello, tel. (416) 787-4917 or 1800-565-9025.

.2 Singleton Birch Natural Hydraulic Lime: Contact Kreit Maker (416-423-9090).

.3 Or approved equal.

.2 Pigments:

.1 Mason's Masonry Supply Ltd. T 416-324-2933

.2 Harcross Pigments T 416-251-1161

.3 Or approved equal.

2.4 Heritage Mix Proportions

.1 Hydraulic lime mortar for resetting, rebedding and rebuilding brick and stone: 1 hydraulic lime NHL 3.5:2 sand

.2 Hydraulic lime mortar for repointing brick and stone: 1 hydraulic lime NHL 2:2 sand.

2.5 Equipment

.1 Mortar mixer: mortar mill type preferred; paddle mixer acceptable.

3.0 EXECUTION

3.1 Examination

.1 Investigate possible structural problems and report to Consultant before beginning work.

.2 Study existing pointing styles and methods of reproducing them, and submit sample for approval before starting work.

.3 Examine horizontal and vertical joints to determine which were struck first and whether they are same style, as well as other aspects of workmanship that establish authenticity of original work.

.4 Report, in writing, to Consultant areas of deteriorated mortar revealed during work. Obtain Consultant's approval and instructions for mortar mix required for deteriorated mortar areas revealed during work before proceeding with work.

.5 Examine joints visually for obvious signs of deteriorated masonry.

.6 Test joints not visually deteriorated as follows:

.1 Test for loose and deteriorated mortar by scratching the surface of the joint using a flathead screwdriver.

.2 Mark unsound joints for review by Consultant.

.3 Consultant will review joints and determine repair quantities prior to removal of joints.

.7 Immediately report to Consultant evidence of moisture damage or structural distress and stop work in that area.

3.2 Work in Cold or Hot Ambient Conditions

.1 Comply with requirements of CSA A371.

.2 Comply with requirements of pre-mixed mortar manufacturer.

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

.4 Maintain dry beds for masonry and use dry masonry units only. Do not wet masonry units in winter.

.5 For masonry work which will be done below 5°C:

.1 Measure temperatures of masonry material prior to use.

.2 Maintain temperatures as close as possible for mortar batches.

.3 Ensure mortar temperature on mortar boards does not exceed 50°C.

.4 Use dry masonry units.

.5 Lay masonry on unfrozen surfaces free from snow and ice.

.6 Use windbreaks when laying masonry not protected by enclosures.

.7 Provide a high-low registering thermometer where directed on site.

.6 When mean air temperature will, over a 24-hour period, go below 5°C but not below 0°C, conduct masonry work as for normal temperatures except heat water or sand to produce mortar temperatures between 5°C and 50°C. Protect entire constructed masonry by enclosing within weatherproof membrane for 72 hours.

.7 When mean air temperature will, over a 24-hour period, go below 0°C but not below -4°C, conduct masonry work as for normal temperatures except heat water and sand to produce mortar temperatures between 5°C and 50°C and maintain temperature of mortar boards above 0°C. Protect entire constructed masonry by enclosing within weatherproof membrane for 72 hours and maintain air temperature within enclosure at minimum 4°C.

.8 When mean air temperature is below -4°C, conduct laying of masonry in enclosures heated to maintain air temperature above 0°C. Conduct masonry work as for normal temperatures except heat water and sand to produce mortar temperatures between 5°C and 50°C and heat units if necessary so that temperature of units at time of laying is minimum 7°C. Maintain enclosure in position for 7 days and maintain air temperature within enclosure at minimum 4°C.

.9 When mean air temperature will, over a 24-hour period, go above 38°C (or 32°C with a 3.6 m/s wind), maintain mortar and grout at a temperature between 21°C and 49°C and limit spread of mortar bed to 1.22 m (4 ft.) Place units within one minute of spreading mortar. Provide shade and air breaks as required.

3.3 Mixing

.1 Prepare mortar by as per manufacturers' instructions. Do not use any additives, such as bonding agents, accelerators or retarders, in the mortar without prior written approval from the manufacturer.

.2 Wear dust mask during mixing. The hydraulic lime and sand must be accurately proportioned using on size of measuring box or plastic pail for all materials. Shovels must not be used for batching.

.3 Mix hydraulic lime, sand, water and pigment, if required for 5 minutes.

.4 Use manual mixing, provided quantities of materials and water are accurately controlled and the method of mixing is approved by the Consultant.

.5 Allow to stand to hydrate for 10 minutes.

.6 Mix again for an additional 3 minutes.

.7 Add small measured amounts of water at this point, if required, to bring the mix to a plastic state that is just wet enough to hang on a trowel.

.8 Record the amount of water required in initial batches for correct consistency and mark a container for subsequent use.

.9 Clean mixing boards and mechanical mixing machines between batches.

.10 Do not mix more material than can be used within 30 minutes. Discard any material that has been mixed for more than 30 minutes.

.11 Ensure that masons do not use too wet a mix. Only water lost through evaporation should be replaced at the mortar-bed. Use a spray bottle of water for this purpose.

3.4 Colouring of Mortar

.1 Match new mortars to samples of freshly broken, unweathered mortar from the original masonry pointing.

.2 As far as possible, achieve the match of colour by means of the aggregate colour.

.3 Where pigment is needed, use only to tone down the whiteness of the white cement and lime.

.4 Use as little pigment as possible to achieve the desired colour and not more than 10% by volume of pigment to mortar.

.5 Provide sample areas of repointing mortar, accurately proportioned to represent the final mix formula and amount of pigment, until a match acceptable to the consultant is obtained.

.6 Mark measuring container to ensure standard amount of pigments for each mortar batch, once correct amount of pigments is determined.

3.5 Raking Joints

.1 Use manual raking tool to remove deteriorated mortar a minimum of 2x the joint thickness and 25 mm to a maximum of 75 mm leaving square corners and a flat surface at back of cut. Clean out voids and cavities encountered.

.2 Cut-out all deteriorated joints where indicated on drawings or identified on site to the full height of the joint and to a minimum depth of 25mm for brickwork and 25 to 50 mm for stone (depth to be twice joint width).

.3 Cut-out fine joints (less than 3mm high) not more than 10 mm (3/8") in depth, to reduce the danger of chipping of masonry edges.

.4 Deteriorated or defective joints are defined as having: loose or missing mortar; excessively soft mortar; powder or crumbling mortar; cracks that weaken the bond between units; voids; badly stained pointing, face worn back more than 3mm (1/8") or previous pointing in hard cement and sand mortar.

.5 Horizontal joints may be partially cut out with power saws and grinding wheels under the direction of a skilled mason. Make one cut at centre of the joint, no more than one half its width and cut to the full depth required.

.6 Do final cutting-out of joints with hand tools only. Remove all joint material to depth specified, with hammers and chisels.

.7 Take care not to damage masonry adjacent to joints. The Contractor may be required to replace masonry units damaged by cutting-out operations.

.8 Clean debris from joints with brush and medium-pressure compressed air.

.9 Remove all fittings such as nails, brackets, clips, plugs and anchors from wall areas as cutting-out proceeds. Drill out lead anchors and fill holes with mortar recessed 3 mm from brick face.

.10 Ensure that no masonry is chipped, altered, or damaged by work to remove mortar. Repair or replace masonry damaged during removals at no additional cost to the Owner. The Consultant will review damage and direct repair or replacement.

.11 Do not cut-out sound adjacent joints but leave in their present state.

.12 Notify Consultant if mortar is unsound past the raking depth.

.13 Where mortar is found to be defective beyond the specified raking depth, the Contractor shall continue raking until solid mortar is encountered. Remove all loose mortar, dirt and other undesirable material.

.14 Be aware that additional raking beyond specified depths will be necessary and that voiding can be expected. Back pointing will be required at these locations prior to re-pointing.

.15 Clean with non-ferrous brush surfaces of joints without damaging texture of exposed joints or masonry units.

.16 Flush open joints and voids. Clean open joints and voids with low-pressure water and, if not free draining, blow clean with compressed air.

.17 Leave no standing water.

3.6 Repointing

.1 Dampen joints prior to repointing.

.2 Keep masonry damp while pointing is being performed.

.3 Completely fill joint with mortar. If surface of masonry units has worn rounded edges, keep pointing back from surface to keep same width of joint. Avoid feather edges. Pack mortar solidly into voids and joints.

.4 Tool and compact using jointing tool to force mortar into joint.

.5 Build-up pointing in layers not exceeding 12 mm in depth. Allow bottom layers to set before applying subsequent layers. Maintain joint width.

.6 Tool joints to match existing profile.

.7 Use suitable jointing tool to form compacted tooled joints.

.8 Remove excess mortar from masonry face before it sets. Finish jointing neatly to specified profile.

3.7 Field Quality Control

.1 Use batching box.

.2 Monitor mixing time.

3.8 Cleaning

.1 Clean surfaces of mortar droppings stains and other blemishes resulting from Work, with natural bristle brush, clean sponge, and water after initial set.

.2 Do not smear wet mortar.

.3 Review with Consultant prior to using other cleaning methods for persistent stains.

.4 Clean tools with water while mixture is not yet hardened. Once it is hard, only a mechanical cleaning will be efficient.

.5 Protect and cover surroundings (windows, openings, vegetation)

.6 During application, remove mortar spots with jute.

.7 Consult the element manufacturer or a cleaning specialist before any cleaning step is initiated. It is important to preserve mortar's integrity.

3.9 Protection and Curing

.1 Protect adjacent finished work against damage that may be caused by the work of this Section.

.2 At end of each working day, cover unprotected work with waterproof tarps. Extend tarps to 0.5 m over surface area of work and install tightly to prevent finished work from drying out too rapidly and to prevent weather from eroding recently repointed material.

.3 Bedding Mortar:

.1 Protect from rain and freezing (temperature at or above to 5°C) for the first 72 hours.

.2 In hot weather, protect from sun and wind to avoid rapid water evaporation from mortar.

.3 Protect finished work with plastic sheeting to avoid mortar spatters.

.4 Final Pointing Mortar:

.1 Protect with damp jute that is not in contact with mortar. Keep joint damp for 72 hours.

.5 Install and maintain wetted burlap protection during the curing process:

.1 Minimum of 7 days in summer.

.2 Minimum of 15 days in cold weather conditions using dry heated enclosures.

.6 Wet mist burlap only. Ensure no direct spray reaches surface of curing mortar.

.7 Shade areas of work from direct sunlight during periods over 25°C and maintain constant dampness of burlap.

.8 Maintain ambient temperature of 10°C for minimum of 15 days after repointing masonry.

.9 No exhaust products shall enter the curing area.

END OF SECTION

1.0 GENERAL

1.1 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CSA A82	Fired Masonry Brick Made from Clay or Shale
.4	CSA A179	Mortar and Grout for Unit Masonry
.5	CSA S304	Design of Masonry Structures
.6	CSA A370	Connectors for Masonry
.7	CSA A371	Masonry Construction for Buildings

.8 Standards and Guidelines for the Conservation of Historic Places in Canada.

1.2 Shop Drawings

.1 Submit shop drawings in accordance with Section 01 33 00.

.2 Submit shop drawings stamped by a licensed Engineer describing method of brick removal and temporary shoring/bracings required in openings.

1.3 Samples

.1 Submit samples for review and testing as follows:

.1 Three (3) of each type of masonry unit specified. Colours and textures are to represent the full range of shading typically shipped in the specified colour. Any variations in texture are to be represented. Note that any variants beyond the accepted sample range, i.e. darker than the darkest sample, lighter than the palest sample, are not to be installed in the repair area. Colours are intended to match existing and be representative of the final installed product.

.2 One of each type of masonry accessory specified.

.3 One of each type of masonry reinforcement and tie proposed for use.

.4 As required for testing purposes.

1.4 Mock-Ups

.1 Construct mock-up panel of masonry wall construction 300 x 300 mm showing masonry colours, textures, special pattern, use of reinforcement, ties, through-wall flashing, weep holes, jointing, coursing, mortar and workmanship.

.2 Construct mock-up where directed.

.3 Allow 24 hours for inspection of mock-up by Consultant. Accepted mock-up becomes standard for this Work.

.4 When mock-up is accepted, proceed with masonry repointing and repair work. Mock-up may remain as part of finished Work. Remove mock-up when directed.

1.5 Storage and Protection

.1 Deliver, store, handle, and protect materials in accordance with manufacturer’s written instructions.

.2 Provide weather protection and construction protection in accordance with CSA S304.

.3 Provide weather protection to newly opened sections in assembly.

.4 Protect bricks and store bricks to facilitate their resetting:

.1 Store dismantled masonry units on wood, such that they are not in contact with the ground and protected from exposure to water, elements, and potential mechanical damage fully covered under polyethylene.

.2 Submit storage and identification system for Consultant review.

.5 Place detached bricks on wood surfaces during handling. Prevent contact with metal.

.6 When bricks are lowered to ground, place directly on wooden platform that will be used for transport or storage.

.7 Transport and keep bricks on wooden platforms.

.8 Ensure that sharp edges of bricks do not come into contact with hard objects.

1.6 Existing Conditions

.1 Review brick and openings for evidence of repairs, cracks, moisture, and dampness and report to Consultant before starting Work or if conditions develop during the project.

2.0 PRODUCTS

2.1 Face Brick

.1 Burned Clay Brick: To CSA A82.

.1 Grade: SW

.2 Type: FBX

.3 Size: To match existing.

.4 Colour and Texture: To match existing.

.5 Solid Brick: where necessary to avoid exposing brick cores.

2.2 Existing Brick

.1 Use hard, sound, and clean old bricks salvaged on site only with Consultant's approval.

2.3 Mortar

.1 Mortar: To Section 04 01 25.

2.4 Concrete Masonry Units

.1 Standard concrete block units produced with the autoclave or bubble process, high pressure steam cured, conforming to CSA A165.1 Series smooth faced concrete masonry solid, linear shrinkage and moisture movement not to exceed 0.045% to modular metric sizes indicated on drawings and as follows:

.1 Classification: H/15/C/O

.2 Size: to match existing.

.2 Where concrete block walls are required as fire separations or barriers, the aggregate used in units and equivalent thickness values of units are to conform to the Supplement to the National Building Code of Canada, Chapter 2 for fire-resistance ratings indicated.

.3 Architectural Concrete Masonry Units (above grade) to be selected from manufacturer standard range:

.1 Approved Manufacturers:

.1 Arriscracft Stone

.2 Shouldice Estate

.3 Permacon Century stone

.4 Brampton Brick

.5 Approved alternative.

2.5 Horizontal Joint Reinforcement

.1 Reinforcement that will also function as masonry connectors:

.1 Stainless Steel Block-Lock Retrofit Masonry Ties, 8mm diameter, at 2’-0” on center and 2’-0” staggered.

.2 Reinforcement:

.1 Steel Wire: to CSA-G30.18, hot dip galvanized.

.2 Continuous Welded Double Wire Welded Ladder or Truss Type: to CSA-A370.

.3 For continuous welded ladder or truss type, provide:

.1 Widths to suit wall widths, and

.2 Prefabricated tee-shaped and 90° corner configurations for use at wall intersections and corners.

3.0 EXECUTION

3.1 Preparation

.1 Place safety devices and signs near work area as directed in accordance with Section 01 56 00.

.2 Install and remove shoring or other supports in accordance with Specifications.

.3 Install and remove self-supporting scaffolding in accordance with Section 01 56 00.

3.2 Brick Removal

.1 Verify locations and dimensions of areas of Work with Consultant prior to removals.

.2 The Contractor shall mark the location of masonry to be removed for verification by the Consultant prior to commencing with the removal process.

.3 The brick is damaged or deteriorated when it is cracked, chipped, spalled or the outer face is hollow.

.4 Should the amount of deteriorated brick rise above 5% of the contract quantity, the Contractor must stop all work and notify the Consultant immediately. The Contractor must obtain written review from the Consultant prior to replacing amounts of brick totalling above 5% of the contract quantity

.5 In areas of work, identify salvageable bricks with Consultant.

.6 Remove identified areas of salvageable brickwork as follows:

.1 Cut out non-loadbearing brickwork in length as practicable.

.2 During removal, protect sound areas to remain. Use mechanical hand methods of removal. Obtain Consultant's approval for use of power tools before commencing work.

3.3 Brick Salvage

.1 Carefully dismantle, clean, and store bricks for re-use.

3.4 Replacement of Deteriorated Clay Brick and Concrete Masonry Unit

.1 The Contractor shall mark the location of masonry to be removed for verification by the Consultant prior to commencing with the removal process.

.2 The brick is damaged or deteriorated when it is cracked, chipped, spalled, or the outer face is hollow.

.3 Should the amount of deteriorated brick rise above the contract quantity, the Contractor must stop all work and notify the Consultant immediately. The Contractor must obtain written review from the Consultant prior to replacing amounts of brick totalling above the contract quantity.

.4 The Contractor shall maintain the stability and water tightness of the structure at all times.

.5 Localized Masonry Replacement (areas with less than four bricks to be replaced):

.1 Bond, coursing, and jointing to match the existing.

.2 Immediately prior to placing the masonry, thoroughly wet the adjacent substrates in order to control absorption. Verify with environmental requirements.

.3 Allow water to soak into the masonry, leaving no standing water but remaining wet. Should the surfaces dry prior to pointing, the substrates should be wet.

.4 Set the masonry in a full bed of mortar, true to line, and level with the adjacent units.

.5 All wedges must be pre-soaked prior to placing masonry units. All wedges should be removed when the mortar has dried prior to pointing.

.6 Avoid bridging of airspace between veneer and back-up wall by beveling back edge of bed joint.

.7 Tool the mortar joints flush to match the existing.

.6 Rebuilding Areas of Masonry:

.1 Meet or exceed requirements of CSA A371.

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

.3 Lay masonry in running bond to meet specified requirements of CSA Standards, unless otherwise specified.

.4 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings with minimum of cutting.

.5 Remove laitance, loose rust, scale, and other foreign materials from supporting bed surfaces to ensure bonding.

.6 Use only dry and unfrozen materials.

.7 Where mortar has started to harden at units requiring repositioning, remove and replace with fresh mortar.

.8 Joints:

.1 Make joints of uniform thickness with vertical joints plumb over each other.

.2 Form tooled concave joints wherever exposed to view, whether behind cabinets, fitments, and wall accessories.

.3 Ensure that no mortar protrudes from joints on wall surfaces to which insulation will be applied.

.9 Stop off horizontal runs of walls by racking back a half unit in each horizontal course. Do not tooth.

.10 Install special units as may be required to form corners, returns, offsets, reveals, and indents without cut ends being exposed and without losing bond pattern or module.

.11 Fit masonry closely against electrical and plumbing outlets so that collars, plates, and covers will overlap and conceal all cuts.

.12 Use chipped and blemished units only where concealed. Do not use defective or broken units.

.13 Distribute masonry units of varying textures to avoid spotty appearance over wall surfaces exposed to view. Do not use units that contrast too greatly with overall range. Remove masonry units of non-matching colour variation. Replace with conforming units at no additional cost to the Owner.

.14 Where replacing in excess of four bricks in one area, install masonry ties to bond facing with back-up wythes of masonry.

.15 The ties should be randomly installed in rebuilt areas except where areas are sufficiently large for the ties to be set every twenty-four (24) inches horizontally and vertically with staggered centres.

.16 At step cracking, the ties should be installed every twenty-four (24) inches horizontally and vertically with staggered centres, aligning with the centre of cracking.

.17 Where replacing in excess of four bricks in one area, install Stainless Steel Block-Lock Retrofit, 8mm diameter masonry ties to bond facing with back-up wythes of masonry

.18 Drill entry hole into the block backup and drive the tie into position in accordance with the Manufacturer's recommended embedment length and hole diameter.

.19 Ensure that the ties are solidly set in the back-up wythe.

3.5 Tolerances

.1 Comply with tolerances as required and recommended in CSA 371.

3.6 Adjustment and Cleaning

.1 Point all voids in brick faces.

.2 Cut out defective mortar joints and repoint.

.3 Clean brick with brushes and as otherwise recommended by the supplier to remove mortar and stains.

.4 Remove mortar droppings that adhere to the exposed face of a unit with a wooden paddle after being allowed to dry and harden. Remove remaining mortar with a stiff fibre brush.

.5 Do not use wire brushes for cleaning.

.6 Should specified cleaning methods be insufficient, proceed with other methods only with prior review and acceptance by Consultant.

.7 Protect adjacent materials and Work from damage while cleaning.

.8 Ensure that all efflorescence and mortar deposits are removed from surfaces.

.9 Exercise particular care during construction to prevent mortar smears on the face of the brick masonry.

.10 Remove efflorescent salts by dry brushing followed by flushing with clean water.

3.7 Cleanup

.1 Remove all debris resulting from the work of this section.

END OF SECTION

1.0 GENERAL

1.1 Measurement Procedures

.1 Measurement for payment for this work will be on a unit rate basis and will include costs associated with supplying materials, and executing work as described herein and reflected in contract.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	ASTM C144	Standard Specification for Aggregate for Masonry Mortar
.4	CAN/CGSB-75.1	Tile, Ceramic
.5	CSA A3000	Cementitious Materials Compendium
.6	CSA A179	Mortar and Grout for Unit Masonry

1.3 Definitions

.1 Repair of Stone: Mechanical or plastic repair, done to restore original appearance and function of partly deteriorated stones.

.2 Filling: Material used to rebuild broken or deteriorated part of stone.

.3 Adhesive: Material used to fasten broken/fractured stone elements by direct application at fracture interface and/or by application to added reinforcing elements such as dowels.

.4 Mortar: Material used to repoint the adjacent mortar joints to stone element being repaired.

1.4 Submittals

.1 Provide submittals in accordance with Section 01 33 00.

.2 Provide samples in accordance with Section 01 33 00.

.3 Provide adhesive**,** mortar**,** and filling samples to CSA A179.

.4 Upon request by Consultant, submit purchase orders, invoices, suppliers test certificates, and documents to prove that materials used in contract meet requirements of specification. Allow free access to sources where materials were procured.

1.5 Quality Assurance

.1 Mock-Ups:

.1 Construct mock-up in accordance with this Section.

.2 Construct mock-up with specified materials and methods.

.3 Use existing stonework when constructing job mock-up.

.4 Construct mock-up where directed.

.5 Allow 48 hours for inspection of mock-up by Consultant before proceeding with stone repair work.

.6 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.

.7 Clean mock-up to demonstrate cleaning operations to Consultant before starting cleaning work.

1.6 Delivery, Storage, and Handling

.1 Packing, shipping, handling, and unloading:

.1 Keep material dry. Protect from weather, freezing and contamination. Store materials in a dry area and supported free of ground.

1.7 Ambient Conditions

.1 Maintain a minimum temperature of 10°C during and 48 hours after repair, throughout thickness of stone.

.2 Allow materials to reach minimum temperature of 10°C prior to use.

.3 Maintain temperature between 21°C and 24°C during repair and 48 hours after, throughout thickness of stone.

.4 Ensure epoxy resin compatible with humidity condition of stone as specified by manufacturer.

.5 Provide temporary enclosures and heating equipment to maintain specified temperatures. Take precautions to avoid overheating masonry.

.6 Refer to manufacturer's instructions for environmental requirements of products.

2.0 PRODUCTS

2.1 Materials

.1 Limestone: to ASTM C568, Category II, medium density, colour and texture shall match existing.

.2 Portland Cement: To CSA A3000.

.3 Sand: Cleaned and graded in accordance to ASTM C144.

.4 Water: Clean and free of deleterious materials such as acid, alkali, and organic material in accordance to CSA A179.

.5 Dowels: Stainless steel 3 mm to 6 mm diameter or threaded rod.

.6 Stone Slabs: To have similar mechanical and aesthetic properties to existing.

2.2 Mortar Mixes

.1 Mortar: Refer to Section 04 01 25.

2.3 Filling Mixes

.1 Filling to contain Portland cement, lime putty, sand, crushed stone and match surrounding stones in texture, strength, porosity, and colour.

2.4 Adhesive Mixes

.1 Adhesive to contain epoxy and sand.

3.0 EXECUTION

3.1 Site Verification of Conditions

.1 Report to Consultant areas of deteriorated stone not identified in the documents.

.2 Obtain Owner’s and Consultant's approval and instructions for repair and replacement of masonry units before proceeding with repair work.

.3 Stop work in that area and report to Owner and Consultant immediately any evidence of mould.

3.2 Preparation

.1 Remove deteriorated portions of stones using low impact removal methods until sound surface is reached.

3.3 Protection

.1 Prevent damage to the building and site elements that are to remain. Make good damage.

.2 Protect surrounding components from damage during work.

.3 Take utmost care not to damage historic fabric. Make good any damage.

.4 Obtain Consultant's approval for repair methodology.

3.4 Repair of a Fractured Stone

.1 Remove elements that require minor repair. Do not damage existing work.

.2 Drill 13 mm diameter holes, a minimum of 75 mm long in each section at fracture.

.3 Insert 6 mm diameter dowels, sized to fit the repair, and apply specified adhesive to holes and interface. Let adhesive cure for manufacturer’s recommended time.

.4 Reinstate consolidated element into work and repoint with specified mortar. Joints to match existing.

.5 Obtain Owner’s and Consultant's approval for alternative repair methodology before commencing work.

3.5 Re-Facing Partly Deteriorated Stone with Slab (Dutchman)

.1 Drill 13 mm diameter holes, a minimum of 75 mm long at interface of existing and new stone slabs as indicated on drawings.

.2 Insert 13 mm diameter dowels, 75 mm long into existing stone and apply specified adhesive to holes and interface. Dowel to be countersunk at face of stone.

.3 Make horizontal dovetailed grooves 12 mm deep at interface of existing and new stone slabs.

.4 Apply specified adhesive to dovetailed grooves and interface of existing stone.

.5 Fill dowel holes and dovetailed grooves of new stone slab with specified adhesive. Erect new stone slab into position. Secure stone temporarily to allow adhesive to set.

.6 Repoint with specified mortar. Joints to match existing.

3.6 Re-Facing Partly Deteriorated Stone with Filling

.1 Remove dust from cavity and wet surfaces.

.2 Drill 10 mm holes into sound stone and roughen stone surfaces to provide keys form grooves in back of cavity.

.3 Install specified metal wire mesh.

.4 Drill grooves into sound stone, insert tiles, and apply specified adhesive as directed by Consultant.

.5 Build up new section gradually in layers not exceeding 14 mm thickness, allowing each layer to set 24 hours before proceeding with next.

.6 Use wood float and avoid excessive trowelling to prevent crazing.

.7 Form roughly to required shape with wood float, then chisel finish to final shape when mortar has set.

.8 Remove laitance with stiff, near-dry fibre brush.

.9 Cover repairs with damp cloths, occasionally sprayed with water for several days.

.10 Repoint with specified mortar. Joints to match existing.

3.7 Mortar Joint Repair

.1 Make good any damage to mortar joints.

.2 Refer to Section 04 01 25.

3.8 Cleaning

.1 Using clean water and natural fibre brush, remove debris from reinstated stones.

.2 Protect foundations, plants, grass, vegetation, and adjacent grounds from excessive water accumulation.

.3 Clean stonework surfaces after repairs have been completed and mortar has set.

.4 Clean stone surfaces of adhesive or mortar residue resulting from work performed without damage to stone or joints.

.5 Clear site of debris, surplus material, and equipment, leaving work area in clean and safe condition.

3.9 Protection of Completed Work

.1 Protect finished work from impact damage for period of two weeks.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to design, prepare and provide revisions to shop drawings, fabricate, and install new guardrails and handrails at the entrance/exit stairs as indicated on the Drawings and described herein.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	ASTM A53/A53M	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
.4	ASTM A307	Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength
.5	CAN/CGSB-1.40	Anticorrosive Structural Steel Alkyd Primer (Withdrawn)
.6	CAN/CGSB-1.108	Bituminous Solvent Type Paint (Withdrawn)
.7	CAN/CGSB-1.181	Ready-Mixed Organic Zinc-Rich Coating (Withdrawn)
.8	CSA G40.20/G40.21	General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel
.9	CSA G164	Hot Dip Galvanizing of Irregularly Shaped Articles
.10	CSA S16	Design of Steel Structures
.11	CSA W48	Filler Metals and Allied Materials for Metal Arc Welding
.12	CSA W59	Welded Steel Construction (Metal-Arc Welding)

1.3 Design Criteria

.1 Design is based on Limit States Design principles using factored loads and resistances.

.2 Loads and load factors are determined in accordance with the referenced Building Code and bylaws of the local municipality.

.3 Resistances and resistance factors are determined in accordance with the National Building Code and CSA S136.

.4 Conform to the requirements of specified fire rated assemblies.

.5 Install components or assemblies to accommodate specified erection tolerances of the structure.

.6 Design and install handrails, railings, landings, and stairs to conform to loading and safety requirements of the referenced Building Code, Occupational Health and Safety Act, and W47.2, as may be applicable.

.7 Maximum deflection for individual members shall not exceed 1/360th of the span.

.8 Work of this Section that will support other items or will be required to support structural loads of any nature shall be designed by a Professional Structural Engineer registered in Ontario, who shall affix their professional seal and signature to the shop drawings for such items.

1.4 Submittals

.1 Submittals to be made in accordance with Section 01 33 00.

.2 If requested, submit three certified copies of mill reports covering chemical and mechanical properties, and coating designation of steel used in this work.

.3 Submit samples of framing and fastener components to Consultant if requested.

.4 Product Data

.1 Submit product data for mechanical fasteners, indicating sizes, shear, and pull-over loading capacity where applicable. Provide data indicating thickness and type of corrosion protection coating.

.2 Submit product data indicating suitability of explosive powder actuated fasteners for application.

.5 Shop Drawings:

.1 Submit shop drawings indicating materials, core thickness, finishes, connections, joints, methods of anchorage, number of anchors, supports, reinforcement, details, and accessories.

.6 Submit evidence of welder qualifications specified in this Section.

1.5 Quality Assurance

.1 Provide proof of manufacturer training for installation of proprietary fastener systems.

.2 Welding shall be by company certified by the Canadian Welding Bureau to CSA W47.1.

1.6 Delivery, Storage, and Handling

.1 Deliver and store material undamaged in original wrapping or containers, with manufacturer's labels intact.

.2 Prevent damage to materials during handling and storage. Any damaged materials will be rejected by the Consultant.

1.7 Site Conditions

.1 Maintain temperature and ventilation conditions for various components and materials of the system, as required by manufacturer.

.2 Protect work of other sections and sub-trades from damage resulting from work of this section.

.3 Take necessary care to avoid damage of adjacent surfaces.

.4 Examine the underlying visible surfaces and adjoining work, and report defects at time of installation that might impair the work of this section to the Consultant, in writing.

.5 Commencement of work implies acceptance of surfaces.

.6 Cooperate with other trades to accommodate fixtures and attachments in the system.

1.8 Inspection

.1 The Design Engineer responsible for the production of the shop drawings shall provide periodic field review during construction and submit reports to the Consultant.

.2 Additional inspection and testing of materials workmanship shall be carried out by a qualified independent Inspection Agency appointed by the Consultant.

.1 The cost of this additional inspection shall be paid by the Owner.

.2 Any testing or inspection required by the Consultant because of an error by the Contractor, or due to departure from the contract documents by the Contractor, shall be paid for by the Contractor.

.3 Inspection shall include:

.1 Checking that mill test reports are properly correlated to materials.

.2 Sampling fabrication and erection procedures for general conformity to the requirements of the specification.

.3 Checking that the welding conforms to the requirements of this specification.

.4 Checking fabricated members against specified member shapes.

.5 Visual inspection of all welded connections including sample checking of joint preparation and fit-up.

.6 Sample checking of screwed and bolted joints.

.7 Sample checking that tolerances are not exceeded during fit-up or erection.

.8 Additional inspection and testing of welded connections as required by CSA W59.

.9 General inspection of field cutting and alterations required by other trades.

.10 Submission of reports to the Consultant, Contractor, and authorities having jurisdiction covering the work inspected with details of deficiencies discovered.

.4 The Contractor shall provide the necessary cooperation for the inspection to proceed.

.5 The inspection provided in this section does not relieve the Contractor of their responsibility for the performance of the contract. The Contractor is solely responsible for quality control and shall implement their own supervisory and quality control procedures.

.6 Materials or workmanship not conforming to the requirements of the contract documents may be rejected at any time during the progress or work.

2.0 PRODUCTS

2.1 Materials

.1 Steel Sections and Plates: To CSA G40.21, Grade 300W, galvanized.

.2 Steel Pipe: To ASTM A53/A53M standard weight**,** galvanized finish. Formed to shape and sizes as indicated on the Drawings.

.3 Welding Materials: To CSA W59.

.4 Welding Electrodes: To CSA W48 Series.

.5 Bolts and Anchor Bolts: To ASTM A307.

.6 Grout: Non-shrink, non-metallic, flowable, 15 MPa at 24 hours, pull-out strength 7.9 MPa.

2.2 Fabrication

.1 Fabricate work square, true, straight, and accurate to required size, with joints fitted closely and secured properly.

.2 Fabricate items from steel and use galvanized steel for exterior items, unless indicated otherwise.

.3 Where possible, fit and shop assemble items ready for erection.

.4 Exposed joints and connections shall be tight, flush, and smooth unless otherwise indicated.

.5 Where work of other Sections is to be attached to work of this Section, prepare work by drilling and tapping holes as required to facilitate installation of such work.

.6 Exposed welds are to be continuous and nonporous for length of each joint. File or grind exposed welds smooth and flush.

.7 Insulate contact surface to prevent electrolysis due to metal-to-metal contact or between metal and masonry or concrete. Use bituminous paint, butyl tape, building paper, or other approved means.

2.3 Anchoring Devices

.1 Drilled Inserts: Steel, cadmium plated or hot-dip galvanized; sizes as indicated on drawings.

.2 Bolts and Nuts: To ASTM A307, sizes as indicated on drawings, with large flat-type steel washers sized to suit fasteners, hot-dip galvanized.

2.4 Framing Connection Devices

.1 Screws: Self-tapping and self-drilling, and as follows:

.1 Case hardened, non-corrosive screw, #10 or heavier with pan type washer heads, 1/2-inch diameter.

.2 Sheet metal screws shall be stainless steel or steel with a minimum coating thickness of 0.008 mm of zinc or cadmium. Other coatings providing equal or better corrosion protection may be used.

.3 Length: Adequate to penetrate not less than three fully exposed threads beyond joined materials.

.4 Thread types and drilling capability shall conform to manufacturer's recommendations.

.5 Screws covered by sheathing materials shall have low profile heads.

.2 Welding Electrodes: Minimum tensile strength series of 480 MPa, suitable for material being welded.

2.5 Surface Preparation

.1 Thoroughly clean and suitably pre-treat steel prior to finishing.

.2 Remove loose mill scale, rust, oil, grease, dirt, and other foreign matter using one or more of the following methods:

.1 Solvent cleaning

.2 Wire brushing

.3 Power wire brushing

.4 Sandblasting

.3 Grind smooth sharp projections.

2.6 Steel Finishes

.1 Galvanizing: Hot-dipped galvanizing with zinc coating 600 g/sq. m to CSA G164.

.1 Zinc Primer: Zinc rich, ready mix to CAN/CGSB-1.181. Apply one coat of zinc rich paint to all surfaces exposed or damaged after erection to minimum dry film thickness of 60 µm. Apply coating immediately after cleaning. Touch up welds.

.2 Bituminous Paint (Isolation Coating): To CAN/CGSB-1.108. Apply an isolation coating to contact surfaces of following components in contact with cementitious materials and dissimilar metals except stainless steel: (1) exterior components (2) interior components exposed to high humidity conditions.

3.0 EXECUTION

3.1 General

.1 Fabrication and erection shall conform to design drawings. Modifications required to accommodate as-built conditions, other than minor dimensional changes, must be submitted for approval.

3.2 Erection

.1 Erect items square, plumb, straight, and true, fitted accurately, with tight joints and intersections.

.2 Make all field measurements necessary for the proper fit of all members.

.3 Provide suitable means of anchorage acceptable to the Consultant by dowels, anchor clips, bar anchors, expansion bolts and shields, toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Make field connections with high tensile bolts to CSA S16 or weld.

.6 Welding to be in accordance with CSA W59 as follows:

.1 Companies engaged in welding shall be certified by the Canadian Welding Bureau to CSA W47.1. Companies shall have welding procedures approved and welders qualified for the base material types and thicknesses that are to be welded.

.2 For material less than 3.0 mm thick, shop drawings may show nominal weld leg sizes. For such material, the effective throats of welds shall not be less than the thickness of the thinnest connected part.

.3 Touch-up welds with zinc-rich paint.

3.3 Touch Up and Cleaning

.1 Touch-up rivets, field welds, bolts, and burnt or scratched surfaces after completion of erection using zinc-rich paint to match original finish.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to prepare foundation wall and footing surfaces, detail all cracks and joints, patch perimeters and all voids, and install a new cold applied waterproofing system as shown on the Drawings and described herein.

.2 Surface preparation includes surface cleaning, application of manufacturer-recommended primer, patching of voids and crevices with manufacturer approved polymer-modified mortar where required, and all other manufacturer requirements.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	CAN/CGSB-37.29	Rubber-Asphalt Sealing Compound
.4	CGSB 37-GP-9Ma	Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing
.5	CGSB 37-GP-15M	Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing
.6	ASTM D4263	Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
.7	ASTM C836/C836M	Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
.8	ASTM E96 (Method B)	Standard Test Methods for Water Vapor Transmission of Materials
.9	ICC-ES AC29	Acceptance Criteria for Cold, Liquid-Applied, Below-Grade, Exterior Dampproofing and Waterproofing Materials

1.3 Submittals

.1 Submit manufacturer's product data sheets, shop drawings, and/or catalogue illustrations identifying details of waterproofing system which have not already been indicated in these documents including installation specifications, material thicknesses, details at joints, cracks, upstands, walls, drains, and termination points for Consultant review prior to starting work.

.2 Submit installation procedures for Consultant review prior to starting work including surface preparation requirements.

.3 Submit with Bid a description of the products to be used to patch rough surfaces suitable for membrane application.

.4 Provide a certificate from system manufacturer confirming the following:

.1 A minimum of 82,000 sq. ft. (7,500 sq. m) of the system has been installed on structures of similar climate and exposure and has performed satisfactorily. Provide to Consultant a list of similar completed waterproofing applications for verification of "satisfactory performance".

.2 The system will meet the warranty requirements as specified in this Section.

.3 Waterproofing systems applicator is presently a licensed applicator of the waterproofing system.

.4 Applicator has a minimum three years of directly applicable waterproofing installation experience, or has installed a minimum of 55,000 sq. ft. (5,000 sq. m) of specified waterproofing system.

.5 Provide a certificate signed by the applicator and system manufacturer certifying the following:

.1 Surfaces to receive waterproofing systems were inspected and found satisfactory to receive the waterproofing system in accordance with the manufacturer's requirements.

.2 Waterproofing system was applied in accordance with manufacturer's recommendations.

.3 Completed waterproofing system conforms to system described.

.4 Additional or supplemental cold applied waterproofing requirements by RJC can be completed without compromising the system or its warranty.

.6 Any existing conditions that may adversely affect the bonding or performance of the membrane shall be brought to the attention of the Consultant, in writing, for resolution prior to installation of membrane. Application of waterproofing implies acceptance of surfaces.

.7 Confirm in writing the compatibility of the proposed waterproofing system with the existing waterproofing prior to application.

.8 Provide three copies of maintenance instructions for finished surfaces prior to Substantial Performance.

1.4 Environmental Requirements

.1 Do not install waterproofing system when ambient air temperature or substrate temperature is less than that specified in manufacturer's specifications.

.1 If this temperature is not reached, installation of temporary heaters is required.

.2 Maintain air temperatures and substrate temperature at installation area in accordance with manufacturer's specifications.

.3 Protect materials from moisture damage or contamination until adequately cured.

.4 Meet the requirements of the Ontario Occupational Health and Safety Act.

.5 During application of waterproofing system, area must be well ventilated such that odours from the waterproofing system do not disturb users of the building.

.1 Provide forced air circulation during installation period for enclosed applications.

1.5 Performance Requirements

.1 The waterproofing membrane system is comprised of a fluid-applied waterproofing membrane specially formulated and installed to provide a monolithic and fully bonded waterproof protective coating. The design properties and installation thicknesses of the membrane are inter-related for proper performance. The performance requirements and warranty requirements apply to the total system and are the responsibility of the waterproofing system applicator and manufacturer.

.2 The waterproofing system shall satisfy the following requirements for the duration of the warranty:

.1 The system shall be totally waterproof, flexible, and thermally compatible with the substrate under applicable service conditions.

.2 The system shall not allow moisture penetration at termination details, drains, upturns, splices, joints, cracks, etc.

.3 The system shall be free of visible pinholes or blisters.

.4 The system shall exhibit zero chloride permeability.

.5 The system shall withstand active cyclical crack movements to a minimum of 1.5 mm and remain waterproof. In locations where cracks have been reinforced with rubber sheets, they shall withstand movements to a maximum of 3 mm and remain waterproof. Membrane shall comply with crack bridging requirements of CAN/CGSB-37.50.

.6 The membrane, primer, or surface patching shall fully adhere to the concrete substrate (adhesion).

.7 All layers of the system cohesively bonded to each other (adhesion).

.8 The system shall not debond or crack.

.9 The waterproofing system shall not blister, swell, crack, delaminate, disintegrate, compress, or stretch unduly:

.1 When subjected to long-term weight.

.2 When subjected to temperature ranges from winter to summer.

.3 When exposed to ultraviolet or any other sun’s rays.

1.6 Warranty

.1 Extended and/or product warranties for the cold-applied waterproofing system shall be supplied for a total warranty period of five years commencing on date of Substantial Performance. Warranty is to be a Joint Warranty by Contractor and Manufacturer. Submit to Consultant a joint warranty certificate that is signed by Contractor and manufacturer.

2.0 PRODUCTS

2.1 Waterproofing Membrane

.1 Cold fluid applied elastomeric waterproofing membrane system designed for concealed building components subject to hydrostatic head that is polyurethane, coal-tar free, and complies with ASTM C836:

.1 TREMproof 250 GC roller, self-levelling or trowel applied, as manufactured by Tremco Commercial Sealants and Waterproofing. Vertical applications only.

.2 Colphene LM 300 spray, brush, or trowel applied, as manufactured by Soprema Canada.

.3 MasterSeal HLM 5000 self-leveling/ squeegee, spray, trowel, or roller applied, as manufactured by BASF.

.4 Approved alternative.

.2 For application to green concrete surface or surface-dry-but-damp concrete surfaces, acceptable product:

.1 TREMproof 250 GC rapid-curing, high solids, VOC compliant, modified polyurethane waterproofing membrane. One-part moisture curing elastomer (Viscosities: Self-Leveling, Roller and Trowel) as manufactured by Tremco Commercial Sealants and Waterproofing.

.2 Approved alternative.

2.2 Accessories

.1 Primer: As recommended by waterproofing membrane system manufacturer

.2 Joint Backing: Closed-cell, polyethylene rod as recommended by membrane manufacturer;

.3 Reinforcing Fabric: Woven fiberglass scrim cloth.

.4 Elastomeric Sheet Flashing: 1/16” thick by 12” wide uncured neoprene sheeting.

.5 Joint Treatment: Acceptable Product:

.1 Dymeric 240FC; Tremco Inc.

.2 TREMproof 201/60T; Tremco Inc.

.3 TREMproof 250GCT; Tremco Inc.

.4 Colphene LM 300; Soprema Canada.

.5 Approved alternative.

.6 Protection Course: As recommended by waterproofing membrane manufacturer:

.1 Acceptable Product:

.1 40-mil HDPE Root barrier; Tremco Inc.

.2 Sopraboard; Soprema Canada

.3 Approved alternative.

.7 Prefabricated Composite Drainage: Two-part prefabricated composite drainage material consisting of a formed polystyrene core covered on one side with filter fabric.

.1 For backfilled walls less than 20 feet in height, a composite drainage mat with non-woven polypropylene filter fabric, 9 gpm/ft flow capacity per unit width and 10,800 lb/ft² compressive strength. Acceptable Product:

.1 Tremdrain 1000; Tremco Inc.

.2 Sopradrain 10G; Soprema Canada.

.3 Approved alternative.

2.3 Surface Patch Materials

.1 Products used to patch rough surfaces shall be 100% solids epoxy and contain no additives or fillers. Membrane material may be used to fill rough areas if approved by manufacturer. Alternate products may be suggested for approval but must be suitable for installation below cold-applied waterproofing.

.2 No extras will be entertained for surface preparation or additional membrane material after bid closing, unless the scope of work changes.

2.4 Equipment

.1 Equipment weights and size shall be submitted to Consultant for approval prior to starting work and arrival on site.

2.5 Aluminum Fastener Bars

.1 All fastener bars to be aluminum 6 mm x 25 mm (0.25” x 1”) in size and fastened to wall with 6 mm x 50 mm long (0.25” x 2”) countersunk anchors at 450 mm (18”) centres and covered with an additional layer of membrane.

3.0 EXECUTION

3.1 Surface Preparation

.1 All existing elements that may affect installation of the waterproofing system shall be removed and re-installed as required for application of waterproofing to surfaces unless otherwise noted on Drawings.

.2 Ensure surfaces are smooth, dry, clean, and free of ice and debris.

.3 Preparation of horizontal and vertical surfaces is to be in strict accordance with the more stringent requirements of the membrane manufacturer’s recommendations and these Contract Documents including the following: preparation and smoothing of rough surfaces, and detailing of cracks, joints, and voids as required. No extras for surface preparation will be entertained after bid closing.

.4 The minimum standard for preparation of surfaces for membrane application shall be abrasive-blast, hand patching voids or depressions in concrete surfaces, and re-pointing masonry block wall joints as required. No extras shall be entertained for this item after the award of Contract. This applies to all foundation walls, footings, etc.

.5 Remove all existing paint and/or existing waterproofing membranes.

.6 New concrete surfaces shall be allowed to air dry a minimum of 14 days after moist curing and not exhibit any condensation under plastic sheet test prior to the placement of the waterproof primer and membrane.

.7 Clean all metal surfaces to be cleaned abrasive blasting; scuff-sand lead flashing and plastic surfaces.

.8 No membrane shall be applied until the surface preparation has been reviewed by Consultant and inspected and accepted in writing by a representative of the system manufacturer.

.9 Clean all surfaces to receive membrane system in accordance with manufacturer's instructions; vacuum clean or blow clean with oil-free compressed air all surfaces to receive sealants, detailing materials, or membranes immediately prior to installation.

.10 Ensure environmental and site conditions, as recommended by the membrane manufacturer, are suitable for installation of work of this Section.

.11 Commencement of work implies acceptance of the previously prepared concrete surfaces and assumption of full responsibility for the surfaces prepared to receive the primer and membrane.

.12 Application procedures that result in toxic fumes or flammable solvent collecting or endangering workers or building occupants are not permitted.

.13 Repair adjacent paint and finishes damaged during installation to match existing.

3.2 Detailing of Cracks and Joints

.1 Rout, clean, prepare, and detail surface cracks in accordance with manufacturer's instructions; install backer rod where required.

.2 Install 1/4" diameter backer rod into corner of all horizontal-to-vertical junctures subject to movement and cover with 1" detail cant of approved sealant; install 1" detail cants at projections, curbs and other horizontal-to-vertical junctures.

.3 Install detail coats, joint and crack treatments, elastomeric flashing, and reinforcing fabric in accordance with manufacturer's instructions.

.4 Allow detail applications to cure in accordance with manufacturer's instructions prior to general application of membrane.

3.3 Membrane Application

.1 Prime surfaces in accordance with manufacturer's instructions.

.2 Prepare surfaces to assure proper coverage rates and verify membrane wet-film mil thickness with gauges as work progresses.

.3 Retain empty product containers during course of work to aid in determining whether completed membrane complies with required average dry-film thickness.

.4 Verify proper dry condition of substrate using method recommended by membrane system manufacturer; perform adhesion checks prior to general application of membrane system using field adhesion test method recommended by manufacturer.

.5 Mask off adjoining surfaces not to receive membrane system.

.6 Apply cold-applied waterproofing system in two lifts evenly to provide a continuous coating. Refer to manufacturer’s written instructions for wet film thickness.

.7 Apply membrane uniformly and allow to cure in accordance with manufacturer's instructions.

.8 Mask top of application to ensure neat straight finish to coating. All vertical surface irregularities to be patched prior to coating application.

.9 Feather terminating edge when entire area cannot be completed in one day; clean area 6" wide along terminating edge of membrane with Xylene solvent on clean white rags prior to start-up on next working day; use primer per manufacturer's instructions as needed; overlap existing work by 6" with new work.

.10 Equipment used for installation of waterproof membrane material shall be approved for use by waterproof membrane manufacturer.

3.4 Protection Board

.1 Apply adhesive, tape, or secure without fastening through waterproofing membrane.

3.5 Inspection and Testing

.1 Testing to be conducted by a testing agency designated by Consultant. Owner will pay costs of inspection and testing described in this Section.

.2 Contractor shall inform Consultant and designated testing agency 72 hours in advance of work to be performed under this Section.

.3 Prior to application of membrane, test moisture content of concrete mass by taping down a 450 mm x 450 mm (18” x 18”) polyethylene sheet for a period of 16 hours minimum to detect evaporation from slab surface. Number of tests shall be designated by membrane manufacturer, or Consultant; minimum number to be one test per 5,000 sq. ft. Locations to be determined by Consultant.

.4 To confirm membrane thickness, Consultant to perform cut tests. Number of tests to be one test per 550 sq. ft. of membrane minimum.

.5 To evaluate bonding of membrane to substrate, and/ or interlayer bonding, pull-off adhesion tests may be performed by the Consultant or designated testing agency at the discretion of Consultant.

.6 Additional tests may be performed at the discretion of the Consultant.

.7 Repair waterproofing system at test locations at no extra cost.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to prepare and seal concrete surfaces as indicated on the Drawings and described herein.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3 Alberta Transportation: Technical Standard B388 - Specification for Concrete Sealers

1.3 Performance Requirements

.1 System shall not alter the traction of the existing concrete surface.

.2 For new concrete surfaces, system shall reduce the permeability of the in-situ concrete surface by a minimum of 75% in comparison with the unsealed surface.

.3 For existing concrete surfaces, system shall:

.1 Reduce permeability of the in-situ concrete surface by a minimum of 75% in comparison with virgin unsealed concrete (i.e. portions of concrete deck that has not been sealed in the past or contaminated by grease or oils).

.2 Show a reduction in permeability of newly sealed in-situ concrete surface in comparison with in-situ cleaned but unsealed concrete surface.

1.4 Submittals

.1 Applicator shall be certified in writing by sealer manufacturer.

.2 Provide a letter signed by Contractor and sealer manufacturer certifying that:

.1 Surfaces to receive sealer were inspected and confirmed to be prepared in conformance with manufacturer requirements.

.2 Sealer was applied in accordance with manufacturer installation instructions.

.3 Completed installation conforms to the Specification and manufacturer requirements.

1.5 Warranty

.1 Extended and/or product warranties for the concrete surface sealer shall be supplied for a total warranty period of five years commencing on date of Substantial Performance. Warranty is to be a Joint Warranty by Contractor and Manufacturer. Submit to Consultant a joint warranty certificate that is signed by Contractor and manufacturer.

2.0 PRODUCTS

2.1 Approved Surface Sealers

.1 All sealers must be part of the Approved Product List for Bridge Sealers per Alberta Transportation.

.2 All sealers shall be listed under Type lc exposure. These are high performance, low VOC, penetrating sealers used for new bridges and overlays with low water/ cement ratios (0.30-0.45) where the relative moisture content is less than or equal to 80%.

.3 The application rates approved by the Alberta Transportation and Utilities (ATU) are for comparing different products on a uniform substrate. Actual application rates should be adjusted to suit the permeability of the intended concrete substrate. The minimum rate of application shall be 30% higher than the application rates approved by ATU. Flood coat the surface and repeat on high spots and areas that dry quickly.

3.0 EXECUTION

3.1 Workmanship

.1 Surface cleaning and surface preparation shall be per manufacturer’s recommendations. Surfaces shall be cleaned prior to preparing cracks or application of sealer. The minimum standard of cleaning for vertical surfaces shall be abrasive blast. The minimum standard of cleaning for horizontal surfaces shall be shot blast.

.2 Concrete and sealants are to be adequately cured and concrete surfaces are to have a moisture content not exceeding sealer manufacturer's specifications. No material shall be placed prior to review of the concrete surfaces by the Consultant and the concrete sealer manufacturer.

.3 Contractor applying sealer shall be an approved applicator of materials.

.4 Procedures for application of sealer are to be in strict accordance with manufacturer's recommendations.

.5 Application rates may vary throughout the structure. Re-apply material to areas of the concrete surface that dry quickly. Test applications of sealer may be requested by Consultant to determine material application rates over representative areas. Avoid excessive application resulting in loss of skid resistance.

.6 Recommended Sequence (Vertical Surface):

.1 Surface cleaning.

.2 First application of sealer.

.3 Route and caulk cracks and joints.

.4 Second application of sealer over cracks and joints.

.7 Recommended Sequence (Horizontal Surface):

.1 Surface cleaning.

.2 Application of fillet bead caulking.

.3 First application of sealer.

.4 Route and caulk cracks and joints.

.5 Second application of sealer over cracks and joints caulked in .4 above.

.8 Contractor to determine compatibility between sealer and caulking. If necessary, Contractor may reverse sealer application and caulking operations provided surfaces are re-cleaned prior to sealing concrete.

.9 Traffic shall not be allowed onto treated areas until materials are adequately cured.

3.2 Inspection and Testing

.1 Testing to be conducted by a testing agency designated by Consultant. Owner will pay costs of inspection and testing described in this Section.

.2 Contractor shall inform Consultant and testing agency 72 hours in advance of work to be performed under this section.

.3 For newly placed concrete:

.1 Upon completion of application of new concrete surface sealer and after an adequate curing period as confirmed by the manufacturer, a series of 75 mm diameter core samples (minimum length 75 mm) shall be extracted from the newly sealed slab surface for absorption testing. Minimum number to be one test per 400 sq. m. Locations to be determined by Consultant. Additional tests may be located and paid for by manufacturer.

.2 Absorption testing to be performed on these samples is to be in accordance with latest version of the Alberta Transportation and Utilities test procedure BT-005, method B (penetrating sealers). Control face of the sample being tested being the unsealed face of the core sample at the 50 mm horizon (i.e. down from top of sample). This test shall confirm if the newly installed system has reduced permeability of the existing concrete surface to the level specified in performance requirements of the Specification.

.4 For existing concrete surfaces:

.1 Upon completion of slab surface preparation as confirmed by the manufacturer and prior to application of new concrete surface sealer, a series of 75 mm diameter core samples (minimum length 75 mm) shall be extracted from the unsealed slab surface and use as control samples for absorption testing. Minimum number to be one test per 400 sq. m. Locations to be determined by Consultant. Additional tests may be located and paid for by manufacturer.

.2 Upon completion of application of new concrete surface sealer and after an adequate curing period as confirmed by the manufacturer, a second series of 75 mm diameter core samples (minimum length 75 mm) shall be extracted from the newly sealed slab surface for absorption testing. Locations where these core samples are to be extracted are to be within one core diameter of the first set of core sample extractions (.3 above).

.3 Absorption testing to be performed on these samples is to be in accordance with latest version of the Alberta Transportation and Utilities test procedure BT-005, method B (penetrating sealers) unless otherwise modified by this specification.

.4 To determine the reduction in permeability of the in-situ sealed concrete in comparison with the virgin unsealed concrete surface, absorption testing is to be performed on the second series of core samples extracted from the deck after application of the surface sealer. Control face of the sample being the unsealed face of the core sample at the 50 mm horizon (i.e. down from top of the sample).

.5 To determine that the installation of the new sealer has reduced the permeability of the newly sealed in-situ concrete surface in comparison with the unsealed but cleaned in-situ concrete surface, the absorption testing is to be performed on the top surface of both series of core samples. The control face of the testing being the unsealed top surface of the first series of core samples that were extracted prior to the application of the surface sealer.

.5 Additional tests may be performed at the Consultant’s discretion to confirm in-situ absorption.

.6 Contractor to repair the concrete and sealer system at test locations at no extra cost.

END OF SECTION

1.0 GENERAL

1.1 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	ASTM C794	Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
.4	ASTM C920	Standard Specification for Elastomeric Joint Sealants
.5	ASTM C1193	Standard Guide for Use of Joint Sealants
.6	ASTM C1248	Standard Test Method for Staining of Porous Substrate by Joint Sealants
.7	ASTM C1472	Standard Guide for Calculating Movement and Other Effects When Establishing Sealant Joint Width
.8	ASTM C1521	Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints
.9	ASTM D2202	Standard Test Method for Slump of Sealants

.10 Sealant, Waterproofing and Restoration Institute (SWRI) publication, Sealants: The Professionals' Guide 2013.

1.2 Submittals

.1 Samples:

.1 Submit samples of each type of material and colour to be used and to facilitate colour selection.

.2 Cure samples under equivalent conditions to job site, before submission.

.2 Maintenance Data:

.1 Submit data covering care, cleaning, and maintenance as per Section 01 78 23.

1.3 Quality Assurance

.1 Sealant manufacturer's representative shall review site conditions, joint design, and installer's qualifications. Report unsatisfactory conditions to the Consultant.

.2 Representative shall check container labels, randomly inspect preparation of substrate materials, and perform random testing of installed work in at least 10 locations.

.1 Cut test locations to be 150 mm long.

.2 Certify thickness, hardness, and surface finish conform to intended design.

.3 Report to the Consultant.

1.4 Qualifications

.1 Perform the work of this Section using skilled mechanics having at least five years of experience, and trained and competent in use of sealant materials.

1.5 Mock-Up

.1 Construct mock-up to show location, size, shape and depth of joints complete with back-up material, primer, caulking, and sealant.

.2 Construct mock-up in location directed by the Consultant.

.3 Joint to be size, shape, and depth of joints applicable to work, complete with back-up material, primer, and sealant.

.4 Mock up may be part of finished work.

.5 Allow 24 hours for review of mock-up by Consultant before proceeding with sealant work.

.6 Test sealant in contact with samples of materials to be caulked to ensure that proper adhesion will be obtained and no staining of any materials will result. Prepare joint samples at the site of each type of sealant for each joint condition.

1.6 Performance Requirements

.1 Sealant system shall satisfy the following requirements for the duration of the warranty period:

.1 Totally waterproof, flexible, and thermally compatible with substrate under applicable service conditions.

.2 Provide a weathertight seal that does not allow moisture penetration.

.3 Withstand active cyclical movements of 100% extension and 50% compression of joint width and remain bonded and watertight.

.4 Shall not debond, crack, or craze.

.5 Shall not leak.

.2 Reference to products does not relieve manufacturer of responsibility to comply fully with all specified criteria.

1.7 Delivery, Storage, and Handling

.1 Deliver, handle, store, and protect materials as recommended by materials manufacturer.

.2 Deliver and store materials in original wrappings and containers with manufacturer’s seals and labels, intact. Protect from freezing, moisture, water, and contact with ground or floor.

.3 Store material in heated conditions during winter work.

1.8 Field Conditions

.1 Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Labour Canada.

.2 Conform to manufacturer’s recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.3 Minimum application temperature for sealant to be per sealant manufacturer’s written application instruction.

.4 Special care must be taken to ensure that substrate surfaces are clean and dry. If applying sealants below 4°C, the applicator is to consult with the sealant manufacturer and follow any additional recommendations.

2.0 PRODUCTS

2.1 Materials

.1 Joint Cleaner: Xylol, methylethylketone, alcohol, or non-corrosive type recommended by sealant manufacturer and compatible with joint forming materials.

.2 Primers: Types recommended by sealant manufacturer.

.3 Joint Back-Up: Round closed cell foam, extruded urethane, Shore A hardness of 20, tensile strength 140 to 200 kPa, oversized 30-50%, compatible with sealant and primer, non-adhering to sealant, and non-gassing.

.4 Bond Breaker: Pressure-sensitive plastic tape that will not bond to sealants.

.5 Sealants:

.1 Category 1: One part silicone conforming to ASTM C920 Type S, Grade NS, Class 50, Use NT, M, G, A, O.

.1 790 by Dow Corning.

.2 Spectrem 1 by Tremco Ltd.

.3 Approved Alternative

.2 Colour of Sealants: Selected by the Owner to match adjacent finishes. Contractor to provide colour samples to facilitate selection.

3.0 EXECUTION

3.1 Examination

.1 Examine surfaces before commencing work of this Section.

.2 Installation of sealant implies acceptance of surfaces. Notify Consultant in writing of any existing conditions that may affect bonding or performance of the sealant for resolution before installation of materials.

3.2 Preparation

.1 Ensure ambient and existing site conditions are suitable for installation of work of this Section, as recommended by manufacturer.

.2 Ensure all existing sealant and extruded tapes are removed and surfaces prepared and primed in accordance with manufacturer's recommendations.

.3 Prepare surfaces in strict accordance with manufacturer's recommendations, including preparation and smoothing of rough surfaces and detailing of cracks, joints, and voids.

.4 Ensure joint surfaces are sound and free of all moisture, dust, oils, and other materials that may adversely affect sealant bond.

.5 Minimum standard of cleaning for masonry surfaces shall be wire brush, or grinding, or equivalent to remove all traces of existing sealant and to expose clean substrate.

.6 Clean metal flashings and mullions so as not to damage surface finishes.

.7 On non-porous substrates, use a two-wipe method when cleaning. First wipe shall contain the solvent, followed immediately by second wipe with a clean cloth to collect any re-deposited material loosened by the first wipe.

.8 After cleaning, ensure that joints are dry, dust free, and frost free before applying sealant.

.9 Apply no primer or first coat until surface preparation has been inspected and accepted in writing by a representative of the sealant manufacturer.

.10 Examine joint sizes and correct to achieve depth ratio of one-half of joint width with minimum width and depth of 6.0 mm and maximum width of 25 mm.

.11 Install joint back-up to achieve correct joint depth.

.12 Where necessary to prevent staining, mask adjacent surfaces before priming and caulking.

.13 Apply bond breaker tape where required, in accordance with manufacturer's instructions.

.14 Prime sides of joints in accordance with manufacturer's instructions immediately before caulking.

.15 Install interior splines before caulking of exterior glass bead.

3.3 Application

.1 Apply sealants in accordance with manufacturer's instructions. Apply using gun with proper size nozzle. Use sufficient pressure to fill voids and joints solid. Superficial pointing with skin bead is not acceptable.

.2 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, and embedded impurities. Tool surface neatly to produce slight concave joint.

.3 Do not use application procedures that result in toxic fumes or flammable solvents collecting and endangering workers or building occupants.

.4 Category 1: Apply sealant to the following exterior locations:

.1 Joints between window or door frames to adjacent building components.

.2 Around perimeter of exterior wall penetrations (window framing to cladding).

.3 At junctions of dissimilar materials (i.e. frame construction to masonry construction).

.4 Where detailed.

.5 Where directed by Consultant

.5 In masonry cavity construction, vent caulked joints from cavity to 3 mm beyond external face of wall by inserting 3 mm diameter plastic tubing at bottom of each joint and maximum of 1500 mm o.c. vertically.

.6 Cure sealants in accordance with sealant manufacturer’s instructions.

3.4 Field Quality Control

.1 Provide safe access for Consultant to perform periodic reviews of various phases of the work of this Section.

.2 Notify Consultant and any testing agency that may be designated by the Consultant 24 hours in advance of work to be performed under this Section.

.3 Repair test locations.

.4 Tests may be performed at the Consultant's discretion to confirm in-situ material thickness.

3.5 Cleaning and Protection

.1 Clean adjacent surfaces immediately and leave work neat and clean. Remove excess sealant and droppings, using recommended cleaners as work progresses. Remove masking tape after tooling of joints.

.2 Protect caulked joints until sufficiently cured.

.3 Protect completed work of this Section from staining or contamination.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, equipment, material, supervision, and services necessary to seal designated cracks and joints in stair and landing slabs, and install heel bead sealant, as follows:

.1 Removal of existing materials including sealants, caulking, backer rods, and contaminants at joints, cracks, and vertical and horizontal interfaces in area of work.

.2 Cleaning and preparation of substrate surfaces.

.3 Supply and installation of new sealant materials at cracks, joints, and heel bead locations including primers, backers, and bond-breaker tapes as required.

.4 Protection and clean up.

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	ASTM C920	Standard Specification for Elastomeric Joint Sealants
.4	ASTM C1193	Standard Guide for Use of Joint Sealants

1.3 Performance Requirements

.1 Sealant shall be totally waterproof, flexible, and thermally compatible with the substrate under applicable service conditions.

.2 Sealant assemblies to remain bonded and watertight, and withstand active cyclical movements of at least ±25% of joint width, and no less than 6 mm across joint faces.

.3 Sealant shall remain fully bonded to the substrate surfaces.

.4 Sealed joint shall not leak.

.5 Sealant to be suitable for pedestrian and vehicle traffic.

1.4 Site Examination

.1 Bidders shall visit the Place of the Work and inspect the existing surfaces to receive new sealants. Substrate surfaces and edges may require repairs and surface preparation after cleaning, and prior to installation of sealants. Bid shall include all costs of surface preparation and patching of rough or damaged surfaces. No extras for substrate surface preparation or patching, or additional labour or materials will be entertained after bid closing.

.2 If desired, bidders may remove sections of existing sealant materials in order to evaluate removal requirements, substrate conditions, and patching requirements. Bidders agree to accept existing substrate conditions at time of bid.

1.5 Submittals

.1 Submit a certified statement from manufacturer attesting that all areas and surfaces were satisfactorily prepared to receive sealant per manufacturer instructions and requirements.

.2 Submit statement from manufacturer attesting that all sealant was installed in accordance with manufacturer’s written instructions.

1.6 Delivery, Storage, and Handling

.1 Deliver, handle, store, and protect materials as recommended by material manufacturer.

.2 Deliver and store materials in original wrappings and containers with manufacturer’s seals and labels intact. Protect from heat, direct sunlight, freezing, moisture, water, and contact with ground or floor.

.3 Maintain containers and labels in undamaged condition.

2.0 PRODUCTS

2.1 Materials

.1 Multi-component urethane or polyurethane conforming to ASTM C920 Type M, complete with manufacturer's recommended primers, bond breakers, and backing rods. Approved products are:

.1 Crack and joint sealant at level surfaces: Grade P - Self-levelling consistency complete with manufacturer's recommended primers, bond breakers, and backing rods. Colour to be selected by the Owner from a standard colour chart. Approved products are:

.1 Tremco - Vulkem 445SSL

.2 Tremco - THC-901

.3 Sika - SikaFlex-2c SL

.4 Master Builders Solutions - MasterSeal SL 2

.5 LymTal - Iso-Flex 880 GB

.2 Heel bead, crack, or joint sealant at level or vertical surfaces: Grade NS - Gun grade consistency complete with manufacturer's recommended primers. Colour to be selected by the Owner from a standard colour chart. Approved products are:

.1 Tremco - Dymeric 240FC

.2 Sika - Sikaflex-2c NS EZ Mix

.3 Sika - Sikaflex-2c NS EZ Mix TG

.4 Master Builders Solutions - MasterSeal NP 2

.2 Primer: Non-staining type recommended by sealant manufacturer.

.3 Backer rod to be non-gassing. Approved product is Sofrod.

2.2 Samples

.1 If requested by Consultant, apply samples of joint sealant on site to determine material application rates and final appearance.

3.0 EXECUTION

3.1 Surface Preparation – Crack Locations

.1 All slab surfaces to be shot-blasted or abrasive-blasted clean prior to designation of cracks to be sealed.

.2 Unless otherwise noted on Drawings or in Specifications, cracks are to be routed, ground, or sawcut to provide a straight-sided joint that is 13 mm wide by 13 mm deep. Do not cut beyond actual extent of crack.

.3 Abrasive-blast sawcut surfaces prior to priming and sealing.

.4 Clean substrate of all moisture, dust, grease, oil, existing caulking, paint, loose, and other foreign material that may adversely affect sealant bond prior to priming and sealing.

3.2 Surface Preparation - Heel Bead Locations

.1 Remove all existing caulking, sealant, and prepare surfaces in accordance with manufacturer’s recommendations.

.2 Lightly abrasive-blast substrate surfaces.

.3 Clean substrate of all moisture, dust, grease, oil, existing caulking, paint, loose, and other foreign material that may adversely affect sealant bond prior to priming and sealing.

3.3 Sealant Application

.1 Sealants, tapes, joint fillers, and back-up materials to be physically and chemically compatible with each other and with adjacent materials.

.2 Installation of sealant implies acceptance of surfaces. Notify Consultant in writing of existing conditions uncovered that may affect bonding of performance of sealant for resolution prior to sealant installation.

.3 Application procedures that result in toxic fumes or flammable solvents collecting or endangering workers or building occupants are not permitted.

.4 Mix components in accordance with manufacturer’s instructions.

.5 Prime surfaces to manufacturer’s instructions.

.6 Material application is to be in strict conformance with manufacturer's recommendations with proper application temperatures adhered to. Do not install primer or sealant when temperature is below 5˚C. Do not prepare substrates or install sealants if rain or other inclement weather is imminent or forecasted.

.7 Form surface of sealant at cracks and joints smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities. Sealant to be continuous, free of air voids, and applied such that it fills voids and joints solid to leave a watertight installation. Neatly tool surface to a slight concave profile unless otherwise indicated in Specifications and Drawings.

.8 Apply heel bead sealant to all vertical and horizontal interfaces within areas to receive a surface waterproofing system or as otherwise shown on Drawings to fill all voids and joints solid and tool to a uniform fillet with a minimum throat of 20 mm, unless otherwise indicated on Drawings.

.9 Use dry tooling method. Do not use tooling agents such as soapy water or solvents that have not been approved by sealant manufacturer.

.10 Cure sealants in accordance with manufacturer's instructions. Protect sealant and caulked joints until sufficiently cured to allow traffic.

3.4 Clean Up

.1 Clean adjacent surfaces immediately, leaving work area neat and clean.

.2 Remove excess sealants and droppings using recommended cleaners as work progresses. Remove masking tape after tooling of joints.

3.5 Inspection and Testing

.1 Adhesion tests will be performed to ensure proper bonding of sealant material to substrate. Manufacturer's representative may also perform adhesion testing as required to satisfy themselves prior to issuance of manufacturer's warranty.

.2 Repair all test locations at no extra cost.

END OF SECTION

1.0 GENERAL

1.1 Section Includes

.1 Supply and installation of barrier free thermally broken aluminum swing doors at main entrance and where indicated

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	AAMA/WDMA/CSA 101/ 1.S.2/A440	North American Fenestration Standard / Specification for Windows, Doors, and Skylights
.4	AAMA CW 10	Care and Handling of Architectural Aluminum from Shop to Site
.5	ASTM C1048	Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass
.6	ASTM B209	Standard Specification for Aluminum and Aluminum – Alloy Sheet and Plate
.7	ASTM E283	Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
.8	ASTM E331	Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Static Air Pressure Difference
.9	ASTM E547	Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference
.10	ASTM E783	Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors

.11	ASTM E1105	Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference
.12	ASTM E2190	Standard Specification for Insulating Glass Unit Performance and Evaluation
.13	ASTM F588	Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact
.14	ASTM E2189	Standard Test Methods for Testing Resistance to Fogging in Insulated Glass Units
.15	ASTM D2240	Standard Test Methods for Rubber Property – Durometer Hardness
.16	CSA A440S1	Canadian Supplement to AAMA/WDMA/ CSA 101/I.S.2/A440-17, North American Fenestration Standard/Specification for Windows, Doors, and Skylights.
.17	CSA A440.2/CSA A440.3	Fenestration Energy Performance
.18	CSA A440.4	Window, Door, and Skylight Installation
.19	CSA S157	Strength Design in Aluminum
.20	SFM-1	Aluminum Storefront and Entrance Manual

1.3 Coordination

.1 Coordinate work of this section with that of adjoining work during preparation of shop drawings and field installation to ensure continuity of air/vapour seals at areas of adjoining work.

.2 Do not install any windows, doors or glazing until all nearby grinding and mortar work are complete.

.3 Pre-installation Meeting: Convene pre-installation meeting after Award of Contract and one week prior to commencing work of this Section to verify project requirements, substrate conditions and coordination with other building sub-trades, and to review manufacturers written installation instructions.

.1 Notify attendees 2 weeks prior to meeting and ensure meeting attendees include as minimum:

.1 Owner;

.2 Consultant;

.3 Glazing subcontractor;

.4 Manufacturer's Technical Representative

.2 Ensure meeting agenda includes review of methods and procedures related to aluminum door installation including co-ordination with related work.

.3 Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within 1 week of meeting.

1.4 Submittals

.1 Product Data

.1 Submit product data including manufacturer's literature for aluminum, panels, styles, rails , components and accessories, indicating compliance with specified requirements and material characteristics.

.1 Submit list on aluminum door manufacturer's letterhead of materials, components and accessories to be incorporated into Work.

.2 Include product names, types and series numbers.

.3 Include contact information for manufacturer and their representative for this Project.

.2 Test Reports:

.1 Submit reports from an independent testing agency indicating windows and doors meet specified performance characteristics and physical properties including air infiltration, water infiltration and structural performance.

.3 Shop Drawings

.1 Submit shop drawings prepared under supervision and bearing the seal of a professional engineer licenced to practice in the Province of Ontario. Upon request, provide structural calculations confirming conformance with applicable building codes, other regulatory requirements, and CSA S157 and CAN/CGSB-12.20.

.2 Submit completed Ontario Building Code Letters of Assurance together with initial shop drawing submission.

.3 Include in Shop Drawings

.1 A door schedule indicating door and window type, quantity (total as well as on each floor), operation direction, size, hardware, elevation view of windows, and sill heights from interior floor finish.

.2 Scaled elevations, sections, plans, and details including dimensions. Indicate rough opening requirements, type and frequency of fasteners, and tolerances of adjacent construction.

.3 Each type of door, hardware and locations, framing system, extrusion profiles, methods of assembly, section and hardware reinforcement, anchorages, anchorage type and location, isolation coatings, finishes, glass type and thickness, glazing components.

.4 Full size details for head, sill, and jamb conditions, junctions between combination units (coupling mullions), and interior and exterior trim. Clearly indicate method and location of connection to existing and retrofit wall components.

.5 Required clearances for installation.

.6 References to related Drawing details.

.7 Drainage and ventilation paths within door assembly and at building envelope interface.

.8 Fastening locations and attachment points. Anchors and fasteners shown on Design Drawings are not intended to represent actual fastening locations or types required for installation.

.9 Comprehensive detailing showing continuity of envelope air, vapour, and moisture retarders.

.10 Locations and types of sealant.

.4 Review of shop drawings by the Consultant shall not relieve the Contractor of any responsibilities to perform under the terms of this specification. Do not commence any window fabrication before review of shop drawings is complete.

.4 Performance Certification

.1 Structural, durability, weather tightness, and energy use requirements of this section shall be certified by a Professional Engineer, using standards recognized by the local Authority Having Jurisdiction, the product manufacturer, and current trade associations.

.5 Field Review Reports

.1 Professional Engineer who signed and sealed the shop drawings shall perform sufficient field reviews to provide a Letter of Assurance after completion of the Work, giving assurance that the Work has been fabricated and installed in general conformance with the shop drawings.

.2 Submit written field review reports of field reviews within 48 hours of the visit to site.

.6 Installer Qualifications

.1 Submit letter verifying installer’s experience with work similar to work of this Section.

.7 Maintenance Data

.1 Submit the following data as part of the specified maintenance manual:

.1 A recommended inspection procedure and schedule and a component replacement schedule.

.2 Materials and methods for cleaning and maintenance that will not harm or stain glass, aluminum, rubber, sealant, and other components of the assembly.

.3 Re-glazing procedures and accessories, including supplier information for any proprietary glazing components required during the procedure.

1.5 Quality Assurance

.1 Insulated glazing unit manufacturer shall be a member in good standing of, and units shall be certified by, Insulating Glass Manufacturers Alliance (IGMA).

.2 Glass and glazing work under this Section shall conform to IGMA standards.

.3 Door manufacturer and installer shall each have a minimum of five years uninterrupted experience in carrying out projects of similar size. Installer shall employ suitably qualified tradespeople with at least five consecutive years of experience in this type of work. Provide evidence of experience upon request.

1.6 Delivery, Storage, and Handling

.1 Deliver, store, and handle materials to avoid damage, in accordance with AAMA CW 10.

.2 Store products on site in a safe and secure location that is inaccessible to building users and the public.

.3 Stack frames vertically on edge so that water cannot accumulate on or within materials. Use wood, cork, or plastic shims between components to provide for water drainage and air circulation.

.4 Cover glazing and frame with a protective film prior to shipment to mitigate damage to frames and glazing. Leave protective film in place until final installation.

1.7 Warranty

.1 Work included in this section shall be free of defects and deficiencies in materials and workmanship, and continue to perform satisfactorily for a period of five (5) years from date of Substantial Performance of the Work.

.1 Satisfactory performance means compliance with performance criteria and testing and construction standards of this specification, and with reviewed shop drawings. This includes performance of finishes; hardware; glass and glazing materials; structural attachment; air, vapour and water seals; sealants; and flashings.

.2 Finished surface coating on aluminum door extrusion and related components shall be warranted against excessive surface finish fading, non-uniform fading, loss of gloss, development of pitting corrosion, or flaking discernable at a distance of 2 m from surface of frame.

.3 Correct deficiencies that appear during the warranty period, at no cost to the Owner.

.2 Provide sealed insulating glass unit manufacturer's warranty per Section 08 81 00 – Glass and Glazing

.3 All on site modifications to window assemblies are to be in accordance with and have written approval from manufacturer, and shall not compromise specified warranties.

2.0 PRODUCTS

2.1 Design Responsibility

.1 The Contactor shall be fully responsible for design, fabrication, and installation of door system and all of its components as required to meet specified design criteria and performance requirements.

.2 Design Drawings indicate dimensions and profiles similar to those expected to be required to meet specified performance requirements. The Contractor may propose designs with minor changes to detailing, except where expressly noted on Drawings or expressly stated in Specifications that a requirement may not be altered or may only be altered to a limited extent.

.3 The Contractor's design responsibility shall include temporary provisions associated with fabrication, transport, storage, lifting, installation, and temporary closure of building.

.4 Consultant's review of submittals and of work of this Section is for the benefit of the Owner only and does not make the Consultant responsible for the design.

2.2 Design Criteria

.1 Design aluminum components to CAN/CSA S157.

.2 Compliance with 2012 OBC barrier-free accessibility design.

2.3 Performance Requirements

.1 Doors:

.1 Air Infiltration: not exceeding 0.06 CFM/sq.ft. (0.3 L/S/m2) per ASTM E283 at differential pressure across assembly of 6.24 psf (300 Pa)

.2 Static Water: 10 PSF (480 Pa) per ASTM E331

.3 Deflection Load: +/-70 PSF per ASTM E330

.4 Structural Load: +/- 105 PSF per ASTM E330

.5 Thermal Transmittance (U-factor): to AAMA

.1 Clear Glass: 0.54 BTU/h-ft2-F (3.06 W/m2-K)

.2 b. Low E Glass: 0.32 BTU/h-ft2-F (1.81 W/m2-K)

.6 Condensation Resistance: no less than 62

2.4 Acceptable Products

.1 The following Products may meet specified requirements; however, it is responsibility of the Contractor and supplier to confirm.

.1 Door basis of design: TerraPorte 7600 Out0Swing accessABLE™ or approved equivalent.

.2 Storefront Basis of design: FlushGlaze BF 3400 or approved equivalent.

.3 Approved Manufacturers:

.1 Oldcastle

.2 Alumicor

.3 Kawneer

.4 Approved Alternate

.4 All aluminum entrance doors and storefront by same manufacturer.

2.5 Frame and Sash Materials

.1 Aluminum:

.1 ASTM B221, alloy 6063-T6 for extrusions; ASTM B209, alloy 5005-H16 for sheets; or other alloys and temper recommended by manufacturer appropriate for specified finish.

.2 Minimum thickness of 0.188” for rails and 0.050” for glazing stops.

.2 Internal Reinforcing:

.1 ASTM A36 for carbon steel; or ASTMB308 for structural aluminum

.2 Shapes and sizes to suit installation.

.3 Steel components factory coated with alkyd type zinc chromate primer complying with FS TT-P-645.

.3 Anchorage Devices:

.1 Manufacturer’s standard formed or fabricated steel or aluminum assemblies of shapes, bars or tubes.

.2 Hot-dip galvanized steel assemblies after fabrication, comply with ASTM A123, 2.0 ounce minimum coating.

2.6 Glass and Glazing Materials

.1 Refer to Section 08 81 00 – Glass and Glazing

2.7 Hardware

.1 All hardware, unless otherwise noted, to meet 2012 OBC requirements and to be recommended by the door manufacturer and approved by the Consultant.

.1 Continuous hinges: Offset type, Select Hinges SL11 SD

.2 Pulls: RM3250, 1.5” diameter, satin stainless steel finish, L=50” with mid-point

.3 Push: Adams Rite 8400 Mortise Panic c/w cylinder.

.4 Closer: LCN 4040XP with 18G Drop Plate.

.5 Lock: Manufacturer Standard.

.6 Cylinder: Manufacturer Standard.

.7 Thumbturn: Manufacturer Standard.

.8 Sill Sweeps: Manufacturers standard pile sill sweeps.

.9 Threshold: must not exceed ½" (13 mm) in height above the adjacent floor level and have a bevel with a maximum slope of 1 in 2.

.1 One piece per door opening, extruded aluminum. Barrier free height.

2.8 Accessories

.1 Weather-stripping: Flexible at minimum design temperature, and as follows:

.1 Wood pile conforming to AAMA 701.2.

.2 Provide EPDM or vinyl-blade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.

.2 Expansion Anchor Devices: Lead-shield or toothed steeled, drilled-in, expansion bolt anchors.

.3 Protective Coatings: Cold-applied asphalt mastic complying with SSPC-Paint 12, compounded for 30 mm thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645

.4 Touch-Up Primer for Galvanized Components: Zinc oxide conforming with FS TT-P-641

.5 Joint Sealants: As specified in Section 07 92 00.

.6 Fasteners:

.1 Aluminum, non-magnetic stainless steel or other non-corrosive materials compatible with items being fastened.

.2 Provide concealed fasteners wherever possible.

.3 For exposed locations, provide Phillips flathead screws with finish matching item fastened.

.4 For concealed locations, provide manufacturer' standard fasteners.

.7 Glazing Gaskets: Compression type design, replaceable, molded or extruded, of neoprene, polyvinyl chloride (PVC), or ethylene propylene diene monomer (EPDM). Profile and hardness as required to maintain uniform pressure for watertight seal.

2.9 Fabrication

.1 Coordination of Fabrication:

.1 Check actual frame or door openings required in construction work by accurate field measurements before fabrication.

.2 Fabricate units to withstand loads which will be applied when system is in place.

.2 Fabricate window and door units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement over 1,800 mm or less and plus or minus 3.0 mm for units with a diagonal measurement over 1800mm.

.3 Continuously and uniformly compress length of gaskets during installation to compensate for linear shrinkage.

.4 Anchor using metal strap anchors or concealed fasteners through frames.

.5 Fit corners to provide hairline joint 0.5 mm. Provide continuous sill and head sections for combination units.

.6 Face dimensions detailed are maximum permissible sizes.

.7 Conceal fasteners wherever possible.

.8 Reinforce work as necessary for performance requirements, and for support to structure.

.9 Separate dissimilar metals and aluminum in contact with concrete utilizing protective coating or preformed separators which will prevent contact and corrosion.

.10 Comply with Section 08 81 00 for glazing requirements.

2.10 Fabrication – Aluminum Entrances and Storefront

.1 Entrance Doors:

.1 Fabricate with mechanical joints using internal steel reinforcing plates and shear blocks attached with fasteners and by welding

.2 Provide extruded aluminum glazing stops of rounded and mitred design, permanently anchored on security side and removable on opposite side.

.2 Hardware:

.1 Cut, reinforce, drill and tap frames and doors as required to receive hardware.

.2 Comply with hardware manufacturer's templates and instructions.

.3 Use concealed fasteners wherever possible.

.3 Welding:

.1 Comply with recommendations of the Canadian Welding Bureau.

.2 Use recommended electrodes and methods to avoid distortion and discoloration.

.3 Grind exposed weld smooth and flush with adjacent surfaces; restore mechanical finish.

.4 Flashings: Form from sheet aluminum with same finish as extruded sections. Material thickness as required to suit condition without deflection or "oil canning".

.5 Finishes:

.1 Anodized:

.1 Conforming to AA-M12C22A31 and AAMA 611

.2 Architectural Class II clear anodized.

2.11 Air Barrier and Vapour Retarder

.1 Seal door to building air barrier and vapour retarder as follows:

.1 Material: Identical to, or compatible with, building air barrier and vapour retarder materials to provide required airtightness and vapour diffusion control throughout exterior envelope assembly.

.2 Material Width: Adequate to provide required airtightness and vapour diffusion control to building air barrier and vapour retarder from interior.

3.0 EXECUTION

3.1 Verification of Conditions

.1 Inspect, measure, and survey all areas affecting work of this section before commencing installation. Promptly report surfaces considered not acceptable to receive the work of this Section to the Consultant in writing. Commencement of work implies acceptance of conditions.

.2 Do not install any aluminum work or glazing until all nearby welding, grinding, sandblasting, waterproofing, mortar work, and acid etching are complete.

3.2 Installation

.1 Erection Tolerances:

.2 Limit variations from plumb and level.

.1 1/8” in 10’0’ vertically.

.2 1/8” in 20’0 horizontally.

.3 Limit variations from theoretical locations: 1/4” for any member at any location.

.4 Limit offsets in theoretical end-to-end and edge-to-edge alignment: 1/16” from flush surfaces not more than 2” apart or out-of-flush by more than 1/4”.

.5 Install doors and hardware in accordance with manufacturers printed instructions and approved shop drawings and specifications.

.6 Set units plumb, level and true to line, without warp or rack of frame.

.7 Separate dissimilar materials at contact points, including metal in contact with masonry or concrete surfaces to prevent corrosion.

.8 Glazing: Refer to Section 08 81 00.

.9 Adjusting: Test door operating function. Adjust closing and latching speeds and other hardware in accordance with manufacturer's instructions to ensure smooth operation.

3.3 Caulking

.1 Caulk junction of frame and adjacent building components both inside and outside.

.2 Apply sealant in accordance with Section 07 92 00 – Building Envelope Sealants. Conceal sealant within sliding door units except where exposed use is permitted by the Consultant.

3.4 Protection

.1 Take all precautions necessary to protect materials, before and after installation, from mortar, water run-off from concrete and other potential causes of damage to glass surfaces and aluminum finishes.

.2 Do not rely solely on protective plastic films to protect materials.

3.5 Cleaning

.1 Clean interior and exterior surfaces as soon as adjacent contaminating activities are completed.

.2 Comply with window manufacturer recommendations for cleaning.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 This Section applies to all glass and glazing work not specified in other sections.

.2 Furnish all labour, materials, equipment, and services necessary for the design, fabrication, and supply of all glass and glazing work as indicated on the drawings and as specified. The work of this section shall include, but not necessarily be limited to, the following:

.1 Sealed insulating glass units to aluminum windows and storefronts framing, sash and doors.

.2 Single glazing lites at operable sashes.

.3 Glazing to other areas indicated on the Drawings

.4 Glazing materials, sealants, and glass setting materials that are not normally supplied as part of the framed glazing system but are required to glaze the system to the requirements of this Specification, and in keeping with published good glazing practices in areas not addressed by this Specification.

.5 Proof of compliance with design and performance requirements, including copies of manufacturer's published data sheets, test reports, calculations, computer simulations, or other documentation requested.

.6 Supply of glass samples. Supply and install glass to mock-up framing on building site.

1.2 Reference Standards

.1 Ontario Building Code

.2	ASTM E330/E330M	Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
.3	ASTM D2240	Standard Test Method for Rubber Property—Durometer Hardness

.4	ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials
.5	CAN/CGSB-12.1	Safety Glazing
.6	CAN/CGSB-12.8	Insulating Glass Units
.7	CAN/CGSB-12.20	Structural Design of Glass for Buildings (*Withdrawn*)

.8 Ontario Glass and Metal Association Glazing System Specifications Manual

.9 Insulating Glass Manufacturers Alliance (IGMA) Manual

.10 Glass Association of North America (GANA) Glazing Manual

.11 Flat Glass Manufacturers Association (FGMA) Glazing Manual

.12 Laminators Safety Glass Association Standards Manual

.13 Sealant, Waterproofing and Restoration Institute (SWRI) publication, *Sealants: The Professionals' Guide*

1.3 Design and Performance Criteria

.1 Provide continuity of the building enclosure vapour and air barrier:

.1 Utilising the inner lite of multiple lite sealed units.

.2 Utilising resilient gasket material to transfer the seal from the glass to the frame of the assembly.

.2 Size glass to limit glass deflection, and to withstand wind loads and positive and negative live loads as noted in the referenced Building Code.

.3 Design glass to CAN/CGSB-12.20 using an annual probability factor of 1/10 years for the reference wind velocity, and 8 in 1000 glass failure rate under this load assuming glass strength has a coefficient of variation of 0.25. Limit glass deflection to L/175 to a maximum of 20 mm under wind load.

.4 Design glass to withstand guard loads as required by the referenced Building Code. Limit deflection to 12 mm under guard load. Design glass to withstand thermal stresses imposed in service. In calculation, assume the use of blinds located not less than 50 mm from the inside surface of the glass.

.5 If areas of vision glass are required to be heat strengthened or glass thickness increased due to wind pressure loads at high pressure zones, then all vision glass on the same elevation shall either be heat strengthened or glass thickness increased for consistent appearance of all vision glass when viewed from the exterior. Except where noted specifically otherwise, the decision as to whether the vision glass is required to be heat strengthened or thickened to meet the performance specifications rests solely with the glazing contractor.

.6 Allow for deflection of building structure and framing members. Ensure no structural loads are imposed on glass.

.7 Provide edge and face clearances in keeping with glass manufacturer's written instructions for each type of glass used.

.8 Design for the following wind pressures, snow loads, seismic loads, and building movements as per Ontario Building Code.

1.4 Submittals

.1 Submittals to be made in accordance with Section 01 33 00.

.2 Tender Submission: Provide with tender submission an assessment of the energy calculations using an accepted standard glazing simulation and conforming to CSA A440.2 to confirm the specified design and performance criteria of the vision glass. The energy calculation confirmation must be submitted with a seal of a Professional Engineer registered to practice in .Quality Control Documents:

.1 Provide glass manufacturer's product data sheets confirming that glass performance meets the requirements of this specification.

.2 Submit letter from insulating glass fabricator stating current IGMA compliance number and identifying the types of edge construction covered by that number.

.3 Submit certified test data to show that insulating glass from this supplier, having the same edge construction specified here, has been tested to comply with CAN/CGSB-12.8 within the previous four years.

.4 Upon request, the applicable glass manufacturers shall submit with the window, storefronts, and doors shop drawings, written certification stating that all glass and glazing materials and requirements as detailed and specified on the shop drawings (designating the shop drawings reviewed by enumerating sheet number, dates and revisions) have been reviewed and approved for use relative to their specific application(s), dimensional design and profile parameters, and conformance to all requirements as detailed and as specified in the drawings and specifications. Identify any specified requirements that are in error or cannot legitimately be met, and provide alternatives that meet the intent of the Specification for Consultant's approval.

.5 Submit evidence that glazing contractor is a member in good standing of the Ontario Glass and Metal Association (OGMA).

.3 Shop drawings:

.1 Show scale elevations, sections, dimensions, or otherwise schedule quantity and type of glazing to be provided at each location. Indicate clearances to rough opening or to adjacent framing, and maximum tolerances of adjacent construction.

.2 Provide details of perimeter and interface conditions. Show relationship to other work, engagement of glass, drainage of glazing channel, location of setting blocks, and placement of sealants and glazing splines or tapes.

.3 Show attachment of hardware and identify structural fasteners.

.4 Provide information on insulating glass unit makeup. Identify coatings and their location, edge construction, sealants, and any other information required to indicate compliance with contract documents.

.5 Submit shop drawings under seal of Registered Professional Engineer.

.4 Letters of Assurance: The Registered Professional Engineer who signed and sealed the shop drawings shall perform sufficient field reviews in order to provide a letter of professional assurance after completion of the Work, giving assurance that the Work has been fabricated and installed in general conformance with the sealed shop drawings. Approved forms are Building Code Letters of Assurance (Schedule C). Written inspection reports of field reviews shall be submitted promptly as the field reviews are made.

.5 Samples: Submit colour charts showing all available glazing colours and tints. Three colours/tints may be selected by the Client to be provided on sample glass units. Submit duplicate samples of various types of glass units specified or chosen, including glass spandrel, to the Consultant for final approval. Samples shall be minimum 300 mm x 300 mm (12” x 12”). Samples to be typical production run quality, complete with tint, frit, and primary and secondary edge seals, as applicable. Clearly label each sample with product name, manufacturer’s name, and project name. Do not order material without prior approval of colour, tint, and appearance by the Client.

.6 Manufacturer’s Instructions: Submit manufacturer's installation instructions.

.7 Closeout Submittals: Provide maintenance data including cleaning instructions for incorporation into manual specified in Section 01 78 12.

1.5 Delivery, Storage, and Handling

.1 Prevent damage to materials during handling and storage.

.2 Store packaged material in original containers with manufacturer’s seals and labels intact.

.3 Packaging and packing of glass to be in accordance with best commercial practice.

.4 Keep handling to a minimum. Install glass as soon as possible after delivery to site. Avoid prolonged storage of glass at jobsite.

.5 Store glass vertically, blocked off the floor, in a weather-tight enclosure, in an area not subject to rain, dripping water, condensation, or sunlight. To prevent occurrence of condensation between leaves of stored glass, store at a constant temperature above the dew point.

.6 Make good or replace scratched or damaged materials as directed and at no additional cost.

1.6 Warranty

.1 All glass and glazing materials to be free from defects in material and workmanship, and continue to perform satisfactorily for a period of two (2) year from certified date of Substantial Performance of the Project.

.2 The insulated glass units (IGU) are to have a 10-year written warranty from the date of Substantial Completion.

.3 The Contractor agrees to correct promptly, at its own expense, all defects and deficiencies in the work included in this section. In all cases, defective or deficient work shall be removed and replaced with work acceptable to the Consultant, at no additional cost to the Owner, and at such times as the Owner may designate.

.4 For the purposes of this clause, but without limiting the generality of this clause, defects or deficiencies shall include:

.1 Defects or deficiencies in design, workmanship, or materials forming part of the work of this section.

.2 “Materials” shall include glass and glazing, aluminum, gaskets, tapes, and sealants.

.3 With respect to sealed glazing unit:

.1 Hermetic seal failure, fogging, reflective coating defects, low emissivity coating defects, breakdown due to edge flaws (chips, gouges, etc.), migration of edge spacers, and breakage due to thermal stress.

.2 Chipping, cracking, or breakage of glass panes occurring due to manufacturing defects or under specified service conditions.

.3 Fogging or visible moisture within air space when subjected to normal service temperature range.

.4 With respect to spandrel glass, frit/scrim defects and breakage due to edge flaws (chips, gouges, etc.)

.5 On or before the certified date of Substantial Performance of the Project, this Contractor shall obtain from manufacturers of materials and deliver to the Owner written warranties or guarantees in the name of the Owner against defects or deficiencies of the type described in this clause.

1.7 Mock-Up

.1 Construct mock-ups in accordance with Section 01 33 00 – Submittals.

.2 Supply and install glass to mock-up framing on building site. Construct mock-ups to include glass glazing and perimeter air barrier and vapour retarder seal.

.3 Construct mock-ups where directed.

.4 Allow 48 hours for inspection of mock-up by Consultant before proceeding with work.

.5 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.

1.8 Quality Assurance

.1 Glass and glazing work to be done under this section shall be executed by a qualified glazing contractor with at least five years of continual experience in the trade, who shall be prepared to prove to the Owner's satisfaction that they have adequate facilities and skilled personnel suitable for the supply and installation of all glass and glazing materials required by this section of work.

.2 This Contractor shall be prepared to prove to the Owner's satisfaction, that they have adequate facilities and skilled personnel suitable for the design, detailing, fabricating, and installation of the glazing assembly.

.3 Glass and glazing work under this section shall conform to IGMA and recommendations and specifications of the Ontario Glazing Contractors Association Glazing Systems Specification Manual and of the glass and sealed glazing unit manufacturers.

.4 All glass to bear manufacturer's labels identifying glass type and thickness. Labels to remain on glass until final cleaning.

2.0 PRODUCTS

2.1 Glass Products

.1 Glass: To CAN/CGSB-12.3, glazing quality float unless noted otherwise. Glass thickness not less than 6 mm nor less than that scheduled. Structural requirements may require a greater thickness.

.2 Heat Treated Glass (tempered and heat strengthened):

.1 Flatness and visual quality tolerances to CAN/CGSB-12.1.

.2 Glass fabrication (holes and notching) of heat-treated glass to fabrication requirements of ASTM C1048.

.3 Laminated Glass: 0.76 mm (0.030”) PVB interlayer with protective edge treatment where weather exposed.

.4 Safety Glass: To CAN/CGSB-12.1, laminated or tempered.

.5 Insulating Glass Units: To CAN/CGSB-12.8, double glazed unit, 1’’ (25) mm overall thickness, IGMA certified, tempered glass both lites.

.1 Unit edge construction to be manufacturer’s standard dual seal, with a thermally broken u-shaped metal or non-metallic “warm edge” spacer. Unit edge construction to be dual seal construction, with a thermally broken metal spacer, primary seal of polyisobutylene and secondary seal of silicone.

2.2 Glazing Materials (Performance Tested Systems)

.1 Exterior and Interior Glazing Gaskets, Tapes, Sealants, and Adhesives: Manufacturer’s standard, as used in assemblies tested to meet performance criteria for air infiltration and water penetration.

.2 Glass Setting and Edge Blocks: Framing manufacturer’s standard products designed to support glass, prevent frame contact, and maintain drainage and venting within the system.

.3 All glazing materials to be compatible with materials they contact.

.4 Setting blocks to be compatible with insulating glass edge sealants.

.5 Sealants in contact with edges of insulating glass to be compatible with insulating glass edge sealants.

.6 Heel, toe, and cap sealants to be compatible with glazing gaskets and glazing tapes.

3.0 EXECUTION

3.1 General

.1 Install all materials according to instructions from all product manufacturers. Ensure all materials are compatible with the materials they contact.

3.2 Examination

.1 Verify that openings for glazing are correctly sized and within tolerance.

.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

.3 Ensure that conditions of temperature, humidity, and precipitation are suitable for installation, in accordance with manufacturer's instructions. No glazing shall be installed when framing members and other glazing materials are wet or frosted.

.4 Coordinate glass and glazing activities with trades of other sections of this specification when required. Do not install any glazing until all nearby welding, grinding, sandblasting, waterproofing, mortar work, and acid etching are complete. When such activities must be carried out in the vicinity of stored or installed glass, provide hoarding or other suitable protection.

.5 Coordinate glass hoisting and handling of glazing materials with the general contractor/project manager.

.6 Report, to the Consultant in writing, any defects in existing work or unsatisfactory site conditions. Start no work until conditions are satisfactory. Starting work implies acceptance of existing conditions and surfaces.

3.3 Preparation

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.4 Installation

.1 Install all materials according to manufacturer's instructions, reviewed shop drawings, and best practices as described in IGMA and GANA glazing manuals.

.2 Adjust operable sash before glazing. Glaze operable sash in closed position and is to remain closed until glazing materials have properly cured.

.3 Provide specified edge and face clearances and glass bite.

.4 Ensure all weep holes and passages remain free of obstruction.

.5 Provide safety markings to installed glass by attaching streamers or tape to face of sash. Do not apply tape directly to the glass. Do not mark glass with paint or other substance that is difficult to remove or could leave permanent stains.

3.5 Cleaning

.1 Remove all protective materials, labels, and other deposits from glazing.

.2 Clean glass according to instructions from glazing contractor. Cleaning solutions to CAN/CGSB-2.55.

3.6 Glazing Schedule

.1 Aluminum Door and Storefronts:

.1 Basis of Design:

.1 25 mm overall hermetically sealed unit

.2 outer lite 6 mm clear tempered safety glass or other pre-approved

.3 inner lite 6 mm clear tempered safety glass with Solar Ban 60 (or other pre-approved alternative) on Surface #3

.4 overall performance

.1 S.C. = 0.50 - 0.55

.2 VLT = 0.69 - 0.70

.3 Uc.o.g = 1.65 - 1.66 w/m^2K (0.290 - 0.29 BTU/h*ft^2*F)

.4 Low E on surface #3

.5 All units air filled (no inert gas fill)

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, and equipment necessary for the complete supply, surface preparation, and application of paint required to restore original finishes.

.2 The work of this section shall include, but shall not necessarily be limited to, the following:

.1 All exterior steel and iron surfaces including: railings and door panels, etc., as outlined in this Section and as shown on the Drawings.

.2 Surface preparation, priming, and painting items under other Sections specified as shop primed and surface treated.

.3 All coating systems materials, including primers, emulsions, stains, sealers, fillers, and other applied materials used as prime, intermediate, or finish coats.

.3 **Note**: Colours to be selected by Owner from the manufacturers' standard range

1.2 Reference Standards

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3 New Surfaces: Canadian Painting Contractor's Architectural (CPCA) Painting Specifications Manual

.4 Existing Surfaces: Master Painters Institute (MPI) Maintenance Repainting Manual.

1.3 Submittals

.1 Make submittals in accordance with Section 01 33 00.

.2 Before any work is commenced, submit sample panels (24" x 36") of each paint type and colour, specified in colour schedule, for Owner's review.

1.4 Quality Assurance

.1 Qualification of Applicators: Contractor shall have a minimum five (5) years of proven satisfactory experience and shall maintain a qualified crew of painters throughout duration of the work who are qualified to fully satisfy the requirements of this Specification. Only qualified journeymen shall be engaged in painting and decorating work and have a provincial tradesmen qualification certificate of proficiency.

.2 Conform to standards contained in MPI Manual, latest edition.

.3 All paint manufacturers and products shall be as listed under “Approved Products” section of MPI Manual.

.4 All painting, unless otherwise specified, shall be to MPI Manual - Premium Grade.

1.5 Regulatory Requirements

.1 Conform to workplace safety regulations for storage, mixing, application, and disposal of all painting-related materials to requirements of those authorities having jurisdiction.

.2 Conform to safety precautions in accordance with latest requirements to Industrial Health and Safety Regulations, latest edition, of authorities having jurisdiction.

.3 To reduce the amount of contaminants entering waterways, sanitary / storm drain systems, or into the ground, strictly adhere to the following procedures:

.1 Retain cleaning water for water-based materials to allow sediments to be filtered out. Do not clean equipment using free draining water.

.2 Retain cleaners, thinners, solvents, and excess paint, and place in designated containers and ensure proper disposal.

.3 Return solvent and oil-soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.

.4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.

.5 Empty paint cans are to be dry prior to disposal or recycling (where available).

.6 Tightly close and seal partly used cans of material, including sealant and adhesive containers, and store in a protected, well ventilated, and fire-safe area at moderate temperature.

.4 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.

.5 Use sufficient drop cloths and protective coverings for the full protection of work not being painted. Protect hardware and all other components of the building which do not require painting from paint spoiling and other soiling during the painting process.

.1 Provide metal pans or adequate tarpaulin in areas assigned to the mixing of paints.

.2 Keep waste rags in metal drums containing water and remove at the end of every working shift.

.3 The painting contractor shall remove from the building all excess material, leftovers and scrap as well as his own equipment at the end of the job.

.4 The owner will be provided with extra stock of each paint colour used, labelled as to its appropriate location of use.

.5 DO NOT paint in unclean areas.

.6 Application and drying of exterior paints shall not proceed at temperatures below 10 deg. C.

.7 Exterior painting shall not proceed when the substrate surface is damp with morning dew.

.8 Exterior painting shall not proceed during periods of rain and shall not resume until the wetted surface has fully dried.

.9 Moisture content of wood must not exceed 14% prior to applying paint as checked by approved moisture meter.

1.6 Mock-Up

.1 When requested by the Consultant or Owner, prepare and repaint a designated surface area or item to specified requirements for review and approval. Use specified paint or coating and show selected colours, gloss/ sheen, texture, and workmanship in with specifications.

.2 Reviewed and acceptable surface area or item shall become the standard for finish quality and workmanship on similar on-site repainting work.

1.7 Delivery, Storage, and Handling

.1 Delivery, storage, and handling of materials shall be in accordance with applicable sections of MPI Architectural Painting Specification Manual. Deliver and store on site in manufacturer's sealed and labelled containers. Labels are to include manufacturer's name, brand name, type of paint or coating, colour designation, standard compliance, material content, and mixing and/or reducing and application requirements.

.2 Store paint material in original labeled containers in a secure, locked, dry, heated, and well-ventilated designated area that meets minimum requirements of paint manufacturer and authorities having jurisdiction.

.3 Maintain minimum ambient temperature of 45°F (7°C). Only material used on this project is to be stored at the Place of the Work.

.4 Take all necessary precautionary measures to prevent fire hazards and spontaneous combustion and to protect the environment from hazard spills. Materials that constitute a fire hazard (paints, solvents, drop clothes, etc.) shall be stored in suitable closed and rated containers and removed from the Place of the Work on a daily basis.

.5 Comply with requirements of authorities having jurisdiction for the use, handling, storage, and disposal of hazardous materials.

1.8 Protection

.1 Adequately protect all other surfaces from paint and damage and make good any damage caused by failure to provide suitable protection.

.2 Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or droppings from fouling surfaces not being painted, including surfaces within the storage and preparation area.

.3 Mask all surfaces not being painted to obtain uniform termination.

.4 Remove all electrical plates, surface hardware, fittings, and fastenings prior to painting operations. Carefully store, clean, and replace upon completion of Work in each area.

1.9 Environmental Conditions

.1 Temperature and moisture content of all surfaces shall conform to ratings given in CPCA or MPDA manual.

.2 All areas where painting and decorating work are proceeding require adequate continuous ventilation and sufficient heating facilities to maintain temperature above 10°C for 24 hours before, during, and 24 hours after paint application.

.3 Do not paint where there is dust in the air.

.4 Provide adequate illumination on surfaces being painted.

1.10 Maintenance Materials

.1 At project completion, provide 16 L (4 gal.) of each type of colour to paint from same production run (batch mix) used, in unopened cans, properly labelled and identified for Owner's later use in maintenance. Store where directed.

2.0 PRODUCTS

2.1 Materials

.1 Use paint materials and products of paint manufacturers listed and approved in MPI Manual and CGSB Qualified Products List. No substitutions.

.2 All paints shall be Premium Grade; first quality products as manufactured by C.I.L., Bapco Paint Co., Brandram-Henderson Company, Sherwin Williams, Glidden, Pratt & Lambert, Benjamin Moore, International and General Paint.

.3 Provide undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.

2.2 Exterior Painting and Finishing Schedule

.1 Unless otherwise indicated, titles and code numbers in below listed schedule refer to MPI Architectural Painting Specification Manual, Chapter 2, for type surfaces, coating, grade, named products, and their manufacturers. Use products from only one manufacturer for each system.

.2 Wood:

.1 Finish Wood: Premium exterior paint with high percentage of pigment.

.1 Basis of Design:

.1 A-100 Exterior Latex Gloss by Sherwin-Williams

.2 Primer Wood: Exterior primer specified for, and./or compatible with, chosen exterior paint and able to seal/bridge between paint types.

.1 Basis of Design:

.1 Exterior Oil-Based Wood Primer by Sherwin-Williams

.3 Wood Fillers:

.1 For minor gouges, holes and checks: Elmer Premium acrylic latex wood filler

.2 For larger and/or structural repairs: Wood epoxy filler systems such as West System.

.4 Wood sealing:

.1 Red Shellac

.3 Metal:

.1 Primer Galvanized metal: Specialized rust inhibiting primer specifically for hot dipped galvanized surfaces. Submit product for approval.

.2 Epoxy Primer: Two -component, low VOC, high solids fast curing epoxy primer

.1 Basis of Design: Intergard 345 by International

.3 Urethane Top Coat: two-component acrylic polyurethane finish

.1 Basis of Design: Interthane 990 by International

2.3 Accessories

.1 Water: potable, direct from mains.

.2 Bleach: 10% sodium hypochlorate solution e.g. Javex.

.3 Tri-sodium phosphate.

.4 Mineral Spirits or Varsol.

.5 Heat gun.

.6 Scrub brushes: natural bristle or soft plastic type only.

.7 Mechanical scrapers: round all edges.

.8 Citrus based bio-degradable paint strippers.

.9 Caulking: Polyurethane based.

2.4 Mixing

.1 Paints shall be ready-mixed unless otherwise specified. Paint shall have good flowing and brushing properties and shall dry or cure free of streaks or sags to yield the desired finish specified.

3.0 EXECUTION

3.1 Inspection

.1 Examine all surfaces to be painted before commencing work.

.2 Commencement of work indicates acceptance of surfaces and job conditions.

3.2 Performance Requirements

.1 Painting performed under this Contract shall satisfy the following requirements:

.1 Not debond or peel off substrate to which it is applied.

.2 Not crack, mark, bubble, or wear unduly under normal maintenance.

3.3 Preparation - General

.1 Prepare surfaces in accordance with MPI Manual or CPCA Manual.

.2 Prepare existing exterior surfaces by high-pressure water or other approved method to remove all dust, loose paint, and other deposits on surfaces.

.3 Remove hardware, hardware accessories, plates, lighting fixtures, and similar items in place and not to be finish-painted or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.

.4 Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly painted surfaces.

3.4 Preparation - Woodwork

.1 Use only bio-degradable paint strippers where stripping is required.

.2 Special approval would be required for use of methylene-chloride based paint strippers for paint stripping of woodwork.

.3 Wash woodwork down with tri-sodium phosphate solution in hot water.

.4 Where mould is present apply a dilute bleach solution.

.5 All new wood shall be primed and back-primed immediately as it is installed and before exposure. ‘Kill’ all knots with application of red shellac. All existing wood elements exposed by paint removal to be spot primed.

.6 Any open joints shall be sealed with caulking compound.

.7 Weathered wood shall be carefully treated by gently sanding the area by hand until it is relatively smooth and using filler to provide smooth surfaces.

.8 Carefully sand smooth between coats.

.9 Nailheads with the capacity to rust shall be sunk below the surface of the wood and the nail hole puttied with oil base putty and putty painted with one coat gum shellac cut in pure alcohol.

.10 After first coat, fill nail holes, splits and scratches, using putty coloured to match finish.

3.5 Application - General

.1 Perform painting and decorating work in accordance with the standards and requirements incorporated in the CPCA Manual and/or MPI Manual.

.2 Method of paint application shall be by either spray-on or roll-on, sufficient to fill all voids in existing surfaces and provide uniform appearance.

.3 Apply two coats of approved paint to all miscellaneous metal fabrications, maximum coverage rate 150 sq. ft. per imperial gallon per coat.

.4 Flammable rubbish, cotton waste, cloths, and material that may constitute a fire hazard shall be placed in closed metal containers and removed from site daily.

.5 Protect all signs and fixtures attached to the walls. Uncover and clean when painting has been completed.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 This Section outlines repair and inspection procedures to be undertaken when existing electrical conduits, cables, fixtures, systems, etc. are damaged due to the construction activity.

.2 Damaged electrical conduits, cables, fixtures, systems, etc. must be repaired in a timely fashion. If repair cannot be made in a timely fashion, a temporary system must be installed.

.3 Visit site to ascertain and note existing conditions that will affect the Work.

1.2 Regulatory Requirements

.1 Comply with Safety Codes Act and rules and regulations made pursuant thereto, including Canadian Electrical Code.

.2 Unless otherwise indicated, all references in the Contract Documents to "Canadian Electrical Code" or "CEC" shall mean the edition of the Canadian Electrical Code, Part I, CSA C22.1 and the variations made thereto by Ontario regulation, which are in force on the date of bid closing for the Contract.

.3 All electrical products shall be tested, certified, and labelled in accordance with a certification program accredited by the Standards Council of Canada.

.4 Submit drawings and specifications to authority having jurisdiction and local utility company for examination and approval before commencement of electrical work. Pay any associated fees required to obtain a permit for the Work.

.5 Submit a copy of electrical permit obtained from the Authority Having Jurisdiction to the Consultant.

1.3 Examination of Site

.1 Visit and examine the site and all applicable Drawings before Bid. The Bid shall include all costs for required electrical work necessary for performance of the Work. No extras will be paid due to failure to visit the site or adequately review all required interfacing details.

1.4 Delivery, Storage, and Handling

.1 Submit copies of Safety Data Sheets (SDS) for all products prior to arrival on site.

.2 Deliver, store, and maintain packaged material with manufacturer's seals and labels intact.

.3 Store material in regulation containers in accordance with the Occupational Health and Safety Regulation and manufacturer instructions.

.4 Toxic or hazardous chemicals shall be secured in a locked storage area with appropriate protection measures in accordance with the Occupational Health and Safety Act.

.5 All containers to be labelled with material expiration dates. Material that is older than the expiry date shall be rejected. Shelf life shall be strictly adhered to and material shipped without dates will be rejected. Immediately remove rejected materials from site.

2.0 PRODUCTS

2.1 Materials

.1 Use new products unless otherwise specified.

.2 Provide electronic copies of maintenance instructions for finished surfaces and maintenance material before Substantial Performance of the Work.

3.0 EXECUTION

3.1 Exposed Conduits, Fixtures, Systems, Etc.

.1 All exposed conduits, fixtures, systems, etc. are to be properly protected and operational at all times during the Work. Refer to Section 01 56 00.

.2 Repair or replacement of damaged exposed conduits, cables, fixtures, systems, etc. is Contractor's responsibility when damage was caused by Contractor's operations. Required repair or replacement work to exposed conduits, cables, fixtures, systems, etc. may be performed by Contractor's own electrician.

3.2 Existing Embedded, Buried, and Hidden Electrical Services

.1 Identify potential areas of embedded, buried, or hidden conduit, cables, systems, etc. and locate or switch off high voltage systems in the area of Work to prevent possible damage and injury. Coordinate requirements with Owner.

.2 Take utmost precaution during demolition operations to prevent damage to embedded, buried, or hidden conduit, cables, systems, etc. Immediately report damage to embedded, buried, or hidden conduits, cables, systems, etc. to Owner and Consultant.

.3 Damaged or deteriorated conduits, cables, systems, etc. are not to be covered up without specific approval from Owner.

.4 Allow reasonable time in scheduling of the Work for implementation of any required repairs to embedded, buried, or hidden conduit, cables, systems, etc.

.5 Take all precautions to ensure embedded, buried, or hidden conduits uncovered by the work are not live before performing demolition work around them. Anticipate uncovering lighting conduits, 600V main power lines, exhaust fan conduits, alarm lines, telephone lines, etc.

.6 Repair or abandon damaged conduit, cables, systems, etc. uncovered by the Work at discretion of Owner. Owner will pay for repairs to damaged embedded, buried, or hidden conduit, cables, systems, etc. provided damage did not result from a lack of Contractor care or negligence. Negligence shall be determined at discretion of Consultant.

.7 All repairs to embedded, buried, or hidden conduit, cables, systems, services, etc. will be performed by an electrician that is agreeable to Owner and paid via Change Order through contingency allowance.

3.3 Temporary Systems

.1 If damage to surface-mounted or hidden conduit, cables, systems, etc. cannot be repaired in a timely fashion, Owner may, at their discretion, request that Contractor provide a temporary system or connection to maintain operation.

.2 Costs for requested temporary systems will be allocated to Owner for damage to hidden conduit, cables, systems, etc., and to Contractor for damage to surface-mounted conduit, cables, systems, etc.

3.4 Inspection of Work

.1 All electrical system repair work is to be inspected as required by the authority having jurisdiction.

.2 Arrange for required inspections of repairs within 48 hours of repairing damage. Schedule all required inspections, regardless of whether Owner's or Contractor's electrician performed the repair.

.3 Cost of inspections shall be responsibility of Contractor.

.4 Copies of inspection certificates for required inspections shall be distributed to Owner and Consultant upon completing the Project.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to supply, install, and compact new topsoil, and supply, install, and maintain new sod, where indicated on the Drawings and as described herein.

2.0 PRODUCTS

2.1 Materials

.1 Granular base and subbase materials: Refer to Specification Section 32 11 00 - Granular Backfill.

.2 Geotextile filter cloth to be Terrafix 200R. Overlap filter cloth 24” minimum where overlap is required.

.3 Triple Mix topsoil material – a 30% mixture of topsoils, sands and shredded wood mulch, a 30% mixture of black organic compost and manure and a 30% mixture of peat loam.

3.0 EXECUTION

3.1 Sequence of Operation

.1 Remove and dispose of existing vegetation, including but not limited to hedges, shrubs, grass, flowers, etc., at areas of work. Protect and maintain in place irrigation systems and other services within the area of removals.

.2 Excavate, remove, and dispose of soil and subgrade material to facilitate new stair structure construction, as indicated on the Drawings.

.3 Placing of Topsoil:

.1 Place material using methods that do not lead to segregation or degradation of aggregate.

.2 Place material in uniform layers not exceeding 150 mm compacted thickness. Consultant may authorize thicker lifts (layers) if specified compaction can be achieved. No subsequent lifts shall be placed until the required compaction levels have been achieved.

.3 Compact each layer to specified density before succeeding layer is placed.

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

.4 Compaction Equipment:

.1 Compaction equipment to be mechanical tampers capable of obtaining required material densities.

.5 Compaction:

.1 Compact granular layer to density not less than 98% standard proctor max dry density. Topsoil to be compacted to 85% standard proctor max dry density.

.2 Apply water as necessary during compaction to obtain specified density.

.3 Density is to be measured using a nuclear density gauge.

.4 Finished surfaces to be to finished grades where indicated, or as directed by the Consultant, with slope away from vertical surfaces and to drains and catch basins.

.6 Re-Instatement of Sod and Plantings:

.1 After installation and compaction of topsoil, install new sod and plantings to match existing and provide all required maintenance, watering, fertilization, and other maintenance until final acceptance of installation. Acceptance will be evaluated 90 days after installation is complete unless installation is performed 90 days prior to frost; in such case acceptance will be evaluated 30 days after start of growing season in following year.

3.2 Protection

.1 Maintain finished base in condition conforming to this section until succeeding materials are applied to complete landscaping.

END OF SECTION

1.0 GENERAL

1.1 Work Included

.1 Provide all labour, materials, equipment, supervision, and services necessary to prepare and compact the existing subgrade material and install and compact new granular backfill materials as indicated on the Drawings and described herein.

1.2 References

.1 All referenced Standards are latest editions referenced by the Building Code in the Place of the Work, or latest editions if not referenced by Code.

.2 Ontario Building Code

.3	ASTM C117	Standard Test Method for Materials Finer than 75-μm (No. 200) Sieve in Mineral Aggregates by Washing
.4	ASTM C136/136M	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
.5	CAN/CGSB-8.1-88	Sieves, Testing, Woven Wire, Inch Series (Withdrawn)
.6	CAN/CGSB-8.2-M88	Sieves, Testing, Woven Wire, Metric Series (Withdrawn)
.7	OPSS 501	Compacting
.8	OPSS 1010	Aggregates - Base, Subbase, Select Subgrade, and Backfill Material

1.3 Submittals

.1 Obtain certificates from suppliers that attest that supplied materials comply with Specifications and submit to Consultant.

.2 Obtain copies of waybills for supplied granular backfill material and submit to Consultant at end of each workday.

.3 Unit weight of supplied materials will be determined by average of three compaction tests conducted in the field or by using minimum specified weights and volume based on measured areas.

2.0 PRODUCTS

2.1 Materials

.1 Gradations to be within specified limits when tested to ASTM C117 and ASTM C136/136M. Sieve sizes to CAN/CGSB-8.1 and/or CAN/CGSB-8.2.

.2 Granular base to be Granular “A” to OPSS 1010. Inclusion of reclaimed asphalt pavement (RAP) and/or reclaimed concrete materials (RCM) will be at Consultant’s discretion.

.3 Granular subbase to be Granular “B” to OPSS 1010. Inclusion of reclaimed asphalt pavement (RAP) and/or reclaimed concrete materials (RCM) will be at Consultant’s discretion.

.4 Crushed stone or gravel shall consist of hard, durable, angular particles that are free from clay lumps, cementation, organic material, frozen material, and other deleterious materials.

.5 Filter fabric to be suitable for intended use, as confirmed by Consultant.

3.0 EXECUTION

3.1 Surface Preparation Prior to Installation of New Material

.1 Verify grade of items set in work area for conformance with required elevations before placing granular material. Prepare and compact subgrade materials prior to placing new granular backfill materials.

.2 Allow for Consultant review of subgrade before placing granular backfill materials.

.3 Place granular backfill material only on clean unfrozen subgrade and backfill material that is free from snow and ice.

.4 Place granular backfill material to compacted thicknesses indicated in Contract Documents. Do not place frozen material.

.5 Place granular backfill in layers not exceeding 150 mm compacted thickness. Compact to density not less than 98% of maximum dry density (MDD) determined using standard proctor test.

.6 Finished base surface to be within 10 mm of specified grade but not uniformly high or low. Where grades are not specified on Drawings, confirm requirements with Consultant and ensure slopes to drain.

.7 Replace all damaged, deteriorated, and unsuitable sections of existing subgrade material prior to placement of granular backfill material. Proof-roll in the presence of the Consultant, remove subgrade to depth of 300mm where directed by the Consultant, and replace with granular subbase material.

3.2 Compacting

.1 Compact subgrade and granular backfill materials in accordance with the Ontario Provincial Standard Specifications, using proper equipment to achieve specified density, and complying with OPSS 501.

.2 Compact subgrade and granular backfill materials to a minimum of 98% of MDD as determined by the standard proctor test method.

.3 Density is to be measured using a nuclear density gauge.

.4 Finished surfaces to be to finished grades where indicated, or as directed by the Consultant, with slope away from vertical surfaces and to drains and catch basins.

.5 Finished surfaces to be uniform, smooth, even, dense, and free from shallow areas, protrusions, and surplus backfill. Correct any irregularities that vary more than 6 mm in 3,050 mm (1/4” in 10’-0”).

3.3 Inspection and Testing

.1 Testing to be conducted by a testing agency designated by Owner. Unless otherwise noted, the Owner will pay costs of inspection and testing described in this Section.

.2 Inform Consultant and testing agency 72 hours in advance of work to be performed under this Section.

.3 Testing may include site sampling and laboratory testing and/or in-situ compaction testing.

END OF SECTION