

HERITAGE SPECIFICATION PACKAGE
for
CITY OF PICKERING
Pickering Museum Village - Blacksmith Shop

Project No. 19045

Prepared by:
Goldsmith Borgal & Company Ltd.

ISSUED FOR TENDER
Date: April 13, 2021

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1. **GENERAL**

1.1 **Section Includes**

- 1.1.1 The requirements of the Articles of Agreement, Conditions of the Contract, Division 1 apply to and form all Sections of the Contract Documents and the Work.
- 1.1.2 Work in this Specification is divided into descriptive sections which are not intended to identify absolute contractual limits between Subcontractors, nor between the Contractor and their Subcontractors. The Contractor is responsible for organizing division of labour and supply of materials essential to complete the Contract.
- 1.1.3 Specifications, Schedules and Drawings are complementary and items mentioned or indicated on one may not be mentioned or indicated on the others.
- 1.1.4 Mention in the specifications or indication on the drawings of materials, products, operations, or methods, requires that the Contractor provide each item mentioned or indicated of the quality or subject to the qualifications noted; perform according to the conditions stated each operation prescribed; and provide labour, materials, Products, equipment and services to complete the Work.
- 1.1.5 Where the singular or masculine is used in the Contract Documents, it shall be read and construed as if the plural, feminine or neuter had been used when the context or the statement so requires and as required to complete the Work, and the rest of the sentence, clause, paragraph, or Article shall be construed as if all changes in grammar, gender or terminology thereby rendered necessary had been make.

1.2 **EXISTING SITE CONDITIONS**

- 1.2.1 Make a careful examination of the site, and investigate and be satisfied as to all matters relating to the nature of the Work to be undertaken, as to the means of access and egress thereto and therefore, as to the obstacles to be met with, as to the extent of the Work to be performed and any and all matters which are referred to in the Contract Documents.
- 1.2.2 Report any inconsistencies, ambiguities, discrepancies, omissions, and errors between Site conditions and Contract Documents to the Consultant prior to the commencement of Work. If inconsistencies, ambiguities, discrepancies, omissions, and errors are not reported and clarified, the most stringent requirement shall govern, as determined by the Consultant.
- 1.2.3 Before commencing the Work of any Section or trade, carefully examine the Work of other Sections and trades upon which it may depend, examine substrate surfaces, and report in writing to the Consultant, defects which might affect new Work. Commencement of Work shall constitute acceptance of conditions and Work of other sections, trades, and Other Contractors upon which the new Work depends. If repair of surfaces is required after commencement of specific work it shall be included in the work of the trade providing the specific system or finish.

1.3 **CONTINUITY OF EXISTING SERVICES**

- 1.3.1 Shutdowns and planning of operations that may affect Owner's use of services shall be coordinated with and in accordance with the Owner's written

directions. Provide notice for all required interruptions to utility, heating, cooling, mechanical, electrical, and life safety systems.

- 1.3.2 Shutdowns shall be scheduled in advance with Owner and shutdown period shall be minimized to Owner's convenience. Facilities in existing adjacent areas will be occupied during the Work.

1.4 **ACCESS/PROPERTY CONSTRAINTS**

- 1.4.1 Provide and maintain access facilities as may be required for access to the Work.
- 1.4.2 Minimize disruption, noise and dust to the functions of existing operational areas of existing buildings. Times of entry, routes of access and time required to complete the Work shall be arranged and scheduled in cooperation with the Owner.
- 1.4.3 Confine Work and operations of employees to limits indicated by the Contract Documents. Do not unreasonably encumber the premises with products.
- 1.4.4 Determine and make arrangement as required for loading and unloading of equipment and Products at times that will not affect public traffic flow and that will be permitted by Authorities having Jurisdiction.
- 1.4.5 Workers shall not enter existing building beyond construction areas except where required for connection or modification to existing services or other such work. Arrange such requirements with Owner prior to entering existing occupied areas.
- 1.4.6 Personnel access and material deliveries to the Site shall be only by routes designated by the Owner.

1.5 **COST BREAKDOWN**

- 1.5.1 Before submitting first progress claim submit breakdown of Contract price in detail as directed by Architect and aggregating contract price. After approval by Architect cost breakdown will be used as basis for progress payment.
 - .1 Forms used for the application for payment shall be similar to those presented on the following two pages. The Contractor may copy these forms, if desired, and use them as a base for payment application. Both the Schedule of Values form and the Application for Payment form must be submitted for each progress payment application.
- 1.5.2 In accordance with CCDC supplement to Bulletin #11, dated April 1992:
 - .1 The Application for Payment Form shall contain the following:
 - .1 The Contractor's H.S.T. Registration Number
 - .2 a means of clarifying which amounts include H.S.T.
 - .3 the H.S.T. applicable to the Current Contract Price
 - .4 the amount payable, including H.S.T.
- 1.5.3 An example of the required format is included on the following pages.
 - .1 Each application for payment must be accompanied by a WSIB Clearance Certificate valid for 45 days after issue.
 - .2 Restrictions on deliveries may be in effect.

Contractor: _____

APPLICATION FOR PAYMENT
For submission with
"Schedule of Values"

Progress Billing # _____

To: Goldsmith Borgal & Company Ltd. Architects
Suite 100 – 362 Davenport Rd.
Toronto, ON, M5R 1K6

Date: _____

Period Covered:

From: _____

To: _____

Project: _____

Owner: _____

Contractor's H.S.T. Registration #

CONTRACT STATUS (All prices excluding H.S.T.)

	Total Amount	Work Date	Performed to Value	Value Previously Performed	Value Current Period
Original Contract (Totals per schedule of Values)					
Approved C.O. #'s _____					
Current Contract Total					
H.S.T. @ 13 %					
Total including H.S.T.					

REQUEST FOR PAYMENT (All prices excluding H.S.T.)

Current Value of Work Performed (and products on site): \$ _____

Total Holdback @ _____ %: \$ _____

Holdback Released to Date: \$ _____

Net Holdback Retained: \$ _____ \$ _____

Cumulative Amount Claimed (Value of work performed and products on site
less holdback retained): \$ _____

Less Amount Previously Certified on Certificate for Payment # __: \$ _____

TOTAL AMOUNT DUE THIS APPLICATION (Excluding H.S.T.): \$ _____

H.S.T. payable on application @ _____ %: \$ _____

Total Payment Due this application including H.S.T.: \$ _____

Prepared by : _____

Contractor: _____

SCHEDULE OF VALUES

Address: _____

For submission with
"Application for Payment"

Progress Billing # _____ From: _____ To: _____

Date: _____

To: Goldsmith Borgal & Company Ltd. Architects
Suite 100, 362 Davenport Rd.
Toronto, ON M5R 1K6

Project: _____

Owner: _____

COST BREAKDOWN (All prices excluding H.S.T.)

Division #	Description	Total Amount	Work Performed To Date %	Value Previously Performed	Value Current Period
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Totals

1.6 **CHANGE ORDERS**

- 1.6.1 Contractor shall submit information required for Change to the work in accordance with the construction contract.
- 1.6.2 For the convenience of contractors, a checklist is provided on the following page to expedite the proposal of changes where such changes are initiated by the Contractor. The page may be freely copied and should be faxed to the consultant's office within the stipulated time to notify of requested changes.

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CONTRACTOR REQUEST FOR CHANGE ORDER

Note that this page must be faxed to the consultant's office prior to 14 days of need for a final opinion from the Consultant by the Contractor to ensure that the project incurs no delays. Use only 1 page for each proposed change.

Proposed change

Reason for change: _____ Problem with existing requirement
_____ Improvement to result from proposed change
_____ Proposed change needed to comply with codes or regulations as understood by trade or as indicated by authorities having jurisdiction

Estimated change to construction time (+ or -)

Estimated change to bid cost (+ or -)

Contractor or subtrade

Signed

Consultant Use Only:

Consultant Affected	Need change validated	for Need change validated	for not	Date	Signature
Architect					
Structural					
Mechanical					
Electrical					
Landscape					
Other					
Other					

Contemplated change order initiated

Change order initiated

Change order Number

General comments

1.7 **SETTING OUT**

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

1.8 **COORDINATION**

- 1.8.1 Coordination of the Work of all Sections of the specifications as required to complete the Project is the responsibility of the Contractor.
- 1.8.2 Coordinate with removals/installations specified in other Divisions and Other Contracts. In order to provide a continuous and efficient flow of the Work to achieve the Contract Completion date, the Contractor shall plan and schedule all aspects of the Work, including
 - .1 coordination of subcontractors and subtrades,
 - .2 delivery of material and equipment to the site,
 - .3 fabrication,
 - .4 construction,
 - .5 Distribution of notices in compliance with requirements of OBC regarding required inspections at key construction stages.
 - .1 Submit copies of notification to local Chief Building official to Architect and to Owner.
 - .2 Key construction stages are as defined in revisions to the Ontario Building Code latest edition.
 - .6 cooperation and coordination with testing and commissioning operations and all other aspects of the Work.
- 1.8.3 Install and arrange ducts, piping, tubing, conduit, equipment, fixtures, materials and products to conserve headroom and space with minimum interference and in neat, orderly and tidy arrangement. Run pipes, ducts, tubing and conduit, vertical, horizontal and square with building grid unless otherwise indicated. Install piping, ducts, and conduit as close to underside of structure as possible unless shown otherwise.
- 1.8.4 Pay particular attention to types of ceiling construction and clearances throughout, especially where recessed fixtures are required. Coordinate work with Other Contractors and Subcontractors wherever ventilation ducts or piping installations occur to ensure that conflicts are avoided.
- 1.8.5 Ensure that setting drawings, templates, and all other information necessary for the location and installation of materials, fixtures, equipment, holes, sleeves, inserts, anchors, accessories, fastenings, connections, and access panels are provided by each Section whose work requires cooperative location and installation by other Sections, and that such information is communicated to the applicable installer. Have cutting, fixing and making good to the work of Other Contractors, Subcontractors and trades required for, and make up time lost as result of, failure to comply with this requirement, at no additional cost to Owner.
- 1.8.6 Properly coordinate the work of the various Sections and trades, taking into account the existing installations to assure the best arrangement of pipes, conduits, ducts and mechanical, electrical and other equipment, in the available space. Under no circumstances will any extra payment be allowed due to the failure by the Contractor to coordinate the Work. If required, in critical

locations, prepare interference and/or installation drawings showing the work of the various Sections as well as the existing installation, and submit these drawings to the Consultant for review before the commencement of Work.

- 1.8.7 In case of damage to active services on utilities, notify Consultant and respective authorities immediately and make all required repairs under direction of Consultant and respective authorities. Carry out repairs to such damaged services and utilities continuously to completion, including working beyond regular

1.9 **CUTTING AND PATCHING**

- 1.9.1 Execute Work to avoid damage to other Work.
- 1.9.2 Execute cutting, fitting and patching including excavation and fill to complete the Work.
- 1.9.3 Employ appropriate trades with skilled labour to perform cutting Work.
- 1.9.4 Fit Work segments together, to integrate with penetrations through surfaces and with other Work.
- 1.9.5 Remove and replace defective and non-conforming Work.
- 1.9.6 Do any drilling, cutting, fitting, patching and finishing that may be required to make the various classes and kinds of other Work fit together in a professional and finished manner. Make watertight connections with adjoining structures.
- 1.9.7 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- 1.9.8 Execute Work by methods to avoid damage to other Work and which will provide proper surfaces to receive patching and finishing.
- 1.9.9 Where new Work connects with existing structures, cut, patch and make good existing work to match original condition.
- 1.9.10 Be responsible for correct formation and bridging of openings in masonry and structural walls as required.
- 1.9.11 Ensure compatibility between installed Products and security of installation.
- 1.9.12 Restore Work with new Products in accordance with requirements of the Contract Documents.
- 1.9.13 Fit Work airtight to pipes, sleeves, ducts, conduits and other penetrations through surfaces.
- 1.9.14 Properly prepare surfaces to receive patching and finishing.
- 1.9.15 Refinish surfaces to match adjacent finishes; for continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.

1.10 **FIRE RATINGS**

- 1.10.1 Where a material, component or assembly is required to be fire rated, the fire rating shall be as determined or listed by one of the following testing authorities acceptable to the authorities having jurisdiction:
- .1 Underwriters' Laboratories of Canada.
 - .2 Underwriters' Laboratories Inc.
 - .3 Factory Mutual Laboratories.
 - .4 The National Research Council of Canada.
 - .5 The National Board of Fire Underwriters.

.6 Intertek Testing Services.

- 1.10.2 Where reference is made to only one testing authority an equivalent fire rating as determined or listed by another of the aforementioned testing authorities is acceptable if approved by authorities having jurisdiction. Obtain and submit such approval of authorities, in writing when requesting acceptance of a proposed equivalent rating or test design.

1.11 **FIRE SEPARATIONS**

- 1.11.1 Conform to following requirements to maintain continuity of fire separations whether or not shown on the Contract Drawings.
- 1.11.2 Fire separations may be pierced by openings for electrical and similar service outlets provided such boxes are non-combustible and are tightly fitted and sealed with a ULC approved sealant for the assembly being sealed.
- 1.11.3 Construction that abuts on or is supported by a non-combustible fire separation shall be constructed so that its collapse under fire conditions will not cause the collapse of the fire separation.
- 1.11.4 At penetration through fire rated walls, ceilings or floors, completely seal voids with ULC approved firestopping material; full thickness of the construction element. In locations that require a smoke seal, provide appropriate ULC approved system installed in accordance with the manufacturer's recommendations.

1.12 **CODES**

- 1.12.1 Reference is made to standards in the specifications to establish minimum acceptable standards of materials, products and workmanship. Ensure that materials, products and workmanship meet or exceed requirements of the reference standards specified.
- 1.12.2 In the event of conflict between documents specified herein, execute the Work in accordance with the most stringent requirements.

1.13 **STANDARDS**

- 1.13.1 Where a material or product is specified in conjunction with a referenced standard, do not supply the material or product if it does not meet the requirements of the standard. Supply another specified material or product, or an acceptable material or product of other approved manufacture which does meet the requirements of the standard, at no additional cost to the Owner.
- 1.13.2 If there is question as to whether a material, product or system is in conformance with applicable standards, the Consultant reserves the right to have such materials, products or systems tested to prove or disprove conformance. The cost for such testing will be paid by the Owner in the event of conformance with contract Documents or by the Contractor in the event of non-conformance.
- 1.13.3 Where reference is made to manufacturer's directions, instructions or specifications they shall include full information on storing, handling, preparing, mixing, installing, erecting, applying, or other matters concerning the materials pertinent to their use and their relationship to materials with which they are incorporated.

1.14 **PROGRESS MEETINGS**

- 1.14.1 Attend regularly scheduled progress meetings to be held on Site at times and dates that are mutually agreed to by the Owner, Consultant, and Contractor.

- 1.14.2 Co-ordinate and organize attendance of individual Subcontractors and material suppliers when requested. Relationships and discussions between Subcontractor participants are not the responsibility of the Consultant and do not form part of the meetings content.
- 1.14.3 Ensure that Contractor representatives in attendance at meetings have required authority to commit Contractor to actions agreed upon. Assign same persons to attend such meetings throughout the contract period.
- 1.14.4 Inform the Consultant in advance of meetings regarding all items to be added to the agenda.
- 1.14.5 Consultant will distribute copies of Agenda prior to meeting.
- 1.14.6 Be prepared to provide specific information relative to agenda items at each meeting as they are pertinent to the Contract.
- 1.14.7 Record minutes of meeting and distribute type written copies to all participants and other interested parties, within one week of meeting date.
- 1.15 **PRODUCT DATA**
 - 1.15.1 Before delivery of Products to the Site, submit Product data as specified in each section or as requested by the Consultant.
 - 1.15.2 Submit manufacturer's Product data for systems, materials, and methods of installation proposed for use. Such literature shall identify systems, each component, and shall certify compliance of each component with applicable standards.
- 1.16 **SAMPLES**
 - 1.16.1 Before delivery of Products to the Site, submit samples of Products as specified or as requested by the Consultant. Label samples as to origin and intended use in the Work and in accordance with the requirements of the Specification Sections. Samples must represent physical examples to illustrate materials, equipment or work quality and to establish standards by which completed Work is judged.
 - 1.16.2 Notify the Consultant in writing, at time of submission, of any deviations in samples from requirements of the Contract Documents, and state the reasons for such deviations.
 - 1.16.3 If samples are not acceptable, both samples will be returned. If samples are acceptable, one sample will be so indicated and returned. Be responsible for the cost of samples that are not accepted and for resubmission of samples.
 - 1.16.4 Each Product incorporated in the Work shall be precisely the same in all details as the acceptable sample.
 - 1.16.5 Should there is any change to the accepted sample, submit in writing for approval of the revised characteristics and resubmit samples of the Product for approval if requested.
- 1.17 **SHOP DRAWINGS**
 - 1.17.1 Arrange for the preparation of shop drawings as called for in the Contract Documents or as may be reasonably requested by the Consultant. The Contractor and each Subcontractor shall operate as experts in their respective fields and all shop drawings and samples shall conform to the requirements of the Contract Documents.

- 1.17.2 The term "shop drawings" means drawings, diagrams, schematics, illustrations, schedules, performance charts, brochures and other data which are required to illustrate details of the Work.
- 1.17.3 In addition to shop drawings specified in the specification sections, submit shop drawings required by jurisdictional authorities in accordance with their requirements.
- 1.17.4 Include in shop drawing submissions detailed information, templates, and installation instructions required for incorporation and connection of the Work.
- 1.17.5 Before submitting to the Consultant, review all shop drawings to verify that the Products illustrated therein conform to the Contract Documents. By this review, the Contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers and similar data and that it has checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents. The Contractor's review of each shop drawing shall be indicated by stamp, date and signature of a qualified and responsible person possessing the appropriate authorization.
- 1.17.6 Be responsible for dimensions to be confirmed and correlated at the Site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of the Work of all subtrades.
- 1.17.7 Submit shop drawings for the Consultant's review with reasonable promptness and in orderly sequence so as to cause no delay in the Work nor in the work of Other Contractors. At the time of submission, notify the Consultant in writing of any deviations in the shop drawings from the requirements of the Contract Documents. The Contractor will be held responsible for changes made from the Contract Documents which are not indicated or otherwise communicated in writing with the submission.
- 1.17.8 Submit shop drawings, as indicated in each section of the Work, signed and sealed by a licensed Professional Engineer registered in the place of the Work.
- 1.17.9 The Consultant's review will be for conformity to the design concept and for general arrangement only and such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the Contract Documents unless a deviation on the shop drawings has been approved in writing by the Consultant.
- 1.17.10 The Contractor shall make any changes in shop drawings which the Consultant may require consistent with the Contract Documents and re-submit unless otherwise directed by the Consultant. When re-submitting the shop drawings, the Contractor shall notify the Consultant in writing of any revisions other than those requested by the Consultant.
- 1.17.11 Only drawings noted for revision and resubmission need be resubmitted.

1.18 **CERTIFICATES**

- 1.18.1 Submit certificates that are required by authorities having jurisdiction or that are requested in the specification sections.
- 1.18.2 Clearly show on each certification the name and location of the Work, name and address of Contractor, quantity and date of shipment and delivery and name of certifying company.
- 1.18.3 Certificates shall verify that Products and/or methods meet the specified requirements and shall include test reports of acceptable testing laboratories to validate certificates.

- 1.18.4 Submit certificates in duplicate and signed by an authorized representative of the certifying company.

1.19 **WARRANTIES**

- 1.19.1 Submit extended warranties as requested in sections of the Specifications showing title and address of Contract, warranty commencement date and duration of warranty.
- 1.19.2 Extended warranties shall commence on termination of the standard warranty specified in the conditions of the contract and shall be an extension of these provisions. Clearly indicate what is being warranted and what remedial action is to be taken under the warranty. Ensure warranty bears the signature and seal of the Contractor.
- 1.19.3 Submit each extended warranty on a form that is acceptable to the Owner and Consultant.

1.20 **INSPECTION AND TEST REPORTS**

- 1.20.1 Submit inspection and test reports as specified in the Sections of the specifications within 3 working days of inspection or testing. If immediate action is required by the Contractor or Consultant inform the Consultant immediately and submit inspection and testing report within one working day.
- 1.20.2 Inspection and test reports shall be signed by a responsible officer of the inspection and testing company.

1.21 **SCHEDULES**

- 1.21.1 Be responsible for planning and scheduling of the Work. Be responsible for ensuring that Subcontractors plan and schedule their respective portions of the Work. Subcontractor's schedules shall form part of the above mentioned schedules.
- 1.21.2 Prepare and submit a Construction Schedule within two weeks of Award of Contract. This schedule, once it is reviewed and accepted by the Consultant, will be updated and submitted prior to each Site Meeting.
- 1.21.3 This schedule shall cover the construction period. It will show, in detail, activities on a daily basis indicating durations, manpower and constraints.

1.22 **INSPECTION AND TESTING**

- 1.22.1 Be responsible for inspection and testing as required by the Contract Documents, statutes, regulations, by-laws, standards or codes or any other jurisdictional authority. Give the Consultant timely notice of the readiness for inspection, date and time for such inspection for attendance by the Consultant.
- 1.22.2 Verify by certification that specified products meet the requirements of reference standards specified in the applicable specification sections.

1.23 **TOLERANCES FOR INSTALLATION OF WORK**

- 1.23.1 Unless specifically indicated otherwise, Work shall be installed plumb, level, square and straight.
- 1.23.2 Unless acceptable tolerances are otherwise specified in specification sections or are otherwise required for proper functioning of equipment, site services, and mechanical and electrical systems:
 - .1 "Plumb and level" shall mean plumb or level within 1 mm in 1 m.

- .2 "Square" shall mean not in excess of 10 seconds lesser or greater than 90 degrees.
- .3 "Straight" shall mean within 1 mm under a 1 m long straightedge.
- .4 "Flush" shall mean within:
 - .1 6 mm for exterior concrete, masonry, and paving materials.
 - .2 1 mm for interior concrete, masonry, tile and similar surfaces.
 - .3 0.05 mm for other interior surfaces.

1.23.3 Allowable tolerances shall not be cumulative.

1.24 **DEFECTS**

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

1.25 **TEMPORARY CONTROLS**

1.25.1 Hoarding, fencing and barriers:

- .1 Before commencing operations, supply, erect and maintain hoarding, fencing and barriers around entire perimeter of Site in accordance with Authorities having Jurisdiction.
- .2 Provide temporary enclosures as required to protect the building in its entirety or in its parts, against the elements, to maintain environmental conditions required for work within the enclosure, and to prevent damage to materials stored within.

1.25.2 Prevent unauthorized entry to the Site. Barricade, guard or lock access points to the satisfaction of the Consultant and post "NO TRESPASSING" signs.

1.25.3 Install signs for movement of people around Work Site as required and directed by the Consultant.

1.25.4 Provide secure, rigid guide rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs as required for protection of Work, workers, and the public.

1.25.5 Remove hoarding, fencing, barriers, building enclosures, guide rails and barricades upon Contract Completion unless otherwise noted on the Contract Drawings or as directed by the Consultant

1.26 **SITE SECURITY**

1.26.1 Provide and pay for security personnel to guard the Site and contents of the Site after working hours and during holidays as established by the Owner. Control of access shall be through hoarding and barricades during times work is in progress, and by locking hardware otherwise.

1.27 **TEMPORARY WORKS**

1.27.1 Installation and Removal: Provide temporary utilities, facilities and controls in order to execute the Work expeditiously. Remove from Site all such Work after use.

1.27.2 Temporary Power and Lighting Systems:

- .1 Supply, install and maintain electrical power and necessary electrical equipment. Connections will be made available to any part of the Work within distance of a 30 m extension.
- .2 Provide temporary lighting of adequate intensity to illuminate construction activities.
- .3 Make all necessary arrangements for and pay all costs for a temporary electrical service of sufficient capacity to supply temporary lighting, operation of power tools, and equipment for all construction, implementation, and inspection and testing purposes. Supply and install necessary temporary cables and other electrical equipment and make all temporary connections as required.
- .4 Temporary power distribution wiring shall comply with local Hydro Electrical Safety Code. Obtain inspection certificates for temporary electrical work.
- .5 Upon Contract Completion, remove electrical plant and temporary lighting from the Site.

1.27.3 Water Supply:

- .1 Provide potable water for construction use.
- .2 Provide and maintain all temporary lines, extensions and hoses as required. Remove all temporary connections and lines on completion of the Work and make good any damage.

1.27.4 Temporary Heating:

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 Construction heaters used inside buildings must be vented to the outside or be flame less type. Solid fuel salamanders are not permitted.
- .3 Maintain temperatures of minimum 10°C in areas where construction is in progress unless otherwise indicated in the Contract Documents. Protect exposed and adjacent services from freezing. Repair at no cost to the Owner any such services, buildings or other utilities disrupted by freezing.
- .4 Ventilate heated areas and keep structures free from exhaust combustion gases.
- .5 The permanent heating system of the building or portions thereof may be used when available only upon written permission by Consultant.

1.28 **PROTECTION**

- 1.28.1 Protection of Public Area: Protect surrounding private and public property from damage during performance of the Work.

1.28.2 Protection of Building Finishes and Equipment:

- .1 Provide protection for existing structure, finished and partially finished building finishes, waterproofing systems, and equipment during performance of the Work.
- .2 Cover Owner's equipment and plant within the Site with 6 mil PVC sheet, or equal, taped to make it dust-tight. Equipment and existing work moved or altered to facilitate construction, movement of Products or

equipment shall be stored, protected with dust-tight covers and subsequently returned to its original location.

- .3 Provide necessary screens, covers and hoarding as required.
- .4 Any Products or equipment damaged while carrying out the Work shall be restored with new Products or equipment matching the original equipment. Damage shall include harm resulting from all construction work, such as falling objects, wheel and foot traffic, failure to remove debris, operation of machinery and equipment, and scaffolding and hoisting operations.

1.28.3 Fire Protection:

- .1 Take precautions to prevent fires. Provide and maintain temporary fire protection equipment of a type appropriate to the hazard anticipated in accordance with authorities having jurisdiction, governing codes, regulations, by-laws and to the satisfaction of the Consultant and insurance authorities.
- .2 Open burning of rubbish is not permitted on the Site.

1.29 **PEST CONTROL**

- 1.29.1 Be responsible to provide control measures, restraining procedures, and treatments to prevent infestation and spread of insects, rodents and other pests deemed to be present at Site and/or noticed during course of the Work. Carry out fumigation, pest control procedure, and posting of warning signs, notices including contents of such notices in accordance with requirements of Pesticides Act and any other authorities having jurisdictions. Pesticides used shall be in accordance with Canada Pest Control Products Act, and provincial and municipal regulations.

1.30 **SITE MAINTENANCE**

- 1.30.1 Maintain the Site and adjacent premises in a clean and orderly condition, free from debris and other objectionable matter. Immediately remove rubbish and surplus Products, equipment and structures from the Site. If the Site is not cleaned (within 48 hours after the Contractor has been instructed to do so), the Consultant may clean the Site and retain the cost from monies due, or to become due, to the Contractor.
- 1.30.2 When the Work is substantially performed, remove surplus Products, tools, construction machinery and equipment not required for the performance of the remaining Work.

1.31 **SITE STORAGE AND OVER LOADING**

- 1.31.1 Confine the Work and operations of employees to limits indicated by the Contract Documents. Do not unreasonably encumber the Site with Products.
- 1.31.2 Products shall be stored only in areas designated or approved by the Consultant, and shall not be left lying on streets, sidewalks, boulevards or elsewhere within public view. Products which the Consultant may permit to be stored elsewhere than in the Contractor's storage areas shall be neatly stacked or otherwise disposed and shall be so maintained.
- 1.31.3 Do not load or permit to be loaded any part of the Work with a weight or force that it is calculated to bear safely. Be solely responsible and liable for damages resulting from violation of this requirement. Provide temporary supports as strong as permanent support.

- 1.31.4 Do not cut, drill or sleeve load bearing members unless shown on drawings or otherwise approved by the Consultant in writing for each location.
- 1.31.5 Site storage and loading requirements to be in accordance with the local Occupational Health and Safety Act and Regulations for Construction Projects.

1.32 **APPROVAL OF PRODUCTS AND INSTALLATION METHODS**

- 1.32.1 Wherever in the Specifications it is specified that Products and installation methods shall meet approval of Authorities having Jurisdiction, underwriters, the Consultant, or others, such approval shall be in writing.

1.33 **AVAILABILITY**

- 1.33.1 If delays in supply of Products are foreseeable, notify the Consultant of such, in order that remedial action may be authorized in ample time to prevent delay in performance of Work.
- 1.33.2 In the event of failure to notify the Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Consultant reserves the right to direct the Contractor to take the following measures at no increase in Contract Price:
 - .1 Substitute more readily available Products of similar or better quality and character, or
 - .2 Temporarily install another Product until such time as the specified Product becomes available, at which time the temporarily installed product shall be removed and the specified Product installed.

1.34 **DELIVERY, STORAGE, HANDLING AND PROTECTION**

- 1.34.1 Be responsible for handling and delivery of Products. Protect Products from damage during handling, storage and installation. Deliver store and handle items in accordance with manufacturer's instructions and as specified. Be responsible for all costs of delivery, loading and off-loading, and for transportation back to its origin for correction, if required, due to damage or defect. Reject materials and Products delivered to the Site which are damaged.
- 1.34.2 Manufacture, pack, ship, deliver, and handle Products so that no damage occurs to structural qualities and finish appearance, nor in any other way which is detrimental to their function and appearance.
- 1.34.3 Ensure that Products, while transported, are not exposed to an environment which would increase their moisture content beyond the maximum specified.
- 1.34.4 Schedule early delivery of Products to enable Work to be executed without delay. Before delivery, arrange for receiving at the Place of the Work.
- 1.34.5 Deliver packaged Products, in original unopened wrapping or containers, with manufacturer's seals and labels intact.
- 1.34.6 Label packaged products to describe contents, quantity, and other information as specified.
- 1.34.7 Labels attesting that materials conform to specified reference standards will be acceptable as verification that contents meet specified requirements. In the absence of labels, submit affidavits to validate conformance of Product to reference standards, as requested by the Consultant.
- 1.34.8 Label fire-rated Products to indicate Underwriters' Laboratories approval.

- 1.34.9 Handle and store materials and products in such a manner that no damage is caused to the materials and products, the Work, the Site and surrounding property.
- 1.34.10 Store Products off the ground, in a manner to prevent damage, adulteration, deterioration and soiling to the Products, other building components, assemblies, other products, the structure, the Site and surrounding property, and in accordance with manufacturer's instructions when applicable.
- 1.34.11 Store packaged or bundled Products in original and undamaged condition complete with written application instructions. Keep manufacturer's seals and labels intact. Do not remove from packaging or bundling until required in the Work.
- 1.34.12 Store Products so as not to create any overloading conditions to any part of the building, structure, falsework, form work and scaffolding.
- 1.34.13 Store Products subject to damage from weather in weatherproof enclosures.
- 1.34.14 Protect prefinished metal surfaces by protective coatings or wrappings until time of final cleanup. Protection shall be easily removable without damage to finishes. Do not permit strippable tape or coatings to become baked on surfaces which they protect.
- 1.34.15 Touch-up damaged factory finished surfaces to Consultant's satisfaction. Use primer and paint to match original.
- 1.34.16 Protect glass and other finishes against heat, slag and weld splatter by provision on adequate shielding. Do not apply Visible markings to surfaces exposed to view in finished state or that receive transparent finishes.
- 1.34.17 Protect surfaces of completed work exposed to view from staining, disfigurement and all other damage by restriction of access or by use of physical means suitable of the material and surface location.
- 1.34.18 Make good or replace damaged materials to the satisfaction of the Consultant.
- 1.34.19 Hazardous Materials Information:
 - .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) in accordance with jurisdictional authorities.
 - .2 Deliver copies of Material Safety Data Sheets (MSDS) to the Consultant on all Products intended for use in the Work and designated as a "controlled product."

1.35 **MANUFACTURER'S INSTRUCTIONS**

- 1.35.1 Unless otherwise indicated in the Specifications, fabricate, install, apply, connect, install, erect, use, clean, and condition Products in accordance with manufacturer's instructions except where more stringent requirements are specified. Do not rely on labels or enclosures provided with Products. Obtain written instructions directly from manufacturers.
- 1.35.2 Notify the Consultant in writing, of conflicts between the Specifications and manufacturer's instructions, so that the Consultant may establish the course of action. If requested, make a copy of those instructions available at the Site.
- 1.35.3 In cases of improper installation or erection of Products, due to failure in complying with these requirements, the Consultant may direct removal and re-installation at no increase in Contract Price.

1.36 **WORKMANSHIP**

- 1.36.1 Workmanship shall be the best quality, executed by workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Consultant if required Work is such as to make it impractical to produce required results.
- 1.36.2 Do not employ any unfit person or anyone unskilled in their required duties. The Consultant reserves the right to require the dismissal from the Place of the Work, workers deemed incompetent, careless, insubordinate or otherwise objectionable.
- 1.36.3 Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with the Consultant, whose decision is final.
- 1.36.4 Give particular attention to finished dimensions and elevations of the Work. Make finished Work fit indicated spaces accurately. Make finished Work flush, plumb, true to lines and levels and accurate in all respects.
- 1.36.5 In finished areas, conceal pipes, ducts, conduit and wiring in floors, walls, ceilings, chases, or behind furring except where indicated otherwise.
- 1.36.6 Ensure that integrity of fire separations is maintained where they are penetrated.
- 1.36.7 Finish access panels and doors to match adjacent wall and/or ceiling finish unless otherwise specified or indicated.
- 1.36.8 Enforce fire prevention methods at site. Do not permit fires, open flame heating devices or accumulation of debris. Use flammable materials only if all safety precautions are taken. Provide and maintain in working order ULC labelled fire extinguishers of types suitable for fire hazard in each case, and locate them in prominent location and to approval of jurisdictional authorities.
- 1.36.9 Where flammable materials are being applied, ensure that adequate ventilation is provided, spark-proof equipment is used, and smoking and open flames are prohibited.

1.37 **DIMENSIONS**

- 1.37.1 Check all dimensions at the Site before fabrication and installation commences and report discrepancies to the Consultant.
- 1.37.2 Where dimensions are not available before fabrication commences, ensure that dimensions required are agreed upon between the parties concerned.
- 1.37.3 Prior to commencing work, ensure that clearances required by jurisdictional authorities can be maintained
- 1.37.4 Wall thicknesses and openings shown on the drawings may be nominal only; ascertain actual sizes at the Site.
- 1.37.5 Verify dimensions of shop fabricated portions of the Work at the Site before shop drawings and fabrications are commenced. The Owner will not accept claims for extra expense by reason of non-compliance with this requirement.
- 1.37.6 In areas where equipment is to be installed, check dimensional data on equipment to ensure that area and equipment dimensions are compatible with necessary access and clearance provided. Ensure that equipment supplied is dimensionally suitable for space provided.
- 1.37.7 Whether shown on the Drawings or not, leave adequate space and provision for servicing of equipment and removal and reinstallation of replaceable items such as motors, coils and tubes.

1.38 **EXPANSION, CONTRACTION, AND DEFLECTION**

- 1.38.1 Conform to manufacturer's recommended installation temperatures. If items, components, assemblies, systems, and finishes are installed at temperatures different from operation or service temperatures, make provisions for expansion and contraction in service as acceptable to manufacturer and consultant. Repair all resulting damage should expansion provisions provide inadequate.
- 1.38.2 Make provisions for expansion and contraction due to temperature changes within components, Products and assemblies, and between adjacent components, Products and assemblies, and due to building movements including but not limited to creep, column shortening, deflection, sway and twist. Ensure provisions for expansion, contraction and building movements prevent damages from occurring to and within components, Products and assemblies.
- 1.38.3 Make adequate allowance at wall and partition heads for deflection of the structure above. Determine requirements from Consultant where additional information is required. Where partitions butt to underside of floor assembly, or structural framing, the clearance shall be based on the span of the members supporting the floor or structural framing. In making such allowance use methods, which maintain the integrity of the wall or partition as a sound, and/or fire barrier.
- 1.38.4 Make provisions in pipes, plenums, ducts and vessels containing air and fluids as is necessary to prevent damage due to fluid and air induced pressure, surges and vibrations, to pipes, plenums, ducts and vessels and to adjacent components, assemblies and construction to which pipes, ducts, plenums and vessels are attached or pass through.

1.39 **DIELECTRIC SEPARATION**

- 1.39.1 Ensure that a dielectric separator is provided in a permanent manner over entire contact surfaces to prevent electrolytic action (galvanic corrosion) between dissimilar materials. Similarly, prevent corrosion to aluminium in contact with alkaline materials such as contained in cementitious materials.

1.40 **FASTENINGS**

- 1.40.1 Include in the work of each section necessary fastenings, anchors, inserts, attachment accessories, and adhesives. Where installation of devices is in work or other sections, deliver and locate devices in ample time for installation.
- 1.40.2 Do not install fibre, plastic or wood plugs or blocking for fastenings in masonry, concrete, or metal construction, unless specified or indicated on drawings.
- 1.40.3 Install work with fastenings or adhesives in sufficient quantity to ensure permanent secure anchorage of materials, construction, components and equipment under static conditions, and to resist building thermal movement, creep and vibration.
- 1.40.4 Provide metal fastenings and accessories in same material, texture, colour, sheen and finish as metal on which they occur, unless indicated otherwise.
- 1.40.5 Prevent electrolytic action between dissimilar metals and materials.
- 1.40.6 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior Work, and where attached to, or contained within, exterior walls and slabs, unless stainless steel or other material is specified. Leave steel anchors bare where cast in concrete.

- 1.40.7 Space anchors within their load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- 1.40.8 Conceal fasteners where indicated. Keep exposed fastenings to a minimum, space evenly and in an organized symmetrical pattern.
- 1.40.9 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.41 **ADJUSTING**

- 1.41.1 Ensure that all components of assemblies fit snugly, accurately and in true planes, and that moving parts operate positively and freely, without binding and scraping.
- 1.41.2 Verify that work functions properly and adjust it accordingly to ensure satisfactory operation. Lubricate Products as recommended by manufacturer.

1.42 **DEMONSTRATION AND INSPECTION OF PRODUCTS AND SYSTEMS**

- 1.42.1 Arrange for a demonstration of systems and operating Products upon the 100% completion of their installation and prior to certification for Substantial Performance.
- 1.42.2 Owner's representative will acknowledge the successful completion of each demonstration on a form provided by the Contractor. The form shall be agreed to by the Owner, Consultant and Contractor prior to demonstration and testing.
- 1.42.3 Submit copies of letters from manufacturers of Systems and/or Products before making application for certificate of Substantial Performance to verify that the Products has been installed and connected correctly, and that it is operating in a satisfactory manner. The certification shall be based upon inspection and testing of the Products by competent technical personnel. Include in letter of certification the names of personnel conducting the testing and inspection, the methods of inspection utilized, and the location in the building of the Products certified.
- 1.42.4 Following submission of letters of certification and their acceptance by the Owner, the owner shall have the right to use the Products on a trial basis and for instructing their personnel in its use.

1.43 **FINAL INSPECTIONS AND CLOSE OUT**

- 1.43.1 Submit proposed closeout procedures and schedule of inspection to Consultant for approval before final demonstrations and inspections commence.
- 1.43.2 Arrange for, conduct and document final demonstrations, inspections, close-out and take-over at completion of the Work in accordance with procedures described in OAA/OGCA TAKE-OVER PROCEDURES, OAA/OGCA Document No. 100. Where "Architect" is referred to in Document No. 100 it shall mean Consultant.
- 1.43.3 Provide close out documents for Consultant's review. The documents shall include:
 - .1 Record drawings: per part 1.49 of this specification.
 - .2 Photographs record per Section 01 32 33.
 - .3 Documents for Management of the Project issued during the construction of the Work, included but not limited to:
 - .1 Forms for Contract Administration:
 - .1 Architectural Memorandums,
 - .2 Site Instructions,

- .3 Proposed Change Orders,
- .4 Site Visit Reports,
- .5 Change Orders,
- .6 others.
- .2 Forms for Certification:
 - .1 Certificate of Payments
 - .2 Certificate of Substantial Performance,
 - .3 others

1.43.4 Provide 2 CDs with all the information requested in this part.

1.44 **GARBAGE DISPOSAL AND CLEANUP**

- 1.44.1 Provide waste containers for the disposal of all waste materials resulting from performance of their work.
- 1.44.2 No hazardous or contaminated waste material shall be placed in Owner's waste containers and Subtrades shall make their own arrangements for the disposal off site of any such material resulting from performance of their work.
- 1.44.3 Remove all regular waste material and debris from their work areas and deposit in the waste containers at the end of each working day. Any clean up work not performed as requested will be carried out by the Owner will all resultant costs being charged to the Subtrade.

1.45 **CLEANING**

1.45.1 Progress cleaning:

- .1 Remove from finish work, spatters, droppings, soil, labels, and debris, before they set up.
- .2 Ensure that only cleaning materials are used which are recommended for the purpose by both the manufacturer of the surface to be cleaned and of the cleaning material.
- .3 Maintain building work areas "broom clean" at least on a daily basis, but shall also be done immediately before finishing work.
- .4 No waste material may be burned or buried at site. Remove as often as required to avoid accumulation, no less than, at the end of each working day.
- .5 Remove packaging materials and debris from the site immediately product and equipment is unwrapped or uncrated.
- .6 Ensure that volatile fluid wastes are not disposed of in storm or sanitary sewers, in open drain courses, or anywhere on site.
- .7 Do not allow waste material and debris to accumulate in an unsightly or hazardous manner. Sprinkle dusty accumulations with water. Provide containers in which to collect waste material and debris. Dispose of hazardous products in accordance with requirements of jurisdictional authorities.
- .8 Ensure that cleaning operations are scheduled to avoid deposits, of dust or other foreign matter on surfaces during finishing work and until wet or tacky surfaces are cured.
- .9 Provide instructions for final cleaning of finishing work, and for inclusion in Maintenance and Operating Manuals.

1.45.2 Final cleaning:

- .1 Before final inspection, replace glass and mirrors broken, damaged, and etched during construction, or which are otherwise defective.
- .2 In addition to requirements for progress cleaning, Work shall include final cleaning by skilled cleaning specialists on completion of construction.
- .3 Remove temporary protections and make good defects before commencement of final cleaning.
- .4 Final cleaning shall remove dust, stains, paint spots, soil, grease, fingerprints, and accumulations of construction materials, interior and exterior to the building for all new work throughout new and existing Building. Work shall be done in accordance with manufacturer's instructions for each material. This work shall include:
 - .1 Washing of exterior paved surfaces, and of interior stone, brick, and concrete floors.
 - .2 Cleaning and polishing of glass, mirrors, porcelain, enamel and finish metals.
 - .3 Vacuum cleaning of ceilings, walls and floors.
 - .4 Cleaning and polishing of terrazzo and ceramic and quarry tile floors.
 - .5 Cleaning of resilient flooring.
 - .6 Buffing of resilient flooring followed by two light coats of wax, each buffed.
 - .7 Washing clean of glazed wall surfaces.
 - .8 Cleaning of hardware, mechanical fixtures, plumbing fixtures, lighting fixtures, cover plates, and equipment, including polishing of their finish metal, porcelain, vitreous, and glass components.
 - .9 Cleaning of windows, entrances and skylights, both interior and exterior surfaces.
- .5 Maintain cleaning until Owner has taken possession of building or portions thereof.

1.46 **PROGRESS RECORDS**

- 1.46.1 Maintain on site, permanent written records of daily progress of the Work. Records shall be open to review by Consultant and Owner at all times and a copy shall be furnished to Consultant on a weekly basis.
- 1.46.2 Records shall show dates of commencement, progress and completion of various trades and items of work. Particulars pertaining to number of employees of various trades and type and quantity of equipment employed daily, temperature, protection methods and other such data shall be noted.

1.47 **RECORD DRAWINGS**

- 1.47.1 Authorized deviations from drawings shall be marked in red accurately on one set of drawing prints in a neat, legibly printed manner and shall be dated. Prior to final inspection, neatly transfer the recorded information to a second set of drawing prints of the most recent revision to the drawings and submit both sets to the Consultant.

- 1.47.2 Maintain record drawings up to date as Work progresses. Status of maintained record drawings may be considered as a condition for validation of applications for payment.
 - 1.47.3 Identify each record drawing as "Contract Record Copy" and maintain the record drawings in good condition. Make record drawings available to the Consultant at all times.
 - 1.47.4 Record drawings shall include accurate dimensioned record of deviations and changes in Work from drawings.
 - 1.47.5 Record drawings shall be signed and dated by Contractor.
 - 1.47.6 Submit record drawing to Consultant for review and make corrections as directed by Consultant.
 - 1.47.7 Record accurately all deviations in the Work.
 - 1.47.8 Accurately record locations of concealed structure, mechanical and electrical services and similar Work not clearly in view, the location of which is required for maintenance, alteration Work and future additions. Do not conceal such Work until the location has been recorded.
 - 1.47.9 Accurately record locations of equipment bases, anchors, concrete pads and roof curbs, sleeves, piping, conduits, ducts, maintenance holes and valves, etc. located either below, outside or within structure.
 - 1.47.10 Where piping, conduits and ducts are underground, underfloor, embedded in concrete or otherwise in inaccessible locations, accurately record with respect to structure column lines or walls and elevations with respect to finished floor levels or grades referenced to the centre line of components.
 - 1.47.11 Accurately record any components which will be in inaccessible locations for Consultant's review before the component is covered, or buried, or made inaccessible.
- 1.48 **OPERATION AND MAINTENANCE MANUALS**
- 1.48.1 Hand over to the Consultant two (2) copies of a comprehensive operations and maintenance manual and material suitable [for a training course] for the Owner's maintenance employees. Manuals shall cover all Products supplied and installed under the Contract.
 - 1.48.2 Submit draft of the operation and maintenance manuals for the Consultant's review at least 15 days before testing systems and equipment. Incorporate alterations and additions, as found to be necessary during testing, and prepare the final version of the manual from the corrected draft.
 - 1.48.3 Submit final version of operation and maintenance manuals prior to Contract Completion.
 - 1.48.4 Testing of systems and equipment will not be deemed to be complete until the requisite number of copies of the final version of the manuals has been handed over to the Consultant.
 - 1.48.5 If standard literature is incorporated into the operations and maintenance manual, any irrelevant information shall be deleted, or suitably noted.
 - 1.48.6 The manuals shall have sufficient detail in order that the Owner can totally maintain the equipment without outside help.
 - 1.48.7 Submit all material in English.

- 2. **PRODUCTS**
 - 2.1 **Not Applicable**
- 3. **EXECUTION**
 - 3.1 **Not Applicable**

END OF SECTION

1. **GENERAL**

1.1 **Summary of Work**

- 1.1.1 Provide a complete mock-up and sample of proposal documentation for consultant review. See also Section 01 00 00.
- 1.1.2 Document each item prior to repair and/or removal.
- 1.1.3 Provide digital photographs in JPEG format and colour photographic prints in accordance with procedures and submission requirements specified in this Section.
- 1.1.4 Provide *photographs, in focus*, showing the three stages of work: existing (before dismantling and/or demolition), through construction (during construction) and completion (after construction).

1.2 **Photo documentation:**

- 1.2.1 Provide up to six (6) views for each item to fully document its condition at each stage including but not limited to:
 - .1 In situ prior protection, disassembly, intervention and/or demolition;
 - .2 In situ during disassembly, intervention or protection to show methods used;
 - .3 In situ after protection, disassembly, intervention or removal;
 - .4 Any previously hidden original components and finishes;
 - .5 During each stage of treatment in progress, for example showing cleaned and un-cleaned portions of masonry, wood and other heritage finishes;
 - .6 Completed treatments at each stage such as cleaning, repair, priming, painting;
 - .7 Typical and unique installations of new replacement component, showing adjacent or nearest existing retained component;
- 1.2.2 Type and format of photos and equipment to be used.
 - .1 Digital camera must have a sensor capacity of at least 12 megapixels, should be capable of using wide-angle lens system, and electronic flash capable of properly illuminating the element to be recorded. A tripod is recommended to allow long exposures.
 - .2 Digital camera must produce uncompressed JPEG format files that open to display at dimensions that exceed 20 x 30 inches, at minimum of 72 dpi resolution (i.e. 1500 x 2200 pixels minimum).
 - .3 Provide digital photographs in JPEG format and colour photographs prints in accordance with procedures and submission requirements.

2. **PRODUCTS**

2.1 **Not Applicable**

3. **EXECUTION**

3.1 **Photo documentation process.**

- 3.1.1 Label digital files using a system that readily identifies the component and the stage of treatment (Date of digital file creation is the date of photo taken).

- 3.1.2 Submit a complete list of photographs and a Site Plan showing the location of each *before and after* photo.
- 3.1.3 Submit periodically updates of the list of photographs with a description of the component and stage of restoration process.

END OF SECTION

1. **GENERAL**

1.1 **General**

- 1.1.1 Section 01 00 00 form a part of this Section and shall apply in all respects as if requested herein.
- 1.1.2 This Section specifies general requirements and procedures for submission of shop drawings, product data, samples and mock- ups to Architect for review.
 - .1 Additional specific requirements for submissions are specified in individual sections of Divisions 1 to 16.
- 1.1.3 Submit a list of submittals for review by Architect as required in the respective Sections.
- 1.1.4 Submit, as may be required, construction schedules, shop drawings, samples, records, certificates, requests, "as built", manuals, guarantees, lists and written queries in good time to avoid delay.
- 1.1.5 Provide sample installation of typical methods of constructions and assemblies as may be requested by the Owner or Architect.

1.2 **Alternatives:**

- 1.2.1 Where the words "... or approved equal" appear, the Contractor may propose the use of similar products, materials, etc., to the Architect and the Owner.
 - .1 Proposed alternatives must be approved in writing by the Architect and the Owner before they may be used in the work.
- 1.2.2 In making a request for an alternative, ensure that:
 - .1 Proposed product and method has been investigated and determined to be equal or superior in all respects to that specified.
 - .2 The same guarantee is given for the alternative as for the product and method originally specified.
 - .3 Installation of the accepted alternative is coordinated into the Work, and such changes made as may be required for the Work to be completed in all respects.
 - .4 Do not substitute materials, equipment or methods into the Work unless such alternatives have been specifically approved for in writing by the Owner.
- 1.2.3 Alternatives will not be considered if:
 - .1 They are indicated or implied on Shop Drawings or project data without formal request submitted as specified above.
 - .2 Acceptance will require substantial revision of the Contract Documents.

1.3 **Records and Schedules:**

- 1.3.1 Arrange participation, on site and off site, with subcontractors and Suppliers as and when necessary for the purpose of updating and monitoring progress.
- 1.3.2 Keep a permanent record on site of work progress, commencement and completion dates, weather conditions, numbers of men engaged on site and important events such as visits to site by Owner, Architect, Engineers, jurisdictional authorities, testing companies, etc.

1.4 **Samples:**

- 1.4.1 Submit samples with project name, proposed use and material description as may be requested.
- 1.4.2 Do not use materials for which samples are requested until written approval is obtained from the Architect.

1.5 **Shop Drawings:**

- 1.5.1 Submit Shop Drawings with project name, proposed use and material description as may be required.
- 1.5.2 Do not initiate fabrication for which shop drawings are requested until written approval is obtained from the Architect.
- 1.5.3 Refer also to Section 01 00 00.

1.6 **Mock-ups:**

- 1.6.1 Mock-ups: field-erected example of work complete with specified materials and workmanship.
- 1.6.2 Prepare as may be requested and as work sequence allows "in place" samples of the work which would show all materials, the completed assembly, as well as the sequence of the work.
- 1.6.3 Erect mock-ups at locations acceptable to Architect.
 - .1 Notify the Architect, requesting a review of the proposed mock-up.
 - .2 Reviewed and accepted mock-ups will become standards of workmanship and material against which installed work will be verified.
 - .3 Mock-ups may be incorporated as part of the finished work if acceptable to the Architect.
- 1.6.4 Materials or assemblies, whether incorporated in the work or not, which do not match reviewed and accepted samples, shall be removed and replaced at no extra cost to the Owner.
- 1.6.5 Refer also to Section 01 00 00.

1.7 **List of Materials:**

- 1.7.1 Submit a complete list of each product together with the names, addresses and phone numbers of the manufacturer and the supplier, the product name, number and colour (if applicable) and its end use in the construction to the Owner upon completion of construction.

1.8 **Affidavits**

- 1.8.1 Submit affidavits, which are required in other sections of the specification.
 - .1 Deliver affidavits to Architect with all charges pre-paid.
- 1.8.2 Submit affidavits in duplicate and signed and notarized by a responsible officer of the certifying company.
- 1.8.3 Materials or assemblies for which affidavits are submitted, whether incorporated in the work or not, which do not match reviewed and accepted samples, shall be removed and replaced at no extra cost to the Owner.

1.9 **Extended Warranties, Bonds and Guarantee**

- 1.9.1 Submit extended warranties as specified in each applicable section of this specification.
 - .1 Extended warranties shall commence on termination of the standard one year warranty in this contract as specified and shall be an extension of these same provisions.
 - .2 Complete and submit a Form of Guarantee as requested in the Contract.
- 1.9.2 Separate each warranty or bond or guarantee with index tab sheets keyed to Index.
 - .1 List subcontractor, supplier and manufacturer with name, address, and telephone number of responsible principal.
 - .2 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers and manufacturers within ten (10) days after completion of the applicable item of work.
- 1.9.3 Except for items put into use by Architect's permission, leave date of beginning of time of warranty until the date of substantial performance is determined.
 - .1 Retain warranties and bonds until time specified for submittal.
- 1.9.4 Verify that documents are in proper form, contain full information, and are notarized.
- 1.10 **Cost Breakdown:**
 - 1.10.1 Submit a contract cost breakdown in accordance with Section 01 00 00.
- 1.11 **Pricing of Changes to Work:**
 - 1.11.1 Submit with quotations for changes to work detailed estimate sheets showing contracted and revised quantities of labour, materials and equipment, and the related unit costs.
 - 1.11.2 Payment for use of small tools, traveling, out-of-town accommodations and preparation of price change submittals will be considered a part of overhead.
 - 1.11.3 Submit quotations for changes to work with full documentation simultaneously to Architect, Owner and consultants where applicable.
 - 1.11.4 Do not proceed with any changes to the Work without prior approval in writing from the Owner of both the scope of work and the price.
 - .1 If the Contractor proceeds without written permission he does so at his own peril.
- 1.12 **Applications for Payment:**
 - 1.12.1 Applications for Payment must be accompanied by:
 - .1 The Contractor's Statement of Payment.
 - .2 A progress draw showing a schedule of billing values of various trades and for various parts of the work and in a format acceptable to the Architect.
 - .3 A Statutory Declaration stating that all sub-contractors and their sub contractors and suppliers have been paid to date and that there are no construction liens outstanding or filed.
 - .4 Workers compensation Certificate.
 - .5 Send application for payment to the Architect

- 1.12.2 Co-ordinate progress draws with cost breakdown.
- 1.12.3 Include gross and net value of work completed during billing period.
- 1.12.4 Include running total of gross and net value of work completed by the end of the billing period.
- 1.12.5 Break down progress draw into segments which match the Specification sections. Agree divisions with Architect.

1.13 **Publication of Notice of Substantial Performance:**

- 1.13.1 In accordance with the requirements of The Construction Lien Act, 1983, and amendments, be responsible for publication of a Notice of Substantial Performance in a format approved by the Architect and the Owner, in the Daily Commercial News and/or other periodicals deemed to meet the requirements of the Act.
- 1.13.2 The date of publication of this notice shall constitute the commencement of the period for registration of liens.
- 1.13.3 Provide to the Owner a copy of the issue of the publication in which the notice appeared as soon as it is available.
 - .1 Be responsible for paying the cost of publishing the notice.

1.14 **Project Record Documents**

- 1.14.1 At regular intervals, provide copies of record documents to Architect for incorporation into master record drawings for site.
- 1.14.2 Identify drawings as "Project Record Copy".
 - .1 Maintain in new condition and make available for inspection on site by Architect.

2. **PRODUCTS**

- 2.1 **Not Applicable**

3. **EXECUTION**

- 3.1 **Not Applicable**

END OF SECTION

1. **GENERAL**

1.1 **General Comment**

- 1.1.1 Division of this Specification into subsections is for convenience and clarity. Such division does not relieve the Contractor from the responsibility of ensuring that each trade or sub-trade is fully familiar with the extent of their work or the work of other Sections which may have an impact on their work. Each Section or Division may contain more or less than the work of any trade.
- 1.1.2 Contractor shall ensure that all sub-trades are fully familiar with the conditions set forth in the General Conditions of the Contract and General Instructions in Division 00 and 01.

1.2 **Work with Related Trades**

- 1.2.1 Take site dimensions relative to the Work and perform Work to suit site dimensions and conditions.
- 1.2.2 Be responsible for extra Work and time lost as a result of, failure to provide the necessary co-ordination, information or items required to be installed in a timely manner as determined by the Project Schedule.

1.3 **Product Handling**

- 1.3.1 Arrange and pay all costs of hoisting and handling of all items necessary for the completion of the Work of this Section.

1.4 **Intent**

- 1.4.1 It is the intent under this specification to provide a structural scaffolding system for access for the work specified in the Contract Documents and related inspections and for support of the facade during dismantling.
- 1.4.2 Scaffolding shall be designed for erection on both sides of main wall of building to be dismantled and shall be engineered to maintain lateral stability of the wall during the dismantling process.
- 1.4.3 Scaffolding shall be re-erected in support of the re-construction of the facade.
- 1.4.4 Maintain scaffolding for safe access for the duration of each of the two phases of the Work.

1.5 **Related Work**

- 1.5.1 General Requirements Section 01 00 00

1.6 **Reference Standards**

- 1.6.1 Ontario Building Code (O.B.C.), latest edition.
- 1.6.2 Occupational Health and Safety Act (O.H.S.A), Regulations for Construction Projects, latest edition.
- 1.6.3 C.S.A. S269.2 - M87 Access Scaffolding for Construction Purposes
- 1.6.4 C.S.A. O86.1 - 94 Engineering Design in Wood (Limit States Design)

1.7 **Scope of Work**

- 1.7.1 Be responsible for the following:
 - .1 Employ an Engineer (registered in the Province of Ontario) to design and certify scaffolding installation to carry all loads both lateral and vertical.

- .2 Provide all scaffolding and temporary facilities required to ensure access to all parts of the work area in accordance with applicable codes.
- .3 At conclusion of the project, remove all temporary services and scaffolding.
- 1.7.2 Decking
 - .1 Full decking of the scaffolding is to be supplied and installed throughout all levels.
- 1.7.3 Prior to commencement of work, submit shop drawings for all proposed decking and scaffolding.
- 1.7.4 Provide insurance coverage in accordance with the insurance requirements for this Contract.
- 1.7.5 Include in the scaffolding all the components necessary to produce a scaffold that is functionally equivalent to the system shown on the shop drawings including the following:
 - .1 Scaffolding frames.
 - .2 Deck support brackets.
 - .3 Planking and decking to all levels.
 - .4 Handrail and toe boards.
 - .5 Any additional stair systems that may be required by the Contractor to provide access to the work.
 - .6 Structural design for support of wall during dismantling.
- 1.7.6 Provide any other material, labour, equipment or work necessary to achieve a complete scaffolding system to meet the intent of this specification.
- 1.7.7 After completion of the work to the Consultant's approval and acceptance, remove scaffolding system, and related items from site, and clean-up.
- 1.8 **Design Requirements**
 - 1.8.1 Provide Engineering design and detail of scaffolding.
 - 1.8.2 Take professional responsibility for the Engineering of the complete system.
 - 1.8.3 Design 'tie-in' system for lateral loads to permit the scaffolding to provide stability to wall to be dismantled. Scaffolding may be dismantled in parallel with the dismantling of the wall.
 - 1.8.4 Design to be in accordance with C.S.A. S269.2 - M87, O.H.S.A., and N.B.C.
 - 1.8.5 Anchors required for 'tie-in' systems must minimize damage to masonry units.
- 1.9 **Shop Drawings**
 - 1.9.1 Prior to commencement of work, submit shop details and erection drawings in accordance with Section 01 00 00. Do not commence work until drawings are approved.
 - 1.9.2 Each drawings submission shall bear signature and stamp of qualified professional Engineer registered or licensed in the Province of Ontario, Canada.
- 1.10 **Existing Site Conditions**

1.10.1 Verify all site conditions that would interfere with the scaffolding before commencing with the installation, including but not limited to the following:

- .1 Ground slopes and elevations on both faces of the wall.
- .2 Building height and elevation.
- .3 Proposed scaffold layout of the scaffolding system to provide adequate clearance from all parts of the building, existing retaining walls, construction hoarding, related anchorages, electrical services.

1.11 **Maintenance**

1.11.1 Maintain scaffolding used for the 'work', for the duration of the Work in good working order and safe condition in accordance with all applicable codes.

1.12 **Inspection**

1.12.1 Contractor to be responsible for the safety and maintenance of the scaffolding at all times.

1.12.2 Contractor to provide adequate inspection to ensure such safety and maintenance.

2. **PRODUCTS**

2.1 **Materials**

2.1.1 Scaffolding components:

- .1 All scaffolding to be "walk-through" type.

2.1.2 Accessories:

- .1 Plywood: to be in good condition without defects.
- .2 Fasteners: tie-wire and other hardware, hot-dip galvanized or nonferrous metallic.
- .3 Expansion anchors: Lead or Stainless Steel.
- .4 Decking: laminated wood or Proprietary metal deck system.

3. **EXECUTION**

3.1 **Protection**

3.1.1 Obtain approval for fastening to the building and fastening locations.

3.1.2 Prevent rust-staining of masonry, woodwork and pavement from scaffolding and staging run-off.

- .1 Remove such staining or replace damaged material as directed by Consultant at no extra cost.

3.1.3 Do not overload scaffolding.

3.2 **Scaffold Erection**

3.2.1 Erect scaffolding as shown on the approved shop drawings.

3.3 **Access**

3.3.1 Install stair towers or ladders required by the Contractor, include related bracing, handrails, and fall protection.

3.4 **Removals**

- 3.4.1 Promptly remove all scaffolding, fittings, anchors and foundations used in the performance of the work of this section upon completion and acceptance of the work and along with written request from the Consultant.

END OF SECTION

1. **GENERAL**

1.1 **General Comment**

- 1.1.1 Contractor shall ensure that all sub-trades are fully familiar with the conditions set forth in the General Conditions of the Contract and General Instructions in Division 00 and 01.

1.2 **Related Work**

- 1.2.1 General Requirements Section 01 00 00
1.2.2 Temporary Scaffolding Section 01 54 23

1.3 **General Scope**

- 1.3.1 100% of the scaffolding is required to be safety netted at all times.

1.4 **Description of Work**

- 1.4.1 Provide field and shop labour, tools, equipment, materials, supervision, etc., to supply, install and maintain the reinforced netting, and related elements for the duration of the contract as shown on the drawings and as specified herein.
- 1.4.2 Design the reinforced safety netting and related framing systems to resist the wind loads indicated on the drawings and any additional loading indicated on the drawings.
- 1.4.3 Provide the following:
- .1 Reinforced safety netting enclosure to all levels of scaffolding specified on the drawings.
- 1.4.4 Remove the enclosure system and related work upon completion of the project and clean-up.

1.5 **Design Requirements**

- 1.5.1 Design, detail and take professional responsibility for the enclosure system. Design is to be in accordance with the parameters described on the drawings and in the specifications.
- 1.5.2 The wind loads and other incidental loads are to be adequate design loads for the enclosure system based on applicable codes.

1.6 **Delivery, Storage and Handling**

- 1.6.1 Handle material in a manner to prevent damage.
- 1.6.2 Store materials neatly and safely on the site, as recommended by manufacturer.

1.7 **Maintenance**

- 1.7.1 Maintain the enclosure system for its duration on site in an acceptable and safe condition, as recommended by the manufacturer and to the full satisfaction of the Engineer.
- 1.7.2 Repair or replace any damaged material.
- 1.7.3 Perform repairs immediately upon request.

2. **PRODUCTS**

2.1 **Materials**

2.2 **Safety Netting**

- .1 Colour: green
- .2 Material: woven polyester scrim with vinyl coating, with 1.6mm diameter holes.
- .3 Weight: 0.34kg/m2 (10oz/yd2)
- .4 Strength: 2,700kg (6000lbs) seat belt reinforced.
- .5 Fittings: #3 brass grommets at 300mm centres, maximum spacing.
- .6 Fasteners: tie-wire and other hardware, hot-dip galvanized or nonferrous metallic.
- .7 Materials must equal or exceed the following performance requirements:
 - .1 Flame spread rating of less than 50, in accordance with ASTM E84.
 - .2 Smoke Density Rating of less than 450, in accordance with ASTM E84.

2.2.2 Fasteners

- .1 All fasteners to be galvanized, plated or otherwise fabricated so as not to show rusting for the duration of the project.
- .2 Design fasteners to resist the applied loads.
- .3 Washers for fasteners to be EPDM or neoprene.

3. **EXECUTION**

3.1 **Protection**

- 3.1.1 Protect the building and its contents from damage or defacement during the progress of the work by providing resilient bumpers, scaffolding bumper protection, wood blocking to protect the wood work, masonry, roofing or metalwork, and any other protection required. Do not fasten directly to the building.
- 3.1.2 If during work existing items are damaged due to the work of this section, repair or replace them to the satisfaction of the Consultant at no extra cost.

3.2 **Installation of safety netting**

- 3.2.1 Install reinforced tarping, and safety netting in locations shown.
- 3.2.2 Maintain reinforced safety netting tight for the duration of the project.

3.3 **Removals**

- 3.3.1 Promptly remove all enclosure systems used in the performance of the work of this section upon written request from the Engineer.

END OF SECTION

1. **GENERAL**

1.1 **Work included in this section:**

- 1.1.1 The preparation and supply of mortar for restoration masonry work.

1.2 **Related Work:**

- 1.2.1 Restoration Masonry Procedures: Section 04 05 10
1.2.2 Unit Masonry Restoration Section 04 01 20.91

1.3 **Reference Standard.**

- 1.3.1 ASTM International (ASTM)
- .1 ASTM C 5-[10], Standard Specification for Quicklime for Structural Purposes.
 - .2 ASTM C 144-[11], Standard Specification for Aggregate for Masonry Mortar.
 - .3 ASTM C 185-[15a], Standard Test Method for Air Content of Hydraulic Cement Mortar.
 - .4 ASTM C 207-[06(2011)], Standard Specification for Hydrated Lime for Masonry Purposes.
 - .5 ASTM C 260/C 260M-[10a (2016)], Standard Specification for Air-Entraining Admixtures for Concrete.
 - .6 ASTM C 270-[14a], Standard Specification for Mortar for Unit Masonry.
 - .7 ASTM C 780-[15a], Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
 - .8 ASTM C 1072-[13e1], Standard Test Method for Measurement of Masonry Flexural Bond Strength.
- 1.3.2 Canada Green Building Council (CaGBC)
- .1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum [2007]).
 - .2 .LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.
 - .3 LEED Canada 2009 for Design and Construction-[2010], LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide.
 - .4 LEED Canada for Existing Buildings, Operations and Maintenance-[2009], LEED Canada 2009 Leadership In Energy and Environmental Design Green Building Rating System Reference Guide.
- 1.3.3 CSA Group (CSA)
- .1 CSA A23.1/A23.2-[09 (2014)], Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CAN/CSA-A179-[14], Mortar and Grout for Unit Masonry.
 - .3 CAN/CSA-A3000-[13], Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.4 **Existing Conditions**

- 1.4.1 Investigate possible structural problems and report before beginning masonry work.
- 1.4.2 Study pointing styles and methods of reproducing them, and submit sample for approval before starting work.

- 1.4.3 Examine horizontal and vertical joints to determine which were struck first and whether they are same style, as well as other aspects of workmanship which establish authenticity of original work.

1.5 **Environmental Requirements**

- 1.5.1 Execute work when ambient temperature is above 5°C for at least 30 days after completion of work.

1.6 **Alternatives**

- 1.6.1 Obtain Consultant's approval before changing manufacturer's brands or sources of supply of mortar materials during entire contract or other methods of mixing mortar specified elsewhere in this specification.

2. **PRODUCTS**

2.1 **Materials:**

- 2.1.1 Water to be potable and free from contamination.
- 2.1.2 Cement to be:
 - .1 White Portland cement as manufactured by Federal Cement Ltd., Ingersoll, Ontario.
- 2.1.3 Lime to be:
 - .1 Hydrated, dolomitic finishing lime, Type "S", to ASTM C207.
- 2.1.4 Sand: to CAN CSA-A179, (Aggregates for Masonry Mortar) sharp, screened and washed pit sand, passing a [1.18mm] sieve, free of any organic material, colour and grading to match that of original aggregate with grading to approval of Consultant.
 - .1 Acceptable material: sand from local source to match colour and grading distribution. These sands have different effects on the final colour of the mortar. Consultant to make final judgement on mortar mixture at time of construction based on available evidence found during dismantling.

2.2 **Admixtures**

- 2.2.1 Air-entraining admixtures or material containing air-entraining admixtures may be used with caution. Air entraining admixture: Vinsol resin type, conforming to ASTM C260 C 260M. Acceptable materials: Daravair 1400 as manufactured by W.R. Grace.
- 2.2.2 Air entrainment: factory processed cement with agents for air entrainment not to exceed 10 to 15% of total volume.
- 2.2.3 Do NOT use without written permission of consultant:
 - .1 Antifreeze compounds
 - .2 Compounds containing chlorides
 - .3 Dirt resistant additives
 - .4 Waterproofing compounds
 - .5 Accelerators
 - .6 Plasticizers
 - .7 Retarders
 - .8 Shrinkage compensators
 - .9 Bonding and sealing agents

2.3 **Material Source**

2.3.1 Use same brands of materials and source of aggregate for entire project.

2.4 **Freezing**

2.4.1 Lime putty must be stored at temperatures above 5 degrees C. Frozen putty must be discarded.

2.5 **Mortar Mix:**

2.5.1 Bedding mortar to be prepared on site:

.1 Mix No.1:

- .1 1 part of white Portland Cement
- .2 3 parts of lime
- .3 10 parts of sand to match as close as possible original

.2 Mix No.2

- .1 1 part of white Portland Cement
- .2 4 parts of lime
- .3 15 parts of sand to match as close as possible original

.3 **The use of mix No.1 or No. 2 will be selected by Consultant on site**

.4 Pre-bagged mortar:

- .1 It is not permitted. **This a strict requirement of this job**

2.6 **Pre-bagged mortar:**

2.6.1 Acceptable supplier

- .1 Daubois Inc. or
- .2 Approve equal

3. **EXECUTION**

3.1 **Preparation**

3.1.1 Mix Hydrated Lime:

- .1 Soak hydrated lime in water for not less than 12hours. Stir and hoe the mass to form a thick cream
- .2 Allow to stand at least 24 hours before use
- .3 Place safety devices and signs near the work.

3.1.2 Prepare Roughage premix (for later use):

- .1 Accurately proportion the sand and lime using measuring boxes constructed to contain the exact volume of each ingredient required to make on batch.
- .2 Mix sand and lime thoroughly for about ten minutes. Store in plastic-lined drums and seal until required.
- .3 When required for use, add and mix the correct portion of gauging cement as specified and use immediately.

3.1.3 Add cements to lime and aggregate mixes immediately before the use of mortar.

- .1 Perform all batching with wooden boxes or plastic pails of known volume to ensure standardization and conformity of measurement. **Shovel measurement of materials is not permitted. This is a strict requirement of this job.**
- .2 Use box sizes that are sufficient for producing a batch size equal to one mixer load.

3.1.4 For pre-bagged mortar follow manufacturer's instructions.

3.2 **Measurement and Mixing**

3.2.1 General

- .1 Automatic mixers should have rubber blades:
 - .1 Clean mixing machines thoroughly after each use to prevent hardened lumps of mortar from contaminating the next batch

- .2 Mix to semi-fluid consistency.
 - .1 Final mortar mix should have a silky "fat" appearance and a 15mm thickness of mortar should hang onto an inverted trowel.
 - .1 Test the mix by holding a trowel with mortar on it upside down and shaking it once.
 - .1 If the mortar falls off without shaking, it has too much sand.
 - .2 If more than one shake is required, the mortar is too sticky or "plastic" and the lime content must be decreased.
- .3 Mortar should be completely mixed for a period of 3 minutes but not exceeding 10 minutes.
- .4 Do not retemper mortar after 2 hours of use.

END OF SECTION

1. **GENERAL**

1.1 **Description of Work**

1.1.1 Work included in this section:

- .1 Re-point and backpoint area shown on drawings for mock-up.

1.2 **Reference Standards**

1.2.1 ASTM International (ASTM)

- .1 ASTM C 5-[10], Standard Specification for Quicklime for Structural Purposes.
- .2 ASTM C 144-[11], Standard Specification for Aggregate for Masonry Mortar.
- .3 ASTM C 185-[15a], Standard Test Method for Air Content of Hydraulic Cement Mortar.
- .4 ASTM C 207-[06(2011)], Standard Specification for Hydrated Lime for Masonry Purposes.
- .5 ASTM C 260/C 260M-[10a (2016)], Standard Specification for Air-Entraining Admixtures for Concrete.
- .6 ASTM C 270-[14a], Standard Specification for Mortar for Unit Masonry.
- .7 ASTM C 780-[15a], Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
- .8 ASTM C 1072-[13e1], Standard Test Method for Measurement of Masonry Flexural Bond Strength.

1.2.2 Canada Green Building Council (CaGBC)

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- .2 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.
- .3 LEED Canada 2009 for Design and Construction-[2010], LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide.
- .4 LEED Canada for Existing Buildings, Operations and Maintenance-[2009], LEED Canada 2009 Leadership In Energy and Environmental Design Green Building Rating System Reference Guide.

1.2.3 CSA Group (CSA)

- .1 CSA A23.1/A23.2-[09 (2014)], Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .2 CAN/CSA-A179-[14], Mortar and Grout for Unit Masonry.
- .3 CAN/CSA-A3000-[13], Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.2.4 Indicate that masonry units meet or exceed requirements for Severe Weathering (SW) standard.

1.3 **Product Delivery, Storage and Handling**

1.3.1 Deliver materials to job site in dry condition.

1.3.2 Keep materials dry until use, except where wetting of bricks is specified.

- 1.3.3 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

1.4 **Cold Weather Requirements**

- 1.4.1 Do not perform heritage masonry work when air temperature is below 5° C or will drop below 5 degrees within 40 days of setting.
- 1.4.2 Maintain dry beds for masonry and use dry masonry units only. Do not wet masonry units in winter.

1.5 **Hot Weather Requirements**

- 1.5.1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.
- 1.5.2 Use cool equipment and pre-soaked wooden mortar boards.
- 1.5.3 Reduce the rate of moisture loss by using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls until masonry has set.
- 1.5.4 Do not spread more than 900mm (3 ft.) of mortar for placement of stone and ensure that less than one minute passes between spreading mortar and laying units.
- 1.5.5 Arrange work to move with the shade as much as possible to avoid rapid drying of newly laid masonry.

1.6 **Quality Assurance**

- 1.6.1 Qualifications:
 - .1 Mason to have minimum of 5 years' experience in lime mortar preparation.
 - .2 Mix mortar by same mason throughout project

1.7 **Protection**

- 1.7.1 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashings or other permanent construction.
- 1.7.2 Protect masonry and other work from marking and other damage.
 - .1 Protect completed work from mortar droppings.
 - .2 Use non-staining coverings.
- 1.7.3 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

2. **PRODUCTS**

2.1 **Materials**

- 2.1.1 Masonry materials are specified in related Sections.

3. **EXECUTION**

3.1 **Workmanship**

- 3.1.1 Build masonry plumb, level, and true to line, with vertical joints in proper alignment.

- 3.1.2 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.
- 3.1.3 Bond to match bond to exactly duplicate the construction of the original wall.
- 3.2 **Tolerances**
 - 3.2.1 Deviation in joint thickness: 3 mm.
- 3.3 **Raking and cutting out**
 - 3.3.1 General
 - .1 Rake unsound joints free of deteriorated and loose mortar, dirt and other undesirable material.
 - .2 Clean joints back for the full specified depth in areas indicated and in those areas where joints are found to be defective.
 - .1 Clean joints to full depth of deteriorated mortar but in no case to less than 75 mm.
 - .2 Clean out voids and cavities encountered.
 - .1 Clean by compressed air, surfaces of joints without damaging texture of exposed joints.
 - .2 Flush open joints and voids; clean open joints and voids with low pressure water and if not free draining blow clean with compressed air.
 - .3 Leave no standing water.
 - .3 Do not cut out sound lime mortar joints except where specifically instructed.
 - .4 Joints are defective when they are:
 - .1 Cracked
 - .2 Missing mortar
 - .3 Composed of Portland cement or overly hard repair mortar
 - .4 Heavily effloresced
 - .5 The Architect so states in writing
 - .5 Remove all mortar on the masonry surfaces to a square surface of existing mortar at back of joint.
 - .6 Where mortar is found to be defective beyond specified raking depths, advise the Architect.
 - .1 On approval by the Architect, continue raking until sound mortar is encountered.
 - .2 Joints in excess of the recommended depth shall be backpointed as noted below.
 - 3.3.2 Defects and damage during work
 - .1 If masonry unsets or a bond is broken during cutting out, remove unit and reset.
 - .2 Take care to prevent damage to masonry units resulting from cutting out operation.
 - .1 Damage includes the widening of existing joints, nicks, gouges and chipped or scratched surfaces from cutting out tools, resulting from improper workmanship.
 - .2 Replace or repair all damaged units to the satisfaction of the Architect.
 - 3.3.3 Tools and Techniques
 - .1 Tools for cutting out shall be narrower than the joint. Chisels and quirks shall be tipped with titanium-carbide cutting tips, milled to a fine edge.
 - .2 Cutting out of mortar shall be carried out by one of the following techniques:

- .1 Cutting out with light masonry hammer and chisels with dust channels, cutting away from the arrises to prevent spalling of the masonry.
- .2 Flat-bladed quirks and light hammers, hacksaw blades or similar tools are to be used where fine joints are encountered.
- .3 Small hand-held low-impact pneumatic carving tools, fitted with appropriate points and chisels for cutting out rock-faced work only may be used only on approval of the Architect based on a demonstrated capability of the Contractor in a test area.
 - .1 Failure to demonstrate capability, causing damage to masonry, will be grounds for rejection of this method by the Architect.
- .4 Grinders are not permitted. If mortar is hard and portions of masonry are breaking free, a small rotary hand saw with a 100mm diameter x 3mm thick blade may be used as follows:
 - .1 Score not more than 1/3 of the middle of each horizontal joint
 - .2 Do not use power tool on vertical joints
 - .3 Hand cut remaining mortar out of horizontal joints and vertical joints.
 - .4 Grinder to be hand size and electrically powered if used.
- .3 Clear out all loose particles with compressed air and leave ready for inspection.
- 3.3.4 Backpointing
 - .1 Obtain Consultant's acceptance of raked out work prior to commencing pointing operations.
 - .2 Assume that 100% of joints in areas which are not to be disassembled will require backpointing to a depth of 100mm in 3 lifts.
 - .3 Where cut joints are deeper than raking out depths specified above, backpoint joints to bring mortar face to specified depth for raked out joints, in preparation for finish pointing.
 - .4 Immediately prior to pointing, thoroughly wet joints in order to control absorption.
 - .5 Allow water to soak into masonry and mortar, leaving no standing water but remaining wet.
 - .6 For backpointing, fill all joints full with pointing mortar, compacting mortar firmly into joints to ensure positive adhesion to all inner surfaces. Place mortar in layers, maximum 30mm thick, minimum 12mm thick, allowing each layer to set to thumbprint hardness before placing the next layer.
 - .1 Bring face of mortar in backpointed joint to specified depth for raked joints, measured from the arris of the masonry unit, leave ready for final pointing.
 - .2 Prevent mortar from being placed or smeared onto face of stone to prevent mortar staining of masonry faces during backpointing.
 - .3 Keep work clean, remove all droppings as work proceeds, and again at the end of each day.
- 3.3.5 Joints
 - .1 Joints ready for final pointing shall be at least twice the width of the joint to a minimum depth, measured from the arris of the masonry unit, of not less than 25mm and not more than 35mm.
 - .1 Typical stone masonry mortar joints: 30mm depth
 - .2 Review:

- .1 Provide access, permit review, correct any defects and obtain approval of Architect of all raked joints prior to commencing pointing.

3.4 **Jointing**

- 3.4.1 Tool with round jointer to provide smooth, compressed, uniform joints to match existing surrounding joints.
- 3.4.2 Strike flush all joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating.
- 3.4.3 Profile and colour to match existing surrounding.

3.5 **Building-In**

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

END OF SECTION

1 . **GENERAL**

1.1 **Related Work**

- | | | |
|-------|---------------------------------|---------------------|
| 1.1.1 | Period Masonry Mortar | Section 04 03 05.13 |
| 1.1.2 | Restoration Masonry Procedures: | Section 04 05 10 |
| 1.1.3 | Brick Masonry | Section 04 21 13 |

1.2 **Scope**

- 1.2.1 Supply new bricks for construction and repairs.
- 1.2.2 Reclaimed bricks for restoration shall be sorted face brick of a size and shape compatible with the existing. Submit samples prior to final selection. Bricks must be hard fired, un-spalled and free of cracks and attached mortar and shall ring when struck together. Sort and recover appropriate face bricks from areas dismantled. Do not reuse frost softened material or bricks with cracks or other defects

2 . **PRODUCTS**

2.1 **Face Brick for new and weather exposed work**

- 2.1.1 Burned clay brick: to CSA A82.1 Type: FBS.
- 2.1.2 Grade SW - severe weathering. Do not use bricks designated MW (moderate weathering). Submit documentation verifying that the proposed bricks have been tested and pass CSA SW testing requirements.
- 2.1.3 Compressive strength: 20.68 MPa minimum average for 5 bricks.
- 2.1.4 Water absorption: 17.0% for average of 5 bricks.
- 2.1.5 Maximum saturation coefficient: 0.78 for average of 5 bricks.

2.2 **Back-up Brick**

- 2.2.1 Back up brick shall be the same quality and source as the face brick used in individual areas of the work.

3 . **EXECUTION**

3.1 **Laying new brick**

- 3.1.1 Bond: to match original.
- 3.1.2 Coursing height: to match original.
- 3.1.3 Jointing: to match original.
- 3.1.4 Mixing and blending: mix units within each pallet and with other pallets to ensure uniform blend of colour and texture.

3.2 **Cleaning Unglazed Clay Masonry**

- 3.2.1 One week after cleaning and after mortar has set and cured, protect windows, sills, doors, trim and other work, and clean brick masonry as specified in Section 04 01 20.91 supplemented as follows:
 - .1 Remove large particles with wood paddles without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.
 - .2 Scrub with solution of 25 mL trisodium phosphate and 25 mL household detergent dissolved in 1 L of clean water using stiff fibre brushes, then

clean off immediately with clean water using hose. Alternatively, use proprietary compound recommended by manufacturer of brick masonry in accordance with manufacturer's directions.

- .3 Repeat cleaning process as often as necessary to remove mortar and other stains.
- .4 Do not use acid solution treatment for difficult to clean masonry

END OF SECTION

1. **GENERAL**

1.1 **Section Includes**

- 1.1.1 Labour, Products, equipment and services necessary for foundation drainage Work in accordance with the Contract Documents.

1.2 **Reference Standards**

1.2.1 ASTM International (ASTM):

- .1 ASTM A 53/A 53M-[12], Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A 269M-[15a], Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- .3 ASTM A 307-[14], Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

1.2.2 CSA Group (CSA)

- .1 CSA G40.20-[13]/G40.21-[13], General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA G164-[M92(R2003)], Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CSA S16-[14], Design of Steel Structures.
- .4 CSA W48-[14], Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
- .5 CSA W59-[13], Welded Steel Construction (Metal Arc Welding) [Metric]

1.2.3 Environmental Choice Program (ECP)

- .1 CCD-048-[95(2006)], Surface Coatings - Recycled Water-borne

1.2.4 Green Seal Environmental Standards (GS)

- .1 GS-11-[2011], Paints and Coatings

1.2.5 The Master Painters Institute (MPI)

- .1 Architectural Painting Specification Manual - [current edition]

1.2.6 Underwriters Laboratories (UL)

- .1 UL 2768-[11], Architectural Surface Coatings

1.3 **Action and Informal Submittals**

- 1.3.1 Submit in accordance with Section [01 33 00 - Submittal Procedures].

1.3.2 Product Data:

- .1 Submit manufacturer's instructions, printed product literature and data sheets for [sections][plates][pipe][tubing][bolts] and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit [two] copies of WHMIS SDS in accordance with Section [01 35 29.06 - Health and Safety Requirements][01 35 43 - Environmental Procedures].

- .1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.
- 1.3.3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in [Province][Territory], Canada.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
- 1.3.4 Sustainable Design Submittals:
 - .1 LEED Submittals: in accordance with [Section 01 35 21 - LEED Requirements].
 - .2 Construction Waste Management:
 - .3 Submit project [Waste Management Plan][Waste Reduction Workplan] highlighting recycling and salvage requirements.
 - .4 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating [50][75]% of construction wastes recycled or salvaged.
- 1.3.5 Recycled Content:
 - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of [post-consumer][and][post-industrial] content, and total cost of materials for project.
- 1.3.6 Regional Materials: submit evidence project incorporates required percentage [10][20] % of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.
- 1.3.7 Low-Emitting Materials:
 - .1 Submit listing of paints and coatings used in building, comply with VOC and chemical component limits or restrictions requirements.
- 1.4 **Quality Assurance**
 - 1.4.1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
 - 1.4.2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements
- 1.5 **Delivery, Storage and Handling**
 - 1.5.1 Deliver, store and handle materials in accordance with Section [01 61 00 - Common Product Requirements][and][with manufacturer's written instructions].
 - 1.5.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - 1.5.3 Storage and Handling Requirements:
 - .1 Store materials [off ground][indoors][in dry location] and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

- 1.5.4 Develop [Construction Waste Management Plan][Waste Reduction Workplan] related to Work of this Section and in accordance with Section [01 35 21 - LEED Requirements].
- 1.5.5 Packaging Waste Management: remove for reuse [and return][by manufacturer] of [pallets,][crates,][padding,][and][packaging materials] as specified in [Construction Waste Management Plan][Waste Reduction Workplan] in accordance with Section [01 74 19 - Waste Management and Disposal][and][Section 01 35 21 - LEED Requirements].

2. **PRODUCTS**

2.1 **Materials**

- 2.1.1 Steel sections and plates: to CSA G40.20/G40.21, Grade 350W.
- 2.1.2 Steel pipe: to ASTM A 53/A 53M standard weight, black finish.
- 2.1.3 Welding materials: to CSA W59.
- 2.1.4 Welding electrodes: to CSA W48 Series.
- 2.1.5 Bolts and anchor bolts: to ASTM A 307.

2.2 **Finishes**

- 2.2.1 Shop coat primer: MPI- INT 5.1A
- 2.2.2 Zinc primer: zinc rich, ready mix to MPI-INT 5.2C.
- 2.2.3 Galvanizing: hot dipped galvanizing with zinc coating 600g/m2 to CSA G164-M92 on all exterior fitments.
 - .1 Do not treat with Hexavalent Chromium or similar passivated material

2.3 **Shop Painting**

- 2.3.1 Primer: VOC limit 250 g/L maximum to GS-11 UL 2768.
- 2.3.2 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.
- 2.3.3 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Paint when temperature minimum 7 degrees C.
- 2.3.4 Clean surfaces to be field welded; do not paint.

2.4 **Angle Supports**

- 2.4.1 Steel angles: prime painted, sizes indicated for openings. Provide 150 mm minimum bearing at ends.
- 2.4.2 Weld or bolt back-to-back angles to profiles as indicated.
- 2.4.3 Finish:
 - .1 Primer: VOC limit 250 g/L maximum to GS-11 when applied onsite.

2.5 **Pipes**

- 2.5.1 Steel: dimensions to match existing.

3. **EXECUTION**

3.1 **Examination**

- 3.1.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of [Departmental Representative][DCC Representative][Consultant].
 - .2 Inform [Departmental Representative][DCC Representative][Consultant] of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions remedied [and after receipt of written approval to proceed from [Departmental Representative] [DCC Representative] [Consultant]].

3.2 **Fabrication**

- 3.2.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- 3.2.2 Use self-tapping shake-proof to match existing.
 - .1 Where no evidence exists, use flat headed screws on items requiring assembly by screws or as indicated,
- 3.2.3 Where possible, fit and shop assemble work, ready for erection.
- 3.2.4 Exposed welds continuous for length of each joint. File or grind exposed welds smooth and flush.
- 3.2.5 Ensure that Work will remain free of warping, buckling, opening of joints and seams, distortion and permanent deformation.

3.3 **Erection- General**

- 3.3.1 Do welding work in accordance with CSA W59 unless specified otherwise.
- 3.3.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- 3.3.3 Provide suitable means of anchorage acceptable to Consultant such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- 3.3.4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- 3.3.5 Supply components for work by other trades in accordance with shop drawings and schedule.
- 3.3.6 Make field connections with bolts to CSA S16 or Weld field connection whatever matches existing immediate adjacent.
- 3.3.7 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion of:
 - .1 Primer: maximum VOC limit 250 g/L to GS-11.
- 3.3.8 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.
 - .1 Primer: maximum VOC limit 250 g/L to GS-11.

3.4 **Assembly**

- 3.4.1 Accurately cut, machine and fit joints, corners, copes and mitres so that junctions between components fit together tightly and in true planes.
- 3.4.2 Fasten Work with concealed methods unless otherwise indicated on Drawings.

3.4.3 Weld all connections where possible, bolt where not possible and cut off bolts flush with nuts. Countersink bolt heads and provide method to prevent loosening of nuts. Ream holes drilled for fastenings.

3.4.4 Grind welds smooth to the touch where exposed to view.

3.5 **Cleaning**

3.5.1 Progress Cleaning: clean in accordance with Section 01 00 00.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 00 00.

.3 Waste Management: separate waste materials for reuse and recycling.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 **Protection**

3.6.1 Protect installed products and components from damage during construction.

3.6.2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

1 . GENERAL

1.1 Section Includes

- 1.1.1 Labour, Products, equipment, and services necessary for repair existing woodwork in accordance with the Contract Documents.

1.2 Intent

- 1.2.1 The intent of the work is to make all repairs in damaged joists and other woodwork in the Blacksmith Shop using minimal intervention where possible.
- 1.2.2 The retention of as much of the original historic building materials as possible is the desired objective.

1.3 Reference Standards

1.3.1 ASTM International

- .1 ASTM A 325M-[09], Standard Specification for Structural Bolts, Steel, Heat Treated 830 Mpa Minimal Tensile Strength [Metric].

1.3.2 Canada Green Building Council (CaGBC)

- .1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum [2007]).
- .2 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.
- .3 LEED Canada 2009 for Design and Construction-[2010], LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide.
- .4 LEED Canada for Existing Buildings, Operations and Maintenance-[2009], LEED Canada 2009 Leadership In Energy and Environmental Design Green Building Rating System Reference Guide.

1.3.3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers' Association (CPMP)

- .1 CISC/CPMA 1-73a-[1975], A Quick Drying One-coat Paint for Use on Structural Steel.
- .2 CSA Group (CSA)
- .3 CSA G40.20/G40.21-[04(R2009)], General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .4 CSA O86 Consolidation-[09], Engineering Design in Wood.
- .5 CSA O121-[08], Douglas Fir Plywood.
- .6 CSA W59-[03(R2008)], Welded Steel Construction (Metal Arc Welding).
- .7 CAN/CSA-Z809-[08], Sustainable Forest Management.

1.3.4 Forest Stewardship Council (FSC)

- .1 FSC-STD-01-001-[2004], FSC Principle and Criteria for Forest Stewardship.

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- 1.3.5 Green Seal Environmental Standards (GS)
 - .1 GS-36-[11], Commercial Adhesives.
- 1.3.6 National Lumber Grading Authority (NLGA)
 - .1 NLGA Standard Grading Rules for Canadian Lumber [2007].
- 1.3.7 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards.
 - .1 SCAQMD Rule 1168-[A2005], Adhesives and Sealants Applications.
- 1.3.8 Sustainable Forestry Initiative (SFI)
 - .1 SFI-[2010-2014] Standard.
- 1.4 **Delivery, Storage and Handling**
 - 1.4.1 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .1 Deliver wood required for repairs to site two (2) weeks before start of work.
 - 1.4.2 Storage and Handling Requirements:
 - .1 Store materials in dry location, above ground and protected from rain and snow and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect wood from scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
 - 1.4.3 Stack wood above ground or soil with spacer slats between layers to ensure adequate ventilation for air drying.
 - 1.4.4 Cover wood supply with polyethylene sheet.
- 1.5 **Environmental Requirements**
 - 1.5.1 Cover work exposed to weather with secure waterproof covering at end of workday.
 - 1.5.2 Maintain temperature of wood elements, to be repaired, at between 20°C and 24°C throughout its thickness and for 48 hours after repairing.
 - 1.5.3 Adhesive repair:
 - .1 Maintain temperature of elements to be repaired at between 21° C and 24°C throughout its thickness and for 48 hours after repairing.
 - .2 Provide temporary enclosure and heating and/or cooling equipment necessary to maintain temperatures specified.
 - .3 Undertake work under conditions of relative humidity at same level as operational requirements of end product.
- 1.6 **Submittals**
 - 1.6.1 Submit shop drawings indicating repair system for each typical application, construction details, accurately reflecting actual job conditions.
 - 1.6.2 Product Data:

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- .1 Submit manufacturer's instructions, printed product literature and data sheets for [splicing of wood components] and include product characteristics, performance criteria, physical size, finish and limitations.
- 1.6.3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in [Province][Territory], Canada.
 - .2 Submit drawings to [1:5][1:10][1:20] scale of metal [timber][wood][splices][connections] showing details of layout, materials, and construction.
- 1.6.4 Mock-ups:
 - .1 Construct mock-up in accordance with Section 01 33 00 Submittal Procedure Restoration.
 - .2 Construct a full-size mock-up of each type of repair shown in contract documents including specified material and reproduction of tool marks on existing timbers.
 - .3 Study tool marks and methods of reproducing them with advice of Consultant.
 - .1 Submit samples of worked surfaces to Consultant for approval before starting work.
 - .4 Allow [24] hours for review of mock-up by Consultant before proceeding with work.
 - .5 When accepted, mock-up demonstrates minimum standard for this work.
 - .6 Mock-up may remain as part of finished work.
- 1.6.5 Source Quality Control Submittals
 - .1 Submit invoices, purchase orders, and suppliers' certificates when requested by Consultant.
 - .2 Provide free access to materials for examination by Consultant before beginning work on site.
- 1.6.6 Sustainable Design Submittals:
 - .1 LEED Canada submittals: in accordance with [Section 01 35 21 - LEED Requirements].
 - .2 Construction Waste Management:
 - .1 Submit project Waste Reduction Workplan highlighting recycling and salvage requirements.
 - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.
 - .3 Regional Materials: submit evidence that project incorporates required percentage [10][20] % of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.
 - .4 Wood Certification: submit [vendor's][manufacturer's] Chain-of-Custody Certificate number for CAN/CSA-Z809 or FSC or SFI certified wood.

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1.7 Quality Assurance

1.7.1 Sustainable Standards Certification:

- .1 Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC or SFI.

1.7.2 Qualifications:

- .1 Contractor undertaking work in this section is required to be skilled craftsperson[s] and to have a minimum of [10] years of experience in this field.
- .2 Before the start of work submit qualification documents: certificates of skills.

2 . PRODUCTS

2.1 Materials

2.1.1 Patching Heavy Timber framing:

- .1 Use only straight, sawn square and true material free of checks, waned edges and warp.
- .2 Where missing areas are noted for in-situ repair, employ wood to match existing.
- .3 S4S Wood specie to match existing joists.
- .4 CAN/CSA-Z809 or FSC or SFI certified.
- .5 Grade: No.1 Structural
- .6 Actual size: thickness to match existing, rough from the log.
- .7 Moisture content to be shown on stamp (MC): kiln dry to 9% (maximum) or 1% above the existing timber to be repaired.
- .8 Pegs: hardwood.
- .9 Match grain slope to adjacent work

2.1.2 Dimension lumber:

- .1 Use Douglas Fir.
- .2 CAN/CSA-Z809 or FSC or SFI certified.
- .3 Grade: No.1.
- .4 Actual size: thickness and width to match existing.
- .5 Moisture content: kiln dry to 15% (maximum) or 1% above the existing timber to be repaired.

2.1.3 Sheathing:

- .1 Roof and exterior wall sheathing.
 - .1 Planks to match existing in size, specie and thickness
 - .2 Moisture content: kiln dry to 15% (maximum).

2.1.4 Dowels:

- .1 Dowels: to be hardwood.
- .2 Size: 13 mm diameter,

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- .1 Length as designed: 25 mm recessed from the top of the joist and 13 mm recessed from the bottom of the joist.
- 2.1.5 Glass Fiber Reinforced Polymer bars (GFRP).
 - .1 Nominal diameter: 13 mm (size 4)
 - .2 Tensile strength, 743 MPa
 - .3 Ultimate tensile load: 108.49 kN
 - .4 Tensile modulus of elasticity, LW: 46 GPa
- 2.1.6 Wood plugs:
 - .1 Cover recessed dowels and Glass Fiber Reinforced Polymer bars (GFRP) with wood plugs cut from species to match existing wood element. End grain to be exposed.
 - .2 Direction of grain to match existing.
 - .3 Size: diameter to give firm flush fit in hole.
- 2.1.7 Adhesives:
 - .1 VOC limit 80 g/L 5% by weight maximum to GS-36.
 - .2 Type of glues:
 - .1 For small repairs (wood Dutchman up to 200 mm length and 100 mm height): Resorcinol-formaldehyde resin (RF). Acceptable product:
 - .1 Cascophen G-1131 by Hexion Specialty Chemicals Canada Inc., or
 - .2 Approved equal
 - .2 For large repairs (wood Ductman more than 200 length and 100 height), use epoxy to bind new wood with existing and/or insert new GFRP in to bind new wood with existing. Acceptable product:
 - .1 Epotron 5 from Abatron (5501-95th Avenue, Kenosha, Wisconsin 53144, USA), or
 - .2 Approved equal
 - .3 For splitting wood joists: Consolidant. Acceptable product:
 - .1 LiquidWood from Abatron: for saturating splitting areas. Slow dry time (3 days), or
 - .2 Approved equal
- 2.1.8 Fastenings and Hardware
 - .1 In accordance with Part 9 of OBC latest edition as supplemented by following requirements except where specific type is indicated.
 - .2 Nails, spikes and staples, length and type to OBC 9.23.3B except: USE HISTORIC PATTERN NAILS WHERE EXPOSED to match existing work. If supply is not available, salvage existing hardware from dismantled material and re-install.
 - .1 If material is to be salvaged, consult with Consultant prior to salvage to review most appropriate salvage method either by manual extraction (and straightening), or burning and metal salvage from ashes.

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- .2 Use common spiral nails and spiral spikes in hidden areas except where indicated otherwise.
- .3 Use hot galvanized finish steel for exterior work, interior highly humid areas and for pressure-preservative treated lumber except where indicated otherwise.
- .3 Bolt, nut, washer, screw and pin type fasteners: with hot-dip galvanized finish to CSA G164-M1981 for exterior work, interior highly humid areas and for pressure- preservative treated lumber, elsewhere with primer paint finish where installed on sight-exposed surfaces.

2.2 Site Investigation

2.2.1 Definition:

- .1 Excessive moisture content is when the wood element surpasses the reading that manufacturer of the moisture meter states that it is permissible for the element (this excess of moisture can damage the wood element in the future).

2.2.2 Scope of the Investigation:

- .1 Conduct site investigation to determine the true moisture content in wood members to be repaired or where wood damage (i.e. water leakage) has occurred. **This is a strict requirement of this job.** The situations described here apply to the following:
 - .1 Wood Dutchman in structural members (rafters, joists, posts, etc.) to determine the exact moisture content and comply with item 2.1.1.7 for new wood to be installed.
 - .2 Areas that have signs of water infiltration or water damage.
 - .3 Areas of the roof sheathing (planks) and battens suspect of having excessive moisture.
 - .4 Wood sills, door frames and wall cladding that are suspect of having excessive moisture.
 - .5 Areas where water infiltration/leaking are noted
 - .6 Other areas and/or members as stated by Consultant.

2.2.3 Equipment:

- .1 Acceptable portable moisture meters are as follow:
 - .1 Moisture meter using electrical capacitance for wood members up to 25mm (1") thickness (doors, windows, trims, dimension lumber, etc.).
 - .1 Acceptable equipment: TBD or
 - .2 Approve equal
 - .2 Conductance meter for wood members more than 25mm (1") thickness (timers, rafters, joists, sills, etc.)
 - .1 Acceptable equipment: TBD or
 - .2 Approve equal

3 . EXECUTION

3.1 Examination

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- 3.1.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable.
 - .1 Visually inspect substrate in presence of Consultant.
 - .2 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.
- 3.1.2 Stop work and report immediately to Consultant conditions relevant to this contract not described in drawings: evidence of deficiencies, fungal or insect attack which may affect the scope of work and durability of the finished product.

3.2 Preparation

- 3.2.1 Protection of in-place conditions:
 - .1 Protect existing timber elements, finished surfaces, materials adjacent to repair area from damage during the Work.
 - .2 Surface Preparation:
 - .1 Install adequate scaffolding, ladders and platforms for completion of work.
 - .2 Install adequate shoring, bracing. Ensure support in vicinity of repair.
- 3.2.2 Preparation of wood surfaces for bonding
 - .1 Saw sections of the existing and new wood to be joined at the time of connection:
 - .1 No more time than necessary is permitted to elapse between final surfacing and bonding.
 - .2 If necessary keep prepared surfaces covered with a clean plastic sheet or other material to maintain cleanliness prior to the bonding operation.
 - .3 The mating surfaces should be machined smooth and true with planers, joiners, or special miter saws.
 - .4 Planer marks, chipped or loosened grain, and other surface irregularities are not permitted.
 - .5 The use of sandpaper to smooth softwood surfaces that are to be bonded is not allowed.
 - .6 Sawn surfaces must approach well-planed surfaces in uniformity, smoothness, and freedom from crushed fibers.
 - .1 Clean both joint surfaces with a vacuum cleaner just prior to adhesive application.
 - .2 Wood surfaces ready for bonding must be free from oil, wax, varnish, shellac, lacquer, enamel, dope, sealers, paint, dust, dirt, adhesive, crayon marks, and other extraneous materials.
 - .3 Roughening smooth, well-planed surfaces of normal wood before bonding is not allowed. Such treatment of well-planed wood surfaces may result in local irregularities and objectionable rounding of edges.

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- .1 When surfaces cannot be freshly machined before bonding, very slight sanding of the surface with a fine grit such as 220, to improve penetration of the adhesive of aged surfaces should be performed.
- .2 Sanding should never be continued to the extent that it alters the flatness of the surface.

3.2.3 Applying the Adhesive

- .1 Spread the adhesive in a thin, even layer on both surfaces to be joined. It is recommended that a clean brush be used and care taken to see that all surfaces are covered.
 - .1 Spreading of adhesive on only one of the two surfaces is not allowed.
 - .2 Follow the adhesive manufacturer's application instructions.

3.3 Detailed Procedures.

3.3.1 Consolidation of Deteriorated Wood: Follow manufacturer's instruction and this general procedure:

- .1 Mixing
 - .1 Ensure all preparation of area to be repaired has been completed prior to mixing material.
 - .2 Mix Consolidant per manufacturer's instruction.
- .2 Application
 - .1 Do application of consolidant only after saw cut of woodwork.
 - .2 Verify moisture content of wood with moisture meter.
 - .3 Follow manufacturer's instructions
- .3 Procedure:
 - .1 Drill 6mm holes about 50mm on centres at 45 degrees downward from the face plane to allow full impregnation of the grain.
 - .1 To avoid escape of resin, ensure that holes are not drilled completely through the wood
 - .2 Plug any holes that may leak, or areas at the edges of the wood, before applying consolidant.
 - .2 Half fill a ketchup-type bottle squeeze bottle with mixed consolidant and inject consolidant into the holes in the wood.
 - .1 Allow consolidant to seep into the wood
 - .2 Repeat until no further absorption is apparent to ensure that the grain of the wood is saturated as deeply as possible.
 - .3 Brush any consolidant standing on surface into the grain.
 - .1 Add additional consolidant as required until surface is saturated and will absorb no more.
 - .4 Wipe off surplus consolidant with paper towels including all consolidant standing on surface.
 - .5 Allow consolidant to cure 24 hours at room temperature or longer if temperature is below 20 degrees C.

3.3.2 Dutchman Repair (small or large).

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- .1 Install shoring if necessary to support existing wood joist to be repaired and at least three joists at each side of the to-be-repaired-joist.
 - .1 Provide shop drawings signed by a Structural Engineer Licenced in the Province of Ontario.
- .2 Special techniques: study tool marks and methods of reproducing them.
- .3 Lay-out and cut woods according to approved mock up. Cut back wood to provide square edges for new wood.
- .4 Remove cut wood with extreme care. Cause neither disruption nor damage to adjacent structure and finishes.
- .5 Use one-piece wood dutchman in large prepared voids.
 - .1 Shape repair piece using appropriate tools according to approved mock-up.
 - .2 Set dutchman with grain in same direction as wood piece being repaired.
 - .3 Trial fit joints before setting in place. Adjust as necessary to ensure close accurate fit with adjacent surfaces.
- .6 Apply adhesive
- .7 to bed dutchman into place.
 - .1 Set dutchman and ensure adhesive fills all voids at perimeter,
- .8 For Resorcinol-formaldehyde resin (RF):
 - .1 Apply pressure using plates at both sides of the wood member per manufacture instructions or minimum of 0.50 MPa
 - .2 Keep pressure per manufacturer instructions but no less than 4 hours.
- .9 For epoxy: follow manufacturer's instructions
 - .1 After adhesive is cured drill holes for hardwood dowel or GFRP depending of type of repair is going to be done.
 - .2 Apply adhesive uniformly and install wood dowels or GFRP.
 - .3 Clean immediately any excess of adhesive before it is cured
 - .4 After adhesive is cured remove shoring
 - .5 Tolerance: no more than 2 mm.

3.4 Cleaning

- 3.4.1 Progress Cleaning: clean in accordance with Section 01 00 00.
 - .1 Leave Work area clean at end of each day.
 - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section [01 74 00 - Cleaning].
 - .3 Waste Management: separate waste materials for reuse and recycling.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 Protection

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- 3.5.1 Cover completed work not enclosed or sheltered with waterproof covering.
Anchor securely in place.

END OF SECTION

1. **GENERAL**

1.1 **Section Includes**

- 1.1.1 Labour, Products, equipment and services necessary for rough carpentry Work in accordance with the Contract Documents including, but not limited to;
 - .1 Wood sills.
 - .2 Exterior wood work.
 - .1 Siding
 - .2 Wood eaves.
 - .3 Door and Window frames
 - .3 Roof framing and deck.
 - .4 Sheathing and fascia.
- 1.1.2 Comply with the Ontario Building Code, latest edition, and all applicable industry standards.

1.2 **Reference Standards**

- 1.2.1 Canada Green Building Council (CaGBC)
 - .1 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations (including Addendum [2007]).
 - .2 LEED Canada-NC-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations 2009.
 - .3 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Commercial Interiors.
 - .4 LEED Canada-EB: O&M-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Existing Buildings: Operations and Maintenance 2009.
- 1.2.2 CSA Group (CSA)
 - .1 CSA B111-[1974(R2003)], Wire Nails, Spikes and Staples.
 - .2 CSA O121-[08], Douglas Fir Plywood.
 - .3 CSA O141-[05(R2009)], Softwood Lumber.
 - .4 CSA O151-[09], Canadian Softwood Plywood.
 - .5 CAN/CSA-O325.0-[07], Construction Sheathing.
 - .6 CAN/CSA-Z809-[08], Sustainable Forest Management.
 - .7 CSA O80 Series-[2015], Wood Preservation.
 - .8 CSA O322-[15], Procedure for Certification of Pressure-Treated Wood Materials for Use in Preserved Wood Foundations.
- 1.2.3 National Research Council Canada (NRC)
 - .1 National Building Code of Canada [2015] (NBC).
- 1.2.4 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-[2004], FSC Principle and Criteria for Forest Stewardship.
- 1.2.5 Green Seal Environmental Standards (GS)
 - .1 GS-11-[11], Paints and Coatings.
- 1.2.6 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber [2010].

- 1.2.7 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1113-[A2011], Architectural Coatings.
- 1.2.8 Sustainable Forestry Initiative (SFI)
 - .1 SFI-[2010-2014] Standard.

1.3 **Submittals**

- 1.3.1 Submit shop drawings indicating elevations, sections, details, materials, grades, dimensions, gauges, finishes connections, and relationship to adjacent construction per Section 01 00 00.

1.4 **Quality Assurance**

- 1.4.1 Each piece of pressure treated lumber and fire retardant treated lumber shall be shop marked with the pressure treatment brand and ULC monogram respectively,
- 1.4.2 Dimensions of lumber shall conform to dressed sizes specified in CAN/CSA-O141 unless actual dimensions are otherwise indicated or specified.
- 1.4.3 Dimensional references to lumber on Drawings and in Specifications are to nominal sizes unless actual dimensions are indicated. Such actual dimensions shall be dry size.
- 1.4.4 Lumber defects: Discard wood with defects which will render a piece unable to serve its intended function. Lumber will be rejected by Consultant for excessive warp, twist, bow, crook, mildew, fungus, or mould, as well as for improper cutting and fitting, whether or not it has been installed.

2. **PRODUCTS**

2.1 **Materials**

- 2.1.1 Lumber: Softwood, G4S, moisture content 19% or less at time of installation, in accordance with the following:
 - .1 Lumber shall be of same species and grade, equally seasoned and shall be processed and stamped at same mill.
 - .2 CSA O141 and NLGA Standard Grading Rules for Canadian Lumber.
 - .3 Board quality: Construction or better.
 - .4 Dimension quality:
 - .1 Structural joists, planks, and framing: No. 1 Select Structural.
 - .2 Light framing: Construction.
- 2.1.2 Machine stress-rated lumber is acceptable
- 2.1.3 Glued end-jointed (finger-joined) lumber is not acceptable.
- 2.1.4 Pressure treated wood: No.2 or Better Grade treatable species (Pine or Fir) free of checks, holes, loose knots, pitch, shakes, splits, wane and warp, or as allowed by sample acceptable to the Consultant, vacuum/pressure impregnated with copper based preservative in accordance with CAN/CSA-080 to a net retention of 650 kg./m³, unless otherwise specified by preservative manufacturer.
- 2.1.5 Roof lumber: NLGA, Construction grade light framing, Jack Pine, S4S, pressure treated to CAN/CSA-O80 series using copper based waterborne preservative treatment, impregnated to a net retention of 4 kg/ m³ of preservative unless otherwise specified by preservative manufacturer.

- 2.1.6 Surface applied wood preservative: Green coloured copper naphthenate or 5% pentachlorophenol solution, water repellent preservative or same copper based preservative as used for shop impregnation, in accordance with CAN/CSA 080.
- 2.1.7 Fire retardant treatment of lumber and plywood: 'Dricon' fire retardant treatment by J. A. Biewer or approved equivalent, conforming to CAN/CSA-O80.20 and CAN/CSA-O80.27 respectively, to provide a flame spread rating of 25 or less in accordance with CAN/ULC-S102.
- 2.1.8 Rough hardware: Nails, bolts, screws, anchors, expansion shields, and other fastenings required to frame and fix rough carpentry as follows:
 - .1 Nails, spikes and staples: CSA B111; spiral type.
 - .2 Bolts: ASTM A325; 12.7 mm diameter minimum with nuts and washers unless noted otherwise.
 - .3 Screws: Countersunk head, full thread type.
 - .4 Proprietary fasteners: Toggle bolts, expansion shields, lag bolts, screws, inorganic fibre plugs, recommended for purpose by manufacturer.
 - .5 Galvanize rough hardware exposed to the atmosphere in accordance with CAN/CSA G164-M.
- 2.1.9 Fasteners for use in pressure treated wood: Provide hot dipped galvanized fasteners complying to ASTM A153 and connectors in accordance with ASTM A653, Class G185 for non-structural members. Provide type 304 or 316 stainless steel fasteners and connectors for use in Structural, pressure treated wood..

3. **EXECUTION**

3.1 **General**

- 3.1.1 Lay out work carefully and to accommodate work of others. Cut and fit accurately: erect in position indicated by Drawings.
- 3.1.2 Install rough carpentry to allow for expansion and contraction of the materials.
- 3.1.3 Cut work into lengths as long as practicable and with square ends. Align, level, square, plumb, and secure work permanently in place. Brace work temporarily as required. Join work only over solid backing.
- 3.1.4 Bore holes true to line and to same size as bolts. Drive bolts into place for snug fit, and use plates or washers for bolthead and nut bearings. Turn up bolts and lag screws tightly when installed, and again just before concealed by other work or at completion of Work.
- 3.1.5 Provide anchors, bolts, and inserts required for attachment of the work of this Section, to those performing the work of other Sections and who are responsible for their installation.
- 3.1.6 Do not attach work by wood plugs or blocking in concrete or masonry. Use lead shields, expansion shields, or similar methods only as approved by Architect.

3.2 **Miscellaneous Woodwork**

- 3.2.1 Fit and install wood Dutchman, furring, strapping, grounds and blocking. Adequately size, correctly place and conceal members for finishes, fitments and for Work under other Sections. Do not assume that Drawings show required work exactly or completely. Anchor wood members securely in place.

- 3.2.2 Install rough bucks, nailing strips and linings to rough openings as required for backing for frames and other Work.
- 3.2.3 Except where steel supports are specifically shown, provide wood blocking and supports in metal stud partitions for fastening of item such as casework and other wall mounted accessories. Have respective trades approve the location of such wood blocking.
- 3.2.4 Align and plumb faces of furring and blocking to tolerance of 1:600.
- 3.2.5 Use fire retardant lumber for blocking/framing in ceiling spaces.
- 3.2.6 Exterior wood work:
 - .1 Fabricate wood of size, construction and attachment to structure as shown or to match existing.
 - .2 Furnish prefabricated moldings nailed stapled and glued to element as indicated on drawings.
- 3.3 **Framing over Openings**
 - 3.3.1 Bridge openings in non-load-bearing walls with not less than 50 mm material the same width as the studs, securely nailed to adjacent stud.
 - 3.3.2 Bridge openings in load-bearing walls with lintels designed to carry the superimposed loads to adjacent studs.
 - 3.3.3 Where 2 or more members are used in lintels, fasten together with not less than 82 mm nails in a double row, with nails not more than 450 mm apart in each row and the lintel members may be separated by filler pieces.
- 3.4 **Roof Sheathing**
 - 3.4.1 Install wood planks roof sheathing with the surface grain at right angles to the roof framing.
- 3.5 **Wall Cladding**
 - 3.5.1 Where new cladding is required this to match existing in pattern, size, wood specie and dimension.
 - 3.5.2 Sheath exterior portion of the wall when the exterior cladding requires intermediate fastening between supports or if the exterior cladding requires solid backing.

END OF SECTION

1. **GENERAL**

1.1 **Related Work**

1.2 **Reference Standards**

1.2.1 Department of Justice Canada (Jus)

- .1 SOR/2018-196 Prohibition of Asbestos and Products Containing Asbestos Regulations.

1.2.2 ASTM International (ASTM)

- .1 ASTM B 370-[12], Standard Specification for Copper Sheet and Strip for Building Construction.
- .2 ASTM A 153/A 153M-[09], Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

1.2.3 Canada Green Building Council (CaGBC)

- .1 LEED Canada for New Construction and Major Renovations Rating System [2009]. LEED Canada Reference Guide for Green Building Design and Construction 2009.
- .2 LEED v4.

1.2.4 CSA Group (CSA)

- .1 CSA A123.3-[05 (R2010)] Asphalt Saturated Organic Roofing Felt.
- .2 CSA B111-[1974 (R2003)], Wire Nails, Spikes and Staples (withdrawn).
- .3 CSA O118.1-[08 (R2013)], Western red cedar shakes and shingles.
- .4 CSA O118.2-[08 (R2013)], Eastern White Cedar Shingles.

1.2.5 Forest Stewardship Council (FSC)

- .1 FSC-STD-01-001-[(V4-0)] FSC Principles and Criteria for Forest Stewardship.

1.2.6 National Research Council (NRC)

- .1 National Building Code of Canada (NBC) – 2015

1.3 **Definitions**

- 1.3.1 Shake: a thick hand-split shingle, with or without taper, natural texture, edge-grained with minimum thickness exceeding 9.5 mm.

- 1.3.2 Processed shakes: machine-grooved face, re-butt, rejoined shakes.

1.4 **Action and Informal Submittals**

- 1.4.1 Provide submittals in accordance with Section [01 33 00 - Submittal Procedures].

1.4.2 Shop Drawings:

- .1 Provide shop drawings: in accordance with Section [01 33 00 - Submittal Procedures].
- .2 Indicate details of [flashing installation][special patterns].

1.4.3 Samples:

- .3 Provide samples in accordance with Section 01 33 00.

- .4 Provide duplicate full size shingles, of finish, profile and pattern to match existing.

1.5 **Quality Assurance**

1.5.1 Mock-ups:

- .1 Construct mock-up in accordance with Section 01 33 00.
- .2 Construct 1200 x 1200 mm panel of shingle pattern to match existing.
- .3 Construct portion of [fancy or pattern butt][roof][sidewall][shingling] including [corner][hip][ridge] showing repetitive pattern, weather exposure, fitting, dressing and nailing.
- .4 Allow 24 hours for review of mock-up by Consultant before proceeding with Work.
- .5 Obtain approval of mock-up before proceeding with Work.
- .6 Mock-up may be part of finished work.

1.6 **Delivery, Storage and Handling**

1.6.1 Storage and Handling Requirements:

- .1 Provide a platform to prevent bundles or loose shingles/shakes coming in contact with ground.
- .2 Cover top of pile with boards. Keep out rain and prevent over-drying of bundles or loose shingles/shakes in top layer.

1.6.2 Packaging Waste Management:

- .1 Separate and recycle, reuse and return pallets, crates, padding and packaging materials to manufacturers and suppliers of products and systems to the maximum extent economically possible.
- .2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

1.7 **Site Conditions**

- 1.7.1 On the basis of limited investigations, existing shingles understood to have following characteristics:
 - .1 Shingle size, colour, headlap, nailing: to match existing.

1.8 **Warranty**

1.8.1 Extended Correction Period:

- .1 For work of this Section 07 03 31.29, Conservation Treatment For Period Wood Shingles And Shakes, **the 12 month warranty period is extended to 24 months**

2. **PRODUCTS**

2.1 **Sustainability Characteristics**

- 2.1.1 Materials and products in accordance with Section 01 47 15 - Sustainable Requirements: Construction.
 - .1 For LEED credit MR 7: use wood materials certified by FSC.
 - .2 Regional materials: in compliance with LEED credit MR 5.

2.2 **Materials**

2.2.1 Shingles

- .1 Hand split or hand-rived shingles:
 - .1 Species: To match existing. Where this is not possible use Eastern white cedar.
 - .2 Grade: treated.
 - .3 Profile: to match existing.
 - .4 Widths: random widths.
 - .5 Lengths: to match existing.
 - .6 Grain: 100% edge - grain.
 - .7 Wood: free from all heartwood, bark and outer layer of fibre].
 - .8 Defects: clear free from excessive grain sweeps or bad cross-grai].
 - .9 Preparation: hand-dressed.

2.2.2 Underlayment and eave protection:

- .1 Building paper: asphalt saturated paper, breather type, minimum weight 0.195 kg/m². Acceptable product:
 - .1 " Cedar Breather" Underlayment by Benjamin Obdyke Inc., or
 - .2 Approved equal
- .2 Roofing felt: equal to "Roofshield" 3 ply spun bonded polypropylene fabric waterproof, U.V. stabilized and tear resistant.

2.2.3 Roofing battens:

- .1 Nailing strips - SPF, size: 19 x mm 89 mm with minimum head diameter of 5mm.
- .2 Continuous ventilation product.

2.2.4 Flashing:

- .1 Hot dipped galvanized to be at least 0.476 mm.
- .2 Electroplated galvanized:0.476 mm thick.
- .3 Lead sheet:
 - .1 Milled free of inclusions, laminations, and other defects.
 - .2 Weight: 6 pounds per square foot
- .4 Zinc: to be 0.70 mm thick minimum coated with asphaltum paint.
- .5 Copper sheet: to ASTM B 370 cold rolled.
 - .1 Solder: 50% pig lead - 50% pure block tin alloy, conforming to ASTM B32.
 - .2 Flux: rosin type.
 - .3 Screws, fittings, clips, cleats and the like: shall be of non-ferrous material conforming to ASTM b36-1986; Alloys number C11000, Copper, number C23000, Red-brass; number C51000, Phosphor-bronze; number C52100, Phosphor-bronze; number C65100, Silicon Bronze.

- .4 Nails for copper metal work: large flat-head nails, barbed no. 12 gauge of either Alloy C11000 copper or Alloy C23000 red-brass.
 - .5 Length: to penetrate substrate 22mm (7/8") unless otherwise noted.
 - .6 Rivets: flat-head solid brass 6mm (1.4") diameter
 - .6 Lead-coated copper
 - .1 Sheet: conforming to ASTM Standard B101-83.
 - .1 Material shall be free from pinholes or other dewetted areas, uniform in quality and temper, clean, smooth, commercially flat and straight, and free from defects.
 - .2 Type: type I (hot-dip) or type II (electrodeposition).
 - .3 Grade: grade 1 (cold-rolled 34-42MPa), grade 2 (cold-rolled 32-40MPa).
 - .4 Class: class A (general application, 12-15lb/100 SF).
 - .5 Weight: 24oz. (7.33kg/m²) comprised of 20oz. sheet copper with a minimum of 2.0 oz. of lead on each side of the sheet copper.
 - .2 Solder: 67% pig-lead and 33% block-tin, conforming to ASTM B32.
 - .1 Flux: rosin type.
 - .7 Stainless Steel sheet: steel No. 304, Terneplated .015 mm - .025 mm thickness: 80% lead and 20% tin, gauge No. 28.
- 2.2.5 Flashing nails: to be of same material as sheet metal to CSA B111, flat head roofing nails of length and thickness suitable for metal flashing application.
- 2.2.6 Shingle nails:
- .1 Hand-wrought iron nails:
 - .1 Shingle: to Office of Ordnance List, 1812, Fine Shingle, Rose headed (broad faceted head), four sided tapering shank, sharp pointed, [35][51] mm of soft malleable iron.
 - .2 Machine-cut nails:
 - .1 Shingle: [irregular hammered head][level stamped head] a rectangular shank, tapered on two opposing sides, blunt pointed, 51 mm.
 - .2 Double coursing: [irregular hammered head][level stamped head], a rectangular shank, tapered on two-opposing sides, blunt tapered on two-opposing sides, blunt pointed, [45] mm, hot-dipped, zinc coated.
- 2.2.7 Finishes: to match existing.

3. **EXECUTION**

3.1 **Preparation**

- 3.1.1 Ensure that adequate measures are taken to protect property and users from health and safety hazards, dust, debris and exposure to weather.

3.2 **Verification of Conditions**

3.2.1 Confirm listed characteristics of existing shingles noted in Part 1 of this Section.

3.3 **Removal of Existing Finishes**

3.3.1 Remove existing roof finishes, flashings and underlay. Expose sheathing, shingle lath of roof.

- .1 Collect, package and store removed existing underlayment and roofing felts for recycling, and deliver to recycler in accordance with Waste Management Plan.
- .2 Remove existing shingle and flashing nails. Set nails which break off. Leave surfaces free from dirt and loose material.
- .3 Report to Consultant unforeseen deficiencies and deterioration. Repair as directed.

3.4 **Surface Preparation**

3.4.1 Replace cut out portions of sheathing boards with boards of same sectional dimensions as that removed, of specified grade.

- .1 Seat each end of board on rafter, with 25 mm minimum bearing.
- .2 Secure to rafter with nails. Refer to Contract Drawings for areas of repair.

3.5 **Roof Deck Preparation**

3.5.1 Spaced roof sheathing: space sheathing members matching shingle exposure.

3.5.2 Solid roof sheathing: lay boards with tight joints.

3.5.3 Combination: lay roof boards comprising solid deck tightly, sheathing members same as shingle exposure. Lay one roof board 250 mm in width each side of hips, ridges and valleys, around chimneys (including saddle) and other areas where flashing extends onto roof deck.

3.5.4 Inform Consultant when work is completed and ready for review.

3.6 **Installation of Flashings**

3.6.1 Valley flashings:

- .1 Intersecting roof planes of equal pitch: valley sheets to extend from centreline of valley, up each side a distance of at least 300 mm.
- .2 Intersecting roof planes of unequal pitch: valley sheets to extend from centreline of valley, up side of valley with steeper pitch at least 300 mm, and up side of valley with lower pitch a distance of 300 mm.
- .3 Valley flashings for open valley, made shingle fashion, lapped not less than 250 mm.
- .4 Valley flashings for open valley discontinuous, interwoven with shingle courses and have 150 mm headlap.
- .5 Valley flashings for close or closed valleys discontinuous, interwoven with shingle courses and have 200 mm headlap.

3.6.2 Change of Slope

- .1 Extend exposed change of slope on upper slope flashing as far as possible without being punctured by nails and cleated. On lower slope extend change of slope minimum 150 mm over shingles. Insert wood

cant strip and fasten with soldered metal straps 25 mm above butts of first course of upper slope.

- .2 Extend concealed change of slope on upper slope flashing as far as possible without being punctured by nails and cleated. On lower slope carry change of slope down between shingles of double course to within 13 mm of butts. Fasten these shingles with countersunk brass screws passing through lead washers over flashing.

3.6.3 Hip and ridge:

- .1 Install hip and ridge flashing beneath last course of shingles. Extend flashing on each side of ridge to depth of last course.
- .2 Extend hip and ridge flashing over centreline of hip or ridge on each side for distance of 75 mm.
- .3 Install hip and ridge flashing over [top course of shingles and upstanding batten][ridge boards and wooden roll]. Secure on either side of batten with round headed, brass, wood screws at [300] mm on centre roll with nails [300] mm on centre driven into roll, near wings.
- .4 Install hip and ridge flashings over mitred ridge boards raised on wood blocking 1220 mm on centre. Secure on either side with nails, [300] mm on centre driven into outside edges of ridge boards. Crimp and turn down flashing over nail heads.
- .5 Install hip and ridge rolls over final courses of shingles. Hold down aprons using round headed, brass wood screws at [300] mm on centre, set through lead washers. Cover screw heads and washers are covered with metal caps soldered to flashing.

3.6.4 Base:

- .1 Flashings:
 - .1 Minimum height 230 mm.
 - .2 Minimum projection 200 mm out onto roof.
- .2 Stepped base flashing: ensure steps are equal, horizontal width between 230 and 300 mm and vertical height between 2 and 4 courses.
- .3 On sloped intersections, ensure sheets are lapped minimum [75] mm.
- .4 When run horizontally, ensure sheets are flat locked and soldered.
- .5 Vertical corners of chimney: ensure lock seam joints at vertical corners of chimney.

3.6.5 Cap Flashings and Counter Flashings:

- .1 Turn cap flashings down over base flashings to minimum 100 mm extend to within [25] mm of surface of finished roof.
- .2 Extend building paper up under exterior coverings such as wood shingles at 50 mm minimum above butt of second shingle course at [100] mm minimum above butt of bottom course of shingles.
- .3 Through wall: extend (wall) / cap flashing through masonry and turn up [50] mm inside. Extend down over base flashing. Turn down outside edge back on itself [13] mm minimum.
- .4 Reglet: Insert chimney and wall cap flashing [50] mm and secured with lead plugs [25] mm wide, 250 mm on centre [19] mm by removing

mortar, then filling over flashing with bituminous mastic. Turn down over base flashing. outside edge on itself at [13] mm minimum.

3.6.6 Continuous Flashings:

.1 Flashings:

- .1 Minimum height: [150] mm.
- .2 Minimum projection out onto roof: [100] mm
- .3 Lap sheets minimum [100] mm and solder on top only.

3.6.7 Gutter linings:

- .1 Extend gutter lining cant strip 300 mm up under shingle roofing [and secure with cleats].
- .2 Make gutter linings continuous. Securely form joints. Solder on both sides.

3.6.8 Sidewall:

- .1 Install window caps and other projections with flashings at points where rain water [and snow] accumulates. Extend flashings up under shingles of side walls at 150 mm minimum.
- .2 Reinforce mitred corners with square strip moulding with continuous narrow metal flashing strip. Step flash woven inside corners.

3.7 **Application- Roof and Sidewalls**

3.7.1 Install shingles over dry substrate.

3.7.2 Spacing:

- .1 Roof application: Wood shingles.
 - .1 Joint space: approximately 6 mm.
 - .2 .Stagger joints minimum 40 mm from adjacent courses' joints.
- .2 Roof application: Wood shakes.
 - .1 Joint space: 6 to 9 mm.
 - .2 .Stagger joints minimum 40 mm from adjacent courses' joints.
- .3 Sidewall application:
 - .1 Rived or sawn shingles generally [minimum 3 mm, maximum 6 mm][6-10 mm], [3-8.5 mm][6 mm maximum joints].
 - .2 Pre-finished shingles, to be close jointed.
 - .3 Hand split shakes 10 mm maximum joints.

3.7.3 Joints:

- .1 Stagger side lap joints 40 mm with no joint lining up within three courses.

3.7.4 Nailing:

- .1 Concealed nailing: on typical roof and single course sidewalls use [2 nails][per shingle][per shingle up to 200 mm wide][3 nails][per shingle in excess of 200 mm wide]. Space nails [19][25] mm from edge [with additional nails 100 mm apart across face of shingle] and [25][40][50] mm above butt line of following course.

- .2 Butt nailing double coursed side walling: use 2 or more nails. Space nails 19 mm from each edge of shingle, and a third nail in centre of all shingles wider than 200 mm and 50 mm above butt line of following course.
- .3 Bottom shingles of double starter course: install additional line of nailing 13 mm back from overhang. Spacing similar to that of typical roof course. If overhang does not have a soffit: Ensure nails not driven through eave boards .
- .4 Install extra nailing to final course of shingles at ridge, 25 mm minimum down from ridge if sawing off, or breaking off of extra shingle length, in situ, is required.
- .5 Drive nails flush: do not crush shingles.

3.8 Installation- Roofing

3.8.1 Eave protection:

- .1 Provide eave protection in accordance with NBC - 2015.
 - .1 Install No. 15 asphalt-saturated felt. Lay protection in two plies.
 - .1 Lap 480 mm, and cement with lap cement.
 - .2 Lay protection as continuous sheet without use of cement.
- .2 Extend protection from roof edge minimum 900 mm up roof slope to a line minimum 300 mm inside inner face of exterior wall.

3.8.2 Underlayment:

- .1 Install rosin-sized paper breather type, asphalt-saturated paper per manufacturer's instructions.
- .2 Install parallel to eaves with minimum 50 mm head and end lap.
- .3 Fasten top edge of each strip with roofing nails. Ensure it is held in place until shingles are applied.
- .4 Overlap eave protection by minimum of 100 mm.
- .5 After each course of shakes is applied, lay [450 mm wide strip of [No. 25] [No. 30] perforated, asphalt-saturated organic roofing felt][450 mm wide strip of asbestos felt reinforced with glass fibres] over top portion of shakes, extending onto sheathing, with bottom edge of felt positioned at minimum distance above butt equal to twice weather exposure.

3.8.3 Hip and Ridge Protection

- .1 Apply strip of No. 30 perforated, asphalt-saturated organic felt 200 mm wide over crown of ridge.

3.8.4 Starter course:

- .1 Double shingles at eaves.
- .2 Block up starter course to bring high points of shingle courses into alignment.
- .3 Project butts 25-40 mm from first sheathing board and face of crown moulding.

3.8.5 Typical course:

- .1 Install shingles with weather exposure. Ensure double thickness of shingles at any given point.
- .2 Lay shingles with grain perpendicular to eaves.

- .3 Laying shingles containing both flat and vertical grain: Offset joints minimum 38 mm from knots, defects and centerlines of heartwood.
- .4 Split flat grained shingles wider than 200 mm. Minimum width: 100 mm.
- .5 Keep shingles 25 mm clear of vertical flashing.
- 3.8.6 Finishing gable rake:
 - .1 Place 150 mm tilting fillet of [cedar] bevel siding the full length of each gable and with thick edge flush with sheathing edge.
 - .2 Cut back butts of shingles which rest on tilting fillet. Produce at an angle of 45 degrees to side joint.
 - .3 Clip off upper corner of edge shingles.
 - .4 Extend edge protection of shingles over end rafters and barge boards of 25-40 mm.
- 3.8.7 Finishing open valleys:
 - .1 Block out sheathing at base of valley where and as indicated.
 - .2 Run tilting fillets along both sides of valleys.
 - .3 Do not lay [shingles][shakes] with grain parallel to centreline of valleys.
 - .4 Cut to proper mitre shingles extending into valleys.
 - .5 Do not break joints into valleys.
 - .6 Line up [shingles][shakes] extending into valleys formed by roofs of unequal pitch, minimum 25 mm farther back from centreline of valley on lower slope side.
 - .7 Taper open portion of valley: from starting upper width of minimum [50] mm to minimum 150 mm lower width [wider width as it descends at rate of 5 mm/m of length].
- 3.8.8 Finishing closed valleys:
 - .1 Do not lay [shingles][shakes] with grain parallel to centreline of valleys.
 - .2 Keep mitred edges of shingles laid each side of valley 13 mm apart.
 - .3 Use only unbroken joints into valleys.
- 3.8.9 Finishing the hips:
 - .1 "Boston" hip:
 - .1 Select shingles of approximately the same width and strictly vertical grain for use as hip shingles.
 - .2 Lay bottom shingles of first hip line and lower corners of their butts just touching butts of shingles below.
 - .3 Make vertical side cut at right angles to eaves across each hip shingles.
 - .4 Slightly taper side making joint at centreline of hip, and cut back edge projecting over centre of hip on a bevel.
 - .5 Fit hip shingles to side of main roof shingles and nail in place.
 - .6 Install shingles on opposite side, cutting back projecting edge to fit.
 - .7 Install shingles in following courses, alternately in reverse order.
 - .8 Match weather exposure used on main roof.

- .2 Modified "Boston" hip, site applied shingles:
 - .1 Select shingles of approximately same width and strictly vertical grain for use as hip shingles.
 - .2 Carry slope shingles of main roof up to centreline of hip.
 - .3 Lay lower edge of hip shingles to line 130 mm back from centreline of hip.
 - .4 Saw butts of doubled starter course parallel to butts of first course of slope shingles of main roof at eave line.
 - .5 Edge of shingles projecting over centre of hip: cut back on bevel.
 - .6 Install shingles on opposite side, cutting back projecting edge to fit.
 - .7 Install shingles in following courses, alternately in reverse order.
 - .8 Match weather exposure used on main roof.
 - .3 Mitred hip:
 - .1 Cut shingles selected for finishing hip. Ensure grain of wood runs parallel with line of hip.
 - .2 Run shingle ends alternately over centreline of hip and dress to bevel of opposite side of roof.
- 3.8.10 Finishing ridges:
- .1 "Boston" lap, site applied shingles:
 - .1 Select shingles of same width and strictly vertical grain for use as ridge shingles.
 - .2 Carry slope shingles of main roof up to centreline of ridge.
 - .3 Start laying ridge cap at each end with double starter course and proceed to centre. At that point nail small saddle of shingles butts to splice two lines.
 - .4 Nail first shingles in place with one edge resting against guide strip from centreline of ridge.
 - .5 Cut back on bevel edge of shingles projecting over centre of ridge.
 - .6 Shingles on opposite side are applied and projecting edge cut back to fit.
 - .7 Install shingles in following courses, alternately in reverse order.
 - .8 Match weather exposure used on main roof.
 - .2 Common lap:
 - .1 Place butts of shingles comprising top courses, either side of ridge, to be placed against [guide strip] [chalk line] down from centreline of ridge.
 - .2 Run shingles ends alternately over centreline of ridge and dress to bevel of opposite side of roof.
 - .3 Combing:
 - .1 Place butts of shingles comprising top courses, either side of ridge. Place against guide strip down from centreline of ridge.

- .2 Cut feather ends of shingles on leeward side cut flush with top of ridge.
- .3 Run feather ends of shingles on windward side 50 mm over and past ends of cut-off shingles.

3.9 **Construction Waste Management**

- 3.9.1 Waste Management: separate waste materials for reuse and recycling.
- 3.9.2 Separate wood waste in accordance with Waste Management Plan and place in designated areas in the following categories for recycling: Solid wood/ softwood/ hardwood, composite wood, treated, painted, or contaminated wood.
- 3.9.3 Do not burn waste at project site.
- 3.9.4 Collect, package and store partly used or unused containers of underlayment and roofing felts for recycling, and deliver to recycler in accordance with Waste Management Plan.
- 3.9.5 Collect, package and store removed existing underlayment and roofing felts for recycling, and deliver to recycler in accordance with Waste Management Plan.
- 3.9.6 Collect data on weight or volume of CRD waste diversion as required by LEED credit MR 7.
- 3.9.7 Collect data on recycled content as required by LEED MR credit 4.1 and 4.2.

END OF SECTION

1. GENERAL

1.1. Work Description and Heritage Intent

- 1.1.1. Provide all labour, materials, and equipment required to the repair or restoration of existing selected wood windows frames, glazing, and provide weather stripping as indicated in the drawings or specified elsewhere.
- 1.1.2. Rather than restore to 'as-new' finish, the intention of this section is to retain and restore to serviceable condition the maximum quantity of existing material or 'Heritage Fabric' with its existing patina of age.
- 1.1.3. Restoration of historic wood windows, frames, brick mould.
- 1.1.4. Contractor shall ensure that all sub-trades are fully familiar with the conditions set forth in the General Conditions of the Contract and General Instructions in Division 00 and 01.

1.2. Related Work

- 1.2.1. Paint Cleaning Section 09 01 90.51
- 1.2.2. Conservation Treatment for Period Painting Section 09 03 91.13

1.3. Quality Assurance

- 1.3.1. Carpenter, Glazer, and Installer: Fully equipped trade specialist, expert craftsmen, highly skilled, and having a minimum of five years relevant experience to the work of this section.

1.4. Submittals

- 1.4.1. Hardware Cut Sheets and Samples: each type of new and restored window hardware, and suspension system, showing operation and final finish. Submit cut sheets for all new components.

1.5. Mock-ups

- 1.5.1. Provide mock-ups on site for approval. Approved mock-ups will be used as the respective standard for quality and become part of the final work. Show restored construction, primed finish, glazing materials, sealant, and hardware. Demonstrate:
 - .1 Provide one complete window mock-up including:
 - .1 Sill, brick mould,
 - .2 Restored sash,
 - .3 Glazing repair (putty and wood stop),
 - .4 Installation of new sash,

1.6. Precaution

- 1.6.1. Linseed oil, on oxidation, creates high heat and oil-soaked rags can ignite if not properly stored in an air-tight container.

2. MATERIALS

2.1. Materials

- 2.1.1. Wood members: to match existing.

- 2.1.2. Moisture content to be average of 7% (min. 5% max 9%) at time of fabrication.
- 2.1.3. Boiled linseed oil.
- 2.1.4. Glazing compound: linseed oil-based putty. Note that putty must be well kneaded prior to installation to ensure oil is well mixed.
- 2.1.5. Use restoration glass to replace retained existing panels damaged during the work. Use metal glazing points for installation of glazing panels.
- 2.1.6. Paint in accordance with Section 09 03 91.13.

2.2. Hardware

- 2.2.1. Retain or salvage existing historic hardware for reuse.
- 2.2.2. Re-equip damaged/missing hardware on restored windows as opening vents. Use reclaimed hardware to match hardware in existing building except as indicated. Exposed surfaces of reclaimed hardware to be cleaned and in new condition ready for finishing.
- 2.2.3. At retained/re-used sashes indicated as opening vents, provide new sash metal straps, new counterweights if required, revise existing counterweights, and weight covers to match existing as indicated. Submit cut sheets and samples of new elements for approval.

3. EXECUTION

3.1. Site Condition Notifications

- 3.1.1. On completion of removal of all sashes and exposure of frames, review conditions and notify heritage consultant of discrepancies between documents and exposed site conditions

3.2. Protection of Historic Elements for Reuse

- 3.2.1. Label all components to be removed
 - .1 Prior to commencing, apply labels to all components of the window including hardware. Labels shall be removable but secure.
- 3.2.2. Storage
 - .1 Store disassembled elements in a manner that they can be easily sorted and found for re-use at time of re-assembly. Protect reusable historic glazing, from breakage during removal, during repair and during storage period.
 - .2 Store small items in plastic self-sealing bags and label each with indelible ink.
- 3.2.3. Numbering
 - .1 As disassembly proceeds, number all components removed with indelible pen in areas hidden from view in final installation.
 - .2 As much as possible, the original components of the windows shall be re-used in the restoration work.
- 3.2.4. Protection
 - .1 Provide temporary covers over wood elements until exterior masonry restoration has been completed.
 - .2 On completion of exterior masonry restoration, remove exterior temporary covers and restore window frame and exterior stops as specified.
 - .3 Where windows are to be removed protect the remaining elements and building

interior from weather.

- .4 Repair wood frames in situ unless indicated otherwise on the Contract Documents.

3.3. Repair Schedule

3.3.1. The following repairs will be required except as indicated:

- .1 All checked or cracked wood in upper and lower sash and frames.
- .2 Replacement of all putty and wood glazing stops
- .3 Dutchman repairs to match original profiles
- .4 Gluing and clamping of all loose sash members.
- .5 Dowel reinforcing as required at sashes.
- .6 New sash metal straps and lugs where double hung windows are to be operable
- .7 New interior stops, parting strips and blind stops.
- .8 Exterior frames, stops, brick mould, and sills.
- .9 New hardware, pulls, meeting rail, locks where missing

3.4. Repair of Sash

3.4.1. Sash components designated for repair may include rails or stiles.

3.4.2. Remove damaged or rotted rails, stiles designated for replacement by first drilling out wood plugs holding muntins to styles and rails / and styles to rails.

- .1 Separate elements and clean up parts to be re-used by removing paint and damaged areas.

3.4.3. Fabricate replacement components to duplicate exactly the original components in dimension, profile and installation (including mortises and tenons, dowel plugs, etc.).

- .1 Re-install using scored hardwood dowels.
- .2 Use white glue in dowels and mortises

3.4.4. Putty Filler

- .1 Where interior wood is only weathered and not rotted (surface grain raised), putty filler may be used as follows:
 - .1 Assuming all paint has weathered off, scrape any remaining and treat surface with boiled linseed oil cut 50/50- with turpentine.
 - .2 Spread putty on dried surface with putty knife and blend flat.
 - .3 Finish with primer and paint as noted below.

3.5. Preparation for Painting

3.5.1. On completion of reconstruction of damaged elements, scrape loose paint from sash and window elements and lightly sand all surfaces.

- .1 Immediately apply primer as specified in Section 09 03 91.13.

3.6. Re-Glazing

3.6.1. Apply two coats of boiled linseed oil to unpainted frame and muntin bars in areas to receive putty.

- 3.6.2. Use boiled linseed oil as unboiled will not oxidize.
- 3.6.3. Cut 50/50 with turpentine and apply to dry wood areas.
 - .1 If material is absorbed quickly (ie. wood is very dry), repeat application.
 - .2 Also apply this to glazing rebates prior to putty application to prevent putty vehicle from being absorbed into wood.
- 3.6.4. Place a thin setting bed of putty in the muntin/frame mortise.
- 3.6.5. Evenly press the glass pane into the setting bed to avoid breakage and to ensure a complete contact of glass with putty.
- 3.6.6. Install glazing clips.
- 3.6.7. Install putty and trim to profile.

3.7. Shop and Site Painting

- 3.7.1. Allow putty to skim prior to painting.
- 3.7.2. Shop paint removed units and wood stops prior to shipping and site paint units restored in situ with one coat of alkyd primer then one coat of exterior enamel.
 - .1 Ensure that paint coat is installed after putty has skinned (approximately 24 hours).
- 3.7.3. Ensure that paint laps edge of putty onto glass surface by min. 1/16" to seal putty/glass junction.
- 3.7.4. Site paint in accordance with Section 09 03 91.13 with final coat of enamel after installation.
 - .1 Ensure that final paint coat overlaps putty onto face of window by 1mm to ensure a complete seal between glazing and putty.

3.8. Installation

- 3.8.1. Prior to final installation, pre-paint all sash and stops in accordance with Section 09 03 91.13 on all exposed and hidden areas.
- 3.8.2. Set window units in restored openings plumb, square and level, free from warp, twist or superimposed loads. For operable windows:
 - .1 Prior to securing window stops, rub a heavy layer of paraffin wax on hidden planed edges of movable sash to seal and permit easy movement.
 - .2 **Do not use soap.**
- 3.8.3. Secure stops adequately and accurately in required position. For opening windows secure in manner not restricting normal movement of wood windows.
- 3.8.4. Re-install new sash metal straps with counterweight and new metal lugs and sash weight covers where indicated.
- 3.8.5. For operable windows adjust opening sash and hardware to operate smoothly.
- 3.8.6. For formerly operable sashes to become fixed, modify unit in fixed position, install hardware and make hardware non-operable.

END OF SECTION

1. GENERAL

1.1 General Comment

- 1.1.1 Division of this Specification into subsections is for convenience and clarity. Such division does not relieve the Contractor from the responsibility of ensuring that each trade or subtrade is fully familiar with the extent of their work or the work of other Sections which may have an impact on their work. Each Section or Division may contain more or less than the work of any trade.
- 1.1.2 Contractor shall ensure that all subtrades are fully familiar with the conditions set forth in the General Conditions of the Contract and General Instructions in Division 00 and 01.

1.2 Work Description

- 1.2.1 Removal of paint shall be carried out to substrate surfaces without causing damage.
- 1.2.2 Areas of paint to be removed are indicated on the drawings and schedules.
- 1.2.3 Removal operations shall include the following:
- 1.2.4 Preparation of site including the installation of protective materials such as drop sheets, drainage channels and masking.
- 1.2.5 Provision of appropriate containers for collection and disposal of hazardous materials including lead paint and/or asbestos containing paints.
- 1.2.6 Application for and receipt of required permits for disposal of waste.
- 1.2.7 Removal of paint by means of:
 - .1 Proprietary organic solvents used singly or in combination with other methods.
- 1.2.8 Packaging, removal from site, and proper disposal of residues and removed material.
- 1.2.9 Removal of protective materials and final cleanup to condition at commencement of operation.

1.3 Related Work

- 1.3.1 Co-operate with other trades during the progress of this work. Related work is as follows:
 - .1 Section 08 01 52.91 Wood Window Restoration
 - .2 Section 09 91 00 Painting

1.4 Submittals

- 1.4.1 Comply with the requirements of Section 01 10 00 and Section 01 33 00

1.5 Reference Standard

- 1.5.1 Do work in accordance with specified standards in this and attached specification sections

1.6 Samples

- 1.6.1 Demonstrate machinery, and tools for approval by Consultant.
- 1.6.2 Submit samples in accordance with Section 01 00 00 and Section 01 33 00.

1.7 Product Delivery, Storage and Handling

- 1.7.1 Deliver materials to job site in dry condition.
- 1.7.2 Keep materials dry until use, except where specified.
- 1.7.3 Manufacturer's labels shall be intact upon delivery.

1.8 Environmental Requirements

- 1.8.1 In addition to requirements specified elsewhere, the following also apply:
- 1.8.2 Comply with the requirements of the following Federal and Provincial Legislation latest updates related to the transportation use and disposal of all cleaning materials:
 - .1 Federal Transportation of Dangerous Goods Act.
 - .2 Ontario Regulation #309, Liquid Industrial and Hazardous Waste Regulation.
 - .3 All such waste shall be carried by an approved Ministry of the Environment Haulage carrier and disposed of at a Ministry of the Environment approved receiving facility.
 - .4 Provide copies of certificates related to transportation use and disposal of all cleaning materials to Consultant.

1.9 Protection

- 1.9.1 Submit complete details of all protection measures prior to commencing cleaning for review by Consultant.
- 1.9.2 Protect any materials or components or occupants of the building, the public and adjacent property or surroundings which may be damaged by the effects of any of the operations specified herein.
 - .1 Erect properly constructed protection, positioned to confine and prevent any over spray of water, chemicals. or abrasives.
- .1 Protection shall be of the full enclosure type with provision to contain spent cleaning materials so as to prevent their escape.
- .2 Employ negative pressure system as necessary to effectively contain materials.
 - .2 Protect window glass by drop sheets or boards (glass can be etched by chemical overspray) and seal these by means of tape or caulking.
 - .3 Protect masonry and wood work from marking and other damage during cleaning operations.
 - .4 Protect all other surrounding areas as recommended by the product manufacturer or as directed by the Consultant.
- 1.9.3 Contain and collect all spent materials and water immediately below the area of cleaning to prevent run-down onto areas not being treated.
 - .1 Dispose of spent materials in accordance with all relevant legislation and requirements.
- 1.9.4 Protect areas of wall which are not to be treated by means of non-staining tarps of polyethylene sheets.
- 1.9.5 Prevent the spread of contaminants into or throughout the building

- .1 Where contaminants do spread, pay all costs of clean-up.
- 1.9.6 Be aware of the hazardous nature of operations.
 - .1 Mechanics shall wear appropriate protective gear during the course of this work and in accordance with Provincial safety requirements at all times during cleaning operations.

1.10 Existing Conditions

- 1.10.1 Report to Consultant conditions of damaged substrate found during cleaning.

1.11 Schedule

- 1.11.1 Submit work schedule indicating progress of stages within time of final completion shown in Bid documents.
- 1.11.2 Provide Consultant with minimum 48 hours-notice of intent to commence cleaning operations.
 - .1 Take measures necessary to complete work within approved schedule time. Schedule may not be changed without approval.
 - .2 Co-ordinate cleaning work schedule with other work on site.

1.12 Qualification

- 1.12.1 Work under this section shall be performed by a firm having experience with the materials and methods specified.
 - .1 Project supervisor shall have minimum 5 years field experience.
- 1.12.2 Contractor must demonstrate training related to techniques used, quality control inspections by manufacturers of products, successfully completed previous projects of a similar nature or a combination of the these prior to being permitted to proceed with the work.

1.13 Alternatives

- 1.13.1 Changes of cleaning method, cleaning medium, and tools, and during contract, from those specified must be authorized in writing by Consultant.

2. PRODUCTS

2.1 Source of Quality Control

- 2.1.1 Submit manufacturer's literature certifying compliance of paint removal products with those specified prior to proceeding with the work.

2.2 Materials

- 2.2.1 Water shall be potable, clean and free from contaminants.
 - .1 Test water for high iron content prior to use.

- .1 Where water has high iron, copper or other metal content, pre-treat with complexing agents prior to use to avoid staining.
- .2 Avoid use of acidic waters on raw lime plasters.
- .3 Verify that chlorination levels of water do not cause softening and higher erosion rates in materials to be cleaned.
- .1 Check test area after completion to ensure that high levels of chlorides do not exist in stone surface after completion of cleaning process.
- 2.2.2 Paint strippers:
 - .1 Use proprietary paint strippers in poultice form which may contain poultice based environmentally friendly strippers.
 - .2 Acceptable products include the following:
 - .1 Peel Away System
 - .2 KEIM Dispersionsentferner (Aromatic-free bio-stripper).
 - .3 Approved equal.

2.3 Basic Tools

- 2.3.1 Brushes: soft fibred nylon, natural soft and stiff bristle.
- 2.3.2 Scrapers: wood, or plastic.
 - .1 Do not use steel scrapers
 - .2 Use steel razor blade wallpaper scrapers to remove softened paint film.
- 2.3.3 Pails: Rubber or moulded plastic only.

3. EXECUTION

3.1 Preparation

- 3.1.1 Seal and protect all areas from over spray as noted above.

3.2 Testing

- 3.2.1 The intent of the test panels will be to adequately demonstrate and assess the performance of each system and the variables involved. For example:
 - .1 Locations of test panels will be selected by the Consultant.
 - .2 All tests will be conducted in the presence of the Consultant.
- 3.2.2 Acceptance of any one system or technique shall depend on the Contractor's ability to meet the following performance criteria:
 - .1 Acceptable moisture absorption values on cleaned surfaces.
 - .2 Acceptable visual appearance and level of clean to the Consultant.
- 3.2.3 If initial methods prove unsatisfactory, combinations of methods will be tried from acceptable alternatives.
- 3.2.4 Accepted test panels will form the standard and quality of work for the entire project.

- .1 Contractor shall use the recommended procedures which arise from the test panels as the criteria for establishing the standard for the work.

3.3 Specific Procedures

3.3.1 Removal of Paints using non-caustic chemical stripper

- .1 Use brushing scrapping to remove flaking paint prior any chemical application
- .2 Carry out cleaning employing proprietary materials or mixed pastes to remove paint layers.
- .1 Mask any areas not being stripped with masking tape and polyethylene.
- .3 Apply stripper in accordance with manufacturer's instructions.
- .1 Use a wet mil gauge to verify thickness
- .2 Allow to dwell in accordance with test panel results
- .3 Carefully scrape residue into plastic bags, seal and remove from site. Dispose of waste in accordance with waste legislation.
- .4 Clean up with water. Ensure that dried surface has no remnants of original distemper paint - otherwise repeat procedure.
- .4 Pick-up any droppings and dispose of as above.
- .5 For all windows allow for a second application on 40% of the total area, and a third application on 15% of the total area of paint to be removed.

3.3.2 Brushing and scraping.

- .1 Use brushing and scraping to supplement paint removers
- .2 Soften and loosen heavy deposits with scraper brush. Remove thick encrustations with wooden scrapers

3.4 Final Clean Down

- 3.4.1 Immediately prior to application of cleaning materials thoroughly rinse all traces of chemicals.
- 3.4.2 Re-apply as necessary.

END OF SECTION

1. **GENERAL**

1.1 **Related Work**

- 1.1.1 Rough Carpentry for Minor Works Section 06 08 99

1.2 **Price and Payment Procedures**

1.2.1 Alternates:

- .1 Identify alternate products in writing for Consultant's approval.
- .2 Change manufacturer's brands, sources of supply of painting materials from those previously approved only on approval of Consultant.
- .3 Requests for alternate approval: in writing and accompanied by manufacturer's literature and recommendations.

1.3 **Reference Standards**

1.3.1 Canada Green Building Council (CaGBC)

- .1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum [2007]).
- .2 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.
- .3 LEED Canada 2009 for Design and Construction- [2010], LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide.
- .4 LEED Canada for Existing Buildings, Operations and Maintenance-[2009], LEED Canada 2009 Leadership In Energy and Environmental Design Green Building Rating System Reference Guide.

1.3.2 Environmental Protection Agency (EPA)

- .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).

1.3.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

- .1 Safety Data Sheets (SDS).

1.3.4 Master Painters Institute (MPI)

- .1 Maintenance Repainting Manual [current edition], Master Painters Institute (MPI) including Identifiers, Evaluation, Systems, Preparation and Approved Products List.

1.3.5 National Fire Code of Canada (NFC), [2015].

1.3.6 United States Federal Standards, issued by General Services Administration.

- .1 Federal Standard 595C - Colors Used in Government Procurement.

1.4 **Definitions**

- 1.4.1 Exterior surfaces: refers to surfaces of a historic structure which is exposed to exterior weather including wet conditions of rain, sleet or snow, high temperatures and sunlight as well as temperatures below the freezing point.

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- 1.4.2 Period paint samples: paint chips obtained from paint coatings on historic structures for purpose of paint analysis, colour matching and other paint information recording.
- 1.5 **Action and Informal Submittals**
 - 1.5.1 Submit in accordance with Section [01 33 00 - Submittal Procedures].
 - 1.5.2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for [paints and coating products] and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit [2] copies of WHMIS SDS in accordance with Section [01 35 29.06 - Health and Safety Requirements][01 35 43 - Environmental Procedures].
 - 1.5.3 Samples:
 - .1 Submit full range of coating colour sample matches for review and selection.
 - .2 Submit [2] one-litre samples of each paint delivered to site:
 - .1 [1] sample from manufacturer's containers; and,
 - .2 [1] sample from painter's pot.
 - .3 Take samples in presence of [Departmental Representative][DCC Representative][Consultant].
 - 1.5.4 Sustainable Design Submittals:
 - .1 LEED Canada submittals: in accordance with [Section 01 35 21 - LEED Requirements].
 - .2 Construction Waste Management:
 - .1 Submit project [Waste Management Plan][Waste Reduction Workplan] highlighting recycling and salvage requirements.
 - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that [50][75]% of construction wastes were recycled or salvaged.
 - .3 Recycled Content:
 - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of [post-consumer][and][post-industrial] content, and total cost of materials for project.
 - .4 Regional Materials: submit evidence that project incorporates required percentage [_____] % of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.
- 1.6 **Closeout Submittals**
 - 1.6.1 Submit in accordance with Section [01 78 00 - Closeout Submittals].
 - 1.6.2 Operation and Maintenance Data: submit operation and maintenance data for [paints and coatings] for incorporation into manual.

- .1 Provide records of products used. List products in relation to finish system and include following:
 - .1 Product name, type and use (e.g. materials and location).
 - .2 Manufacturer's product number.
 - .3 Colour code numbers.
 - .4 [MPI Environmentally Friendly classification system rating][Environmental Rating].
 - .5 Manufacturer's Safety Data Sheets.
 - .2 Submit maintenance record of painting work.
- 1.7 **Maintenance Material Submittals**
 - 1.7.1 Extra Stock Materials:
 - 1.7.2 Submit [one], [1][4] litre can of each type and colour of [stain][finish coating]. Identify type and colour in accordance with established colour schedule and finish system.
- 1.8 **Source of Quality Control**
 - 1.8.1 Record paint information on period paints; paint material, colour, treatment or finish methods. Also, record information on contemporary coatings, such as paint material and colour in CGSB specification or in other trade designations including paint manufacturer, used on each area of historic structures.
 - 1.8.2 Keep maintenance-record of painting work to indicate detailed work carried out for each area of historic structures including methods of surface preparation and paint application with comments as necessary.
 - 1.8.3 Use appropriate card format for above recording for easy information retrieval
- 1.9 **Quality Assurance**
 - 1.9.1 Regulatory Agency Sustainability Approvals:
 - .1 Compliance Report indicating requirement to purchase energy efficient and environmentally friendly products.
 - .2 Conform to applicable standards and requirements for exterior repainting work including cleaning, preparation and priming.
 - .3 Retain purchase orders, invoices and other documents and produce when requested by [Departmental Representative][DCC Representative][Consultant].
 - 1.9.2 Qualifications:
 - .1 Contractor: minimum of [5] years proven satisfactory experience with historic structures painting. When requested, provide list of last [3] comparable jobs including, job name and location, specifying authority, and project manager.
 - .2 Qualified journeypersons: as identified by local jurisdiction.
 - .3 Apprentices: work under direct supervision of qualified journeyperson in accordance with applicable trade regulations.
 - 1.9.3 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 33 00.

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- .2 Prepare a full-size mock-up of designated surface including specified materials.
- .3 Allow 24 hours for review of mock-up by Consultant before proceeding with work.
- .4 When accepted, mock-up demonstrates minimum standard for this work. Mock-up may remain as part of finished work.

1.10 Delivery, Storage and Handling

- 1.10.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- 1.10.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .1 Labels: to indicate:
 - .1 Type of paint or coating.
 - .2 Compliance with applicable standard.
 - .3 Colour number in accordance with established colour schedule.
- 1.10.3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect paints and coatings.
 - .3 Keep areas for storage, cleaning and preparation, clean and orderly.
 - .4 Remove paint materials from storage in quantities required for same day use.
 - .5 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
 - .6 Store materials and equipment within temperature range between 7 degrees C to 30 degrees C.
 - .7 Store materials and supplies away from heat generating devices and sensitive materials above minimum temperature as recommended by manufacturer.
 - .8 Replace defective or damaged materials with new.
- 1.10.4 Fire Safety Requirements:
 - .1 Provide one 9 kg dry chemical fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site daily.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada (NFC).
- 1.10.5 Packaging Waste Management: remove for reuse by manufacturer of pallets, crates, padding, and packaging materials.

1.11 Ambient Conditions

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- 1.11.1 Substrate and ambient temperatures: in accordance with limits prescribed paint standard by Consultant.
- 1.11.2 Apply paint finish in areas where:
 - .1 Dust is no longer being generated by related construction operations.
 - .2 Wind conditions are such that airborne particles will not affect quality of finished surface.
- 1.11.3 Substrate and ambient air temperature, humidity and moisture content levels:
 - .1 Do not perform repainting work when:
 - .1 Ambient air and substrate temperatures are below 10 degrees C.
 - .2 Substrate temperature is over 32 degrees C, unless paint is specifically formulated for application at high temperatures.
 - .3 Substrate and ambient air temperatures are expected to fall outside MPI prescribed limits.
 - .4 Substrate is wet, damp or frosted.
 - .5 Maximum moisture content of substrate exceeds: 12% for concrete and unit masonry.
 - .6 Maximum moisture content of substrate exceeds: 15% for wood.
 - .7 Maximum moisture content of substrate exceeds: 12% for stucco.
 - .8 Relative humidity is above 85%.
 - .9 Dew point is less than 3 degrees C variance between air/surface temperature.
 - .10 Precipitation is forecast to occur before paint has thoroughly cured.
 - .11 It is foggy, misty, raining, icing or snowing at site.
 - .2 Damp and cold weather conditions:
 - .1 Provide and maintain cover for paint finish.
 - .2 Heat substrates and surrounding air to comply with temperature and humidity conditions required.
 - .3 Protect until paint is dry.
 - .4 Protect until weather conditions are suitable.
- 1.11.4 Perform work on surfaces exposed to direct, intense sunlight in early morning.

2 . PRODUCTS

2.1 Paint Sampling and Analysis

- 2.1.1 When no historic paint information such as paint colours and materials in CGSB standard specifications or other designations are available, it is essential that period paint be analysed to define authentic historic colours, materials and finishes used so that period paint can be exactly reproduced on historic structures.
- 2.1.2 Obtain current research report, if available, on structural history including indications of changes or alterations to historic structures.
- 2.1.3 Analyse this historic information as to tentative dating and possible clues to historic paints and finishes.

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- 2.1.4 Make a plan to take paint samples from historic structures based on information on hand. This plan shall include following items and be approved by [Engineer] [Consultant]: tools and materials to be used for sampling; locations of sampling; number of sampling; on each area; sampling methods i.e. extraction, scraping or cratering in situ; size of sample, depending on method of analysis to be employed and equipment used for analysis of period paint sample and subsequent colour matching.
- 2.1.5 Keep each period sample in small envelope with clear identification and whole samples in a box for storage.
- 2.1.6 Decide that scope of work to be done in order to identify historic paint from extracted period paint samples. Factors to be considered by Consultant are:
 - .1 Direct visual investigation on site.
 - .2 Visual investigation aided by microscope for colour matching.
 - .3 Close microscopic examination and photomicrography for chromochronology.
 - .4 Composition analysis for characteristics of paint materials.
 - .5 Comparative analysis based on both available historic evidence on paint coatings and information obtained through work of 2.1.6.3
- 2.2 **Materials**
 - 2.2.1 Primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, and solvents: in accordance with MPI.
 - .1 Each product from a single manufacturer.
 - 2.2.2 Linseed oil, shellac, and turpentine: highest quality product of an approved manufacturer.
 - .1 Compatible with other coating materials as required.
 - 2.2.3 Paint materials listed in MPI.
 - 2.2.4 Paints and coatings:
 - .1 Provide fire resistance rating where required by Authorities Having Jurisdiction.
 - .2 Products of single manufacturer.
 - 2.2.5 Liquid paint remover: proprietary liquid paint remover of known performance.
 - 2.2.6 Only qualified products with [E1][E2][E3] MPI "Environmentally Friendly" rating are acceptable for use on this project.
- 2.3 **Exterior Painting System**
 - 2.3.1 REX 6.3 - Dressed Lumber: (doors, door and window frames, casings, battens, and smooth fascias).
 - 2.3.2 REX 6.4 - Wood Panelling: (plywood siding, fascias, and soffits).
 - 2.3.3 REX 6.5 - Wood Decks and Stairs/Steps: (using spaced lumber).
- 2.4 **Sustainability Characteristics**
 - 2.4.1 Sustainability characteristics for paints, coatings, thinners, solvents, cleaners and repainting fluids:

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- .1 Do not contain [methylene chloride,][chlorinated hydrocarbons,][toxic metal pigments].
 - .2 Manufactured without formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.
 - .3 Manufactured without compounds that contribute to ozone depletion in upper atmosphere.
 - .4 Manufactured without compounds that contribute to smog in lower atmosphere.
 - .5 Manufactured where matter-generating Biochemical Oxygen Demand (BOD) in undiluted production plant effluent discharged to natural watercourse or sewage treatment facility lacking secondary treatment does not exceed [15] mg/L.
 - .6 .6 Manufactured where total suspended solids (TSS) content in undiluted production plant effluent discharged to natural watercourse or sewage treatment facility lacking secondary treatment does not exceed [15] mg/L.
 - .7 Manufactured and transported in a manner that the steps of process, including disposal of waste products, will meet requirements of applicable government acts, bylaws and regulations including, for facilities located in Canada, Fisheries Act and Canadian Environmental Protection ACT (CEPA).
- 2.4.2 Paints and coatings: not [formulated][manufact ured] with formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.
- 2.5 **Performance Criteria**
- 2.5.1 Environmental Performance Requirements:
- .1 Provide Paint products meeting legislated VOC content levels.
- 2.6 **Colour Matching**
- 2.6.1 Use natural daylight, artificial daylight or incandescent lamp light, as a general rule, when illuminating and viewing historic paint colour with sample colour chips provided by CGSB standard or Munsell colour standard. Follow instructions for illuminating and viewing conditions given by manuals of standard colour systems such as CGSB 1-GP-12C and Munsell Book of Colour.
 - 2.6.2 For greater detail of recommended standards for illuminating and viewing conditions, refer to ASTM Standard Methods D1535, in conjunction with Munsell colour system, and also ASTM Standard Method D1729 with respect to a critical evaluation of colour match.
 - 2.6.3 Convert available Munsell or CIE notation to equivalent CGSB paint colour designation. For cross-referencing Munsell colour notation to closest CGSB colour code or vice versa, refer to EA-PC-80-09, Matching of Historic Paint colours for Government Restoration Projects, including CIE colour equivalency to CGSB colour code.
 - 2.6.4 Use CGSB standard colour designation to CGSB 1-GP-12C when specifying paint colours in job specification.

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- 2.6.5 When proper colour match cannot be found from CGSB 1-GP-12C Standard Paint Colours, use Munsell colour notation, with Munsell colour chip attached as sample, if available.

2.7 Mixing and Tinting

- 2.7.1 Pigment to [MPI standards.
- 2.7.2 Vehicle to MPI standards.
- 2.7.3 Perform colour tinting operations prior to delivery of paint to site.
- 2.7.4 Obtain Consultant's written approval for on-site tinting of paint materials.
- 2.7.5 Reproduce historic paint colour and gloss level using compatible materials meeting current standards.
- 2.7.6 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- 2.7.7 Where thinner is used, addition not to exceed paint manufacturer's recommendations.
- 2.7.8 Do not use kerosene or other organic solvents to thin water-based paints.
- 2.7.9 Thin paint for brush application in accordance with paint manufacturer's recommendations.
- .1 Obtain instructions in writing from manufacturer and provide copy of instructions to Consultant.
- 2.7.10 Re-mix paint in containers prior to and during application. Ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.8 Gloss/Sheen Ratings

- 2.8.1 Paint gloss: in accordance with following MPI Gloss/Sheen ratings:
- | Gloss Level | Units @ 60 | Units @ 85 |
|------------------------|------------|------------|
| Category | Degrees | Degrees |
| G1 - matte finish | 0 to 5 | Maximum 10 |
| G2 - velvet finish | 0 to 10 | 10 to 35 |
| G3 - eggshell finish | 10 to 25 | 10 to 35 |
| G4 - satin finish | 20 to 35 | Minimum 85 |
| G5 - semi-gloss finish | 35 to 70 | |
| G6 - gloss finish | 70 to 85 | |
| G7 - high gloss finish | > 85 | |
- 2.8.2 Gloss level ratings of painted surfaces [as specified][and] as noted on Finish Schedule.

2.9 Acceptable Product

- 2.9.1 Old Village Buttermilk as manufactured by Old Village Paint, P.O, Box 130, Perkiomerville PA 18074, Phone: 215 234 4601, or

2.9.2 Approve equal

3 . **EXECUTION**

3.1 **Examination**

3.1.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for painting in accordance with manufacturer's written instructions.

- .1 Visually review substrate in presence of Consultant.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 **Preparation**

- 3.2.1 Protect existing building surfaces and adjacent structures with non-staining covers against paint spatters, markings and other damage.
- 3.2.2 Protect items permanently attached to surfaces: Fire Labels on doors and frames, Historical Sites and Monuments Board (HS&MB) Plaques and others identified on site..
- 3.2.3 Protect factory finished products and equipment.
- 3.2.4 Remove and safely secure and store light fixtures, surface hardware on doors, and surface mounted equipment, fittings and fastenings prior to undertaking painting operations.
- 3.2.5 Move and cover exterior furniture and portable equipment as necessary to carry out painting operations. Replace as painting progresses.
- 3.2.6 As painting operations progress, place "WET PAINT" signs in pedestrian and vehicle traffic areas

3.3 **Surface Preparation**

- 3.3.1 Perform preparation and operations for exterior painting in accordance with [MPI] Maintenance Repainting Requirements except where specified otherwise.
- 3.3.2 Clean and prepare exterior surfaces in accordance with MPI Maintenance Repainting Manual requirements. Refer to manual for specific requirements as follows:
 - .1 Remove dust, dirt, and surface debris by brushing, wiping with dry, clean cloths or compressed air.
 - .2 Wash surfaces with biodegradable detergent and bleach and clean warm water using a stiff bristle brush. Remove dirt, oil and surface contaminants. Ensure existing substrate is not damaged by process.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Use trigger operated spray nozzles for water hoses.
 - .5 Allow surfaces to drain completely and dry thoroughly.
 - .6 Use water-based cleaners for surfaces to be repainted using water based paints.

- 3.3.3 Where noted on Contract Drawings, pressure wash exterior surfaces in accordance with MPI standards for type of surfaces and in accordance with recommended pressures.
 - .1 Ensure complete removal of loose paint, stains, dirt, and foreign matter.
 - .2 Stop work immediately and report to Consultant damage occurring from this process.
 - .3 Use of water hose as spray equipment not permitted.
 - .4 Allow sufficient drying time.
 - .5 Test surfaces with electronic moisture metre before commencing work.
 - 3.3.4 Clean metal surfaces: remove rust, dirt, oil, grease and foreign substances in accordance with [MPI] requirements.
 - .1 Remove contaminants from surfaces, pockets and corners: blow with clean dry compressed air vacuum as required].
 - 3.3.5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, corrosive chemicals, grease, oil and solvents before priming.
 - 3.3.6 Touch-up, spot prime, and apply primer, paint, or pre-treatment immediately after cleaning.
 - 3.3.7 Obtain written approval of prepared surfaces by Consultant before applying paint.
- 3.4 **Application**
- 3.4.1 Special Techniques:
 - .1 Apply coating in manner that replicates texture of historic paint coating.
 - .2 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.
 - .3 Apply paint materials in accordance with paint manufacturer's written application instructions.
 - .1 Apply paint:
 - .1 To adequately prepared surfaces and within moisture limits.
 - .2 When previous coat of paint is dry and adequately cured.
 - .3 In accordance with manufacturer's written instructions.
 - .4 Apply paint with brush.
 - .1 Obtain Consultant's approval of application method before commencing work.
 - .5 Brush and Roller Application:
 - .1 Apply paint in a uniform layer using brush suitable for application.
 - .2 Work paint into cracks, crevices and corners.
 - .3 Brush out runs and sags, and overlap marks.
 - .4 Eliminate roller tracking and stipple by finishing with a brush. Maintain historic appearance.
 - .5 Remove runs and sags from finished work and repaint.

- .6 Apply final coat of paint with brush.

3.5 Field Quality Control

3.5.1 Standard of acceptance:

- .1 When viewed using natural prevailing sunlight at peak period of day (mid-day) on surface viewed, surfaces to indicate following:
 - .1 Walls: no defects visible from a distance of [1000] mm at [90] degrees to surface.
 - .2 Soffits: no defects visible from grade at [45] degrees to surface.
 - .3 Final coat: to exhibit uniformity of colour and sheen across full surface.
- .2 Advise Consultant when each surface and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved by Consultant.
- .3 Co-operate with Paint Inspection Agency and provide access to areas of work.
- .4 Manufacturer's Field Services:
 - .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .5 Test painted concrete, masonry and plaster surfaces for alkalinity as required.
- .6 Conduct moisture tests on substrates.
 - .1 Use calibrated electronic moisture meter.

3.6 Cleaning

- 3.6.1 Progress Cleaning: clean in accordance with Section 01 00 00.
 - .1 Leave Work area clean at end of each day.
- 3.6.2 Reinstall and clean removed items after painting is completed.
- 3.6.3 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.
 - .1 Clean and restore as directed by Consultant.
- 3.6.4 Wipe spills and spots immediately with a damp cloth.
- 3.6.5 Minimize use of kerosene and organic solvents to clean up water-based paints.
- 3.6.6 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- 3.6.7 Waste Management: separate waste materials for reuse and recycling.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
 - .2 Separate coating products waste in accordance with Waste Management Plan and place in designated areas for recycling and disposal.
 - .3 Place materials defined as hazardous or toxic waste in designated containers.
 - .4 Seal and store emptied containers safely away from children for disposal.

- .5 Dispose of surplus chemical and finishing materials in accordance with Federal, Provincial and Municipal regulations.
- .6 Treat non-reusable materials as hazardous waste and dispose of legally off site.
- .7 Place excess cleaners, thinners, solvents and paint in designated containers and dispose of legally off site.
- .8 Reduce the amount of contaminants entering waterways, sanitary/storm drain systems and into the ground. Adhere to following procedures:
 - .1 Retain cleaning water for water-based materials. Allow sediments to be filtered out. Do not use free-draining water to clean equipment.
 - .2 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
 - .3 Dry empty paint cans prior to disposal or recycling.
 - .4 Close and seal tightly partly used cans of materials including sealant and adhesive containers and store product in well-ventilated fire-safe area at moderate temperature.
- 3.6.8 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling facility.
- 3.6.9 Set aside and protect surplus and uncontaminated finish materials. Deliver to or arrange collection by organizations for verifiable re-use of re-manufacturing.
- 3.6.10 Keep work area free from unnecessary accumulation of tools, equipment, surplus materials, and debris.
- 3.6.11 Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with Federal, Provincial and Municipal regulations.
- 3.6.12 Clean equipment and dispose of wash water used for water borne materials, solvents used for oil based materials as well as cleaning and protective materials, paints, thinners, paint removers/strippers in accordance with Federal, Provincial and Municipal regulations.
- 3.6.13 Clean painting equipment in leak-proof containers that will permit particulate matter to settle out and be collected. Recycle sediment remaining from cleaning operations in accordance with Federal, Provincial and Municipal regulations.
- 3.7 **Hardware Installation**
 - 3.7.1 Clean and re-install hardware items removed and stored previous to commencement of the Work.
 - 3.7.2 Re-install hardware items in original locations.
- 3.8 **Protection**
 - 3.8.1 Protect freshly completed surfaces from paint droppings and dust. Avoid scuffing newly applied paint.
 - 3.8.2 Remove paint splashings on exposed surfaces. Remove smears and spatter immediately as operations progress, using compatible solvent.
 - 3.8.3 Protect completed work from paint droppings. Use non-staining coverings.

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- 3.8.4 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Consultant.
- 3.8.5 Remove protective coverings and warning signs as soon as practical after operations cease.

END OF SECTION

1. GENERAL

1.1. Related Requirements

1.1.1 Section 32 92 23 - Sodding.

1.2. Action and Informational Submittals

1.2.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

1.3. Existing Conditions

1.3.1 Known underground and surface utility lines and buried objects are as indicated on site plan.

2. PRODUCTS

2.4. Materials

2.4.1 Fill material: Site or imported material containing no organic or foreign matter, and which the subcontractor can demonstrate is compactable to a density of 98% SPMDD.

2.4.2 Excavated or graded material existing on site suitable to use as fill for grading work if approved by Consultant.

3. EXECUTION

3.5. Examination

3.5.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for rough grading installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate in presence of Consultant.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.6. Stripping of Topsoil

3.6.1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected as determined by Consultant.

3.6.2 Commence topsoil stripping of areas as indicated by Consultant after area has been cleared of brush weeds and grasses and removed from site.

3.6.3 Strip topsoil to depths as indicated by Consultant. Rototill weeds and grasses and retain as topsoil on site. Avoid mixing topsoil with subsoil.

3.6.4 Stockpile in locations as indicated directed by Consultant. Stockpile height not to exceed 2 m.

3.6.5 Dispose of unused topsoil to location off site.

3.7. Grading

3.7.1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.

3.7.2 Rough grade to following depths below finish grades:

- .1 150 mm for grassed areas.
- .2 400 mm for gravel paving.

3.7.3 Slope rough grade away from building as indicated in Contract Documents

3.7.4 Grade ditches to depth required for maximum run-off as indicated as directed.

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

3.7.6 Compact filled and disturbed areas to corrected maximum dry density maximum dry density to ASTM D 698, as follows:

- .1 85 % under landscaped areas.
- .2 95 % under paved and walk areas.

3.7.7 Do not disturb soil within branch spread of trees or shrubs to remain.

3.8. Testing

3.8.1 Inspection and testing of soil compaction will be carried out by testing laboratory designated by ULC. Costs of tests will be paid under a Cash Allowance by Owner Consultant.

3.8.2 Submit testing procedure, frequency of tests, testing laboratory as designated by ULC or certified testing personnel to Consultant for approval review.

3.9. Cleaning

3.9.1 Progress Cleaning:

- .1 Leave Work area clean at end of each day.

3.9.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment

3.9.3 Waste Management:

- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.10. Protection

3.10.1 Protect and transplant existing museum objects, landscaping , natural features , bench marks , buildings , pavement , surface or underground utility lines which are to remain as directed by Consultant. If damaged, restore to original or better condition unless directed otherwise.

3.10.2 Maintain access roads to prevent accumulation of construction related debris on roads.

END OF SECTION

1. GENERAL

1.1. Related Requirements

- 1.1.1 Section 31 22 13 Site Grading.

1.2. Reference Standards

- 1.2.1 Canadian Society of Landscape Architects (CSLA) / Canadian Nursery Landscape Association (CNLA)
- .1 Canadian Landscape Standard 2016, First Edition
 - .2 Canadian Nursery Stock Standard 2017, Ninth Edition

1.3. Administrative Requirements

- 1.3.1 Scheduling:
- .1 Schedule sod laying and/or seeding to coincide with preparation of soil surface.
 - .2 Schedule sod/seed installation when frost is not present in ground.

1.4. Action and Informational Submittals

- 1.4.1 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for sod, geotextile and fertilizer and include product characteristics, performance criteria, physical size, finish and limitations.
- 1.4.2 Samples.
- .1 Submit:
 - .1 Sod for each type specified.
 - .1 Install approved samples in one 1 m² mock-ups and maintain in accordance with maintenance requirements during establishment period.
 - .2 Bio-degradable geotextile fabric.
 - .3 0.5 kg container of each type of fertilizer used.
 - .2 Obtain approval of samples by Consultant.
- 1.4.3 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements of seed mix, seed purity, and sod quality.
- 1.4.4 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties of seed mix, seed purity, and sod quality.

1.5. Quality Assurance

- 1.5.1 Qualifications: Provide proof of qualifications when requested by Consultant.
- 1.5.2 Contractor Qualifications:
- .1 Landscape Contractor: to be a Member in Good Standing of International Society of Arboriculture Canadian Nursery Landscape Association BC Landscape Nursery Association (BCLNA) Landscape Alberta Nursery Trades Association (LANTA)

- Landscape Saskatchewan Green for Life (LS) Manitoba Nursery Landscape Association (MNLA) Landscape Ontario Green for Life (LO) Landscape New Brunswick Green for Life (LNB) Landscape PEI Green for Life (LPEI) Landscape Nova Scotia Green for Life (LNS) Landscape Newfoundland Green for Life (LNL).
- .2 Landscape Sodding Supervisor: Landscape Horticulturist Journeyperson or Landscape Industry Certified Technician with Softscape Installation designation or equivalent.
 - .3 Landscape Maintenance Supervisor: Landscape Horticulturist Journeyperson or Landscape Industry Certified Technician with Turf Maintenance designation or equivalent.

1.6. Delivery, Storage and Handling

- 1.6.1 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- 1.6.2 Storage and Handling Requirements:
 - .1 Store materials in accordance with supplier's recommendations.
 - .2 Replace defective or damaged materials with new.
- 1.6.3 For palletized sod products:
 - .1 Sod shall not be dumped or dropped from vehicle.
 - .2 Provide wind protection measures to protect sod during transportation against wind exposure and to prevent drying.
 - .3 Ensure sod freshness and healthy conditions when they arrive on site.
 - .4 Provide weather protection measures as required to keep sod fresh and moist, if installation is to be delayed.
 - .5 During the growing season, and where feasible, sod should be delivered to the site within 36 hours of harvest, and be installed within 24 hours of delivery.
 - .6 Allow sod to dry sufficiently after becoming water logged to prevent tearing or damage during handling.
- 1.6.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials

2. PRODUCTS

2.7. Materials

- 2.7.1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.
 - .1 Turf Grass Nursery Sod types:
 - .1 Number One Kentucky Bluegrass Sod: Nursery Sod grown solely from seed of cultivars of Kentucky Bluegrass, containing not less than 50% Kentucky Bluegrass cultivars.
 - .2 Number One Kentucky Bluegrass Sod - Fescue Sod: Nursery Sod grown solely from seed mixture of cultivars of Kentucky Bluegrass and Chewing Fescue or Creeping Red Fescue, containing not less than 40% Kentucky Bluegrass cultivars and 30% Chewing Fescue or Creeping Red Fescue cultivars.
 - .3 Number One Named Cultivars: Nursery Sod grown from certified seed.

- .2 Turf Grass Nursery Sod quality:
 - .1 Not more than 1 broadleaf weed and up to 1% native grasses per 40 m².
 - .2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.
 - .3 Mowing height limit: 35 to 65 mm.
 - .4 Soil portion of sod: 6 to 15 mm in thickness.
- 2.7.2 Commercial Grade Turf Grass Nursery:
 - .1 Mow sod at height directed by Consultant within 36 hours before lifting, and remove clippings.
 - .2 Not more than 5 broadleaf weeds and up to 20% native grasses per 40 m².
- 2.7.3 Sod establishment support:
 - .1 Geotextile fabric: biodegradable.
 - .2 Wooden pegs: 17 x 8 x 200 mm.
 - .3 Biodegradable starch pegs: 17 x 8 x 200 mm.
- 2.7.4 Water:
 - .1 Supplied by Owner Consultant at designated source.
 - .2 Free of impurities that would inhibit plant growth.
- 2.7.5 Fertilizer:
 - .1 To Canada "Fertilizers Act" and Fertilizers Regulations.
 - .2 Complete, synthetic, slow release with 65 % of nitrogen content in water-insoluble form.

2.8. Source Quality Control

- 2.8.1 Obtain written approval from Consultant of sod at source.
- 2.8.2 When proposed source of sod is approved, use no other source without written authorization from Consultant.

3. EXECUTION

3.9. Examination

- 3.9.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sod installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Consultant.
 - .2 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.10. Preparation

- 3.10.1 Verify that grades are correct and prepared in accordance with Section 31 22 13 Site Grading. If discrepancies occur, notify Consultant and commence work when instructed by Consultant.

- 3.10.2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.
- 3.10.3 Fine grade surface free of humps and hollows to smooth, even grade, to contours and elevations indicated, to tolerance of plus or minus 8 mm, for Turf Grass Nursery Sod and plus or minus 15 mm for Commercial Grade Turf Grass Nursery, surface to drain naturally.
- 3.10.4 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials.

3.11. Sod Placement

- 3.11.1 Lay sod during active growing season for type of sod. Laying sod during dry, freezing, or over frozen soil is unacceptable.
- 3.11.2 If growing medium surface is dry, it shall be lightly moistened immediately before laying sod.
- 3.11.3 Lay sod flush with adjoining grass areas, paving and top surface of curbs, unless shown otherwise on the drawings.
- 3.11.4 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.
- 3.11.5 Lay sod sections in rows, joints staggered (a minimum of 25 cm). Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

3.12. Sod Placement on Slopes and Pegging

- 3.12.1 Install and secure geotextile fabric in areas indicated, in accordance with manufacturer's instructions.
- 3.12.2 Erosion control mesh/netting shall be installed in sodded areas where required, and secured with stakes or staples set to a minimum depth of 15 cm.
- 3.12.3 Start laying sod at bottom of slopes.
- 3.12.4 Peg sod on slopes steeper than three (3) horizontal to one (1) vertical, within one (1) m of catch basins and within one (1) m of drainage channels and ditches to following pattern:
 - .1 100 mm below top edge at 200 mm on centre for first sod sections along contours of slopes.
 - .2 Not less than 3-6 pegs per square metre.
 - .3 Not less than 6-9 pegs per square metre in drainage structures. Adjust pattern as directed by Consultant.
 - .4 Drive pegs to 20 mm above soil surface of sod sections.

3.13. Cleaning

- 3.13.1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
 - .2 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.

- 3.13.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment
 - .1 Clean and reinstate areas affected by Work.
- 3.13.3 Waste Management: separate waste materials for reuse compost and recycling
 - .1 Remove recycling and compost containers and bins from site and dispose of materials at appropriate facility.
 - .2 Divert unused fertilizer from landfill to official hazardous material collections site approved by Consultant.

3.14. Protection Barriers

- 3.14.1 Protect newly sodded areas from deterioration with snow fence on rigid frame as directed by Consultant.
- 3.14.2 Remove protection two (2) weeks after installation after inspection as directed by Consultant.
- 3.14.3 Maintain fencing protective measures in good conditions until acceptance by Consultant.

3.15. Maintenance During Establishment Period

- 3.15.1 Perform following operations from time of installation until acceptance.
 - .1 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.
 - .2 Cut grass to 50 mm when or before it reaching height of 75 mm.
 - .3 Maintain sodded areas weed free 95%.
 - .4 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water it well.
 - .5 Temporary barriers or signage to be maintained where required to protect newly established sod.

3.16. Acceptance

- 3.16.1 Turf Grass Nursery Sod areas will be accepted by Consultant provided that:
 - .1 Sodded areas are properly established.
 - .2 Sod is free of bare and dead spots.
 - .3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 50 mm.
 - .4 Sodded areas have been cut minimum 2 times before acceptance.
- 3.16.2 Sodded Commercial Grade Turf Grass Nursery Sod areas will be accepted by Consultant provided that:
 - .1 Sodded areas are properly established.
 - .2 Extent of surface soil visible when grass has been cut to height of 60 mm is acceptable.
 - .3 Sod is free of bare or dead spots and extent of weeds apparent in grass is acceptable.
 - .4 Sodded areas have been cut minimum 2 times before acceptance.
 - .5 Fertilizing in accordance with fertilizer program has been carried out at least once.
- 3.16.3 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

- 3.16.4 When environmental conditions allow, all sodded areas showing shrinkage cracks shall be top-dressed and seeded with a seed mix matching the original.

3.17. Maintenance During Warranty Period

- 3.17.1 Perform following operations from time of acceptance until end of warranty period:
- .1 Water sodded Turf Grass Nursery Sod and Commercial Grade Turf Grass Nursery Sod areas at weekly intervals to obtain optimum soil moisture conditions to depth of 100 mm.
- 3.17.2 Repair and resod dead or bare spots to satisfaction of Consultant.
- 3.17.3 Cut grass and remove clippings that will smother grass as directed by Consultant to height as follows:
- .1 Turf Grass Nursery Sod:
 - .1 50 mm during normal growing conditions.
 - .2 Commercial Grade Turf Grass Nursery Sod:
 - .1 60 mm during normal growing conditions.
 - .3 Cut grass at 2 week intervals or as directed by Consultant, but at intervals so that approximately one third of growth is removed in single cut.
 - .4 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water it well.
 - .5 Eliminate weeds by mechanical or chemical means to extent acceptable to Consultant.

3.18. Closeout Activities

- 3.18.1 Submit sodded areas maintenance reports for review by Consultant.

END OF SECTION