

**PROJECT MANUAL**

**Fort George Powder Magazine Envelope Repairs**

**ISSUED FOR TENDER**

**SPECIFICATIONS**

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**PART 1 GENERAL**

**1.01 ARCHITECT AND PRIME CONSULTANT**

- .1 Specifications sealed for Architectural Work in Sections as listed below:
  - .1 Section 01 00 10 – General Instructions
  - .2 Section 01 14 00 – Work Restrictions
  - .3 Section 01 32 16 – Construction Progress Schedule (CPM)
  - .4 Section 01 33 00 – Submittal Procedures
  - .5 Section 01 35 29 – Health and Safety Requirements
  - .6 Section 01 35 91 – Heritage Protective Measures
  - .7 Section 01 50 01 – Scaffolding and Enclosures
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  - .11 Section 01 61 00 – Common Product Requirements
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  - .28 Section 09 03 52 – Historic – Plaster Consolidation
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  - .30 Section 09 03 91.23 – Historic – Interior Painting
  - .31 Section 09 21 16 – Gypsum Board Assemblies



**PART 2      PRODUCTS**

**2.01      NOT USED**

**PART 3      EXECUTION**

**3.01      NOT USED**

**PART 1 GENERAL**

**1.01 MINIMUM STANDARDS**

- .1 Materials shall be new and work shall conform to the minimum applicable standards of the Canadian General Standards Board, the Canadian Standards Association, the most recent edition of the National Building Code of Canada (NBC) and all applicable Provincial and Municipal codes. In the case of conflict or discrepancy the most stringent requirement shall apply.

**1.02 TAXES**

- .1 Pay all taxes properly levied by law (including Federal, Provincial and Municipal).

**1.03 FEES, PERMITS, AND CERTIFICATES**

- .1 Pay all fees and obtain all permits. Provide authorities with plans and information for acceptance certificates. Provide inspection certificates as evidence that work conforms to requirements of Authority having jurisdiction.

**1.04 SPECIAL REQUIREMENTS**

- .1 Submit schedule in accordance with Section 01 32 16 Construction Progress Schedule (CPM).
- .2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .3 Submit execution plan prior to start of work indicating, but not limited to, the work plan and methodologies, sequence of work, tools and materials, heritage protection, and safety plan.

**1.05 FIRE SAFETY REQUIREMENTS**

- .1 Comply with the most recent editions of National Building Code of Canada (NBC) for fire safety in construction and the National Fire Code of Canada (NFC) for fire prevention, firefighting and life safety in building in use.
- .2 Welding and cutting:
  - .1 Before welding, soldering, grinding and/or cutting work, obtain a permit as directed by the Departmental Representative. Store flammable liquids in approved CSA containers inspected by the Fire Prevention Unit. No open flame shall be used unless authorized by the Fire Prevention Unit.
  - .2 At least 48 hours prior to commencing cutting, welding or soldering procedure, provide to Departmental Representative:
    - .1 Notice of intent, indicating devices affected, time and duration of isolation or bypass.
    - .2 Completed Hot Work Permit
    - .3 Return welding permit to Departmental Representative immediately upon completion of procedures for which permit was issued.

- .4 A fire watcher shall be assigned when welding or cutting operations are carried out in areas where combustible materials within 10m may be ignited by conduction or radiation.
- .3 Store flammable liquids in approved in CSA containers inspected by the Fire Prevention Unit. No open flame is to be used unless authorized by the Fire Prevention Unit.
- .3 Burning rubbish or any construction product or waste material is not permitted.

#### **1.06 FIELD QUALITY CONTROL**

- .1 Carry out Work using qualified licenced workers or apprentices in accordance with Provincial Act respecting manpower vocational training and qualification.
- .2 Permit employees registered in Provincial apprenticeship program to perform specific tasks only if under direct supervision of qualified licenced workers.
- .3 Determine permitted activities and tasks by apprentices, based on level of training attended and demonstration of ability to perform specific duties.

#### **1.07 REMOVED MATERIALS**

- .1 Unless otherwise specified or directed by Departmental Representative, materials for removal become the Contractor's property and shall be taken from site.
- .2 Immediately take removed materials from site. Leave no build-up of removed materials on site.
- .3 Prepare salvaged and removed materials by loading onto pallets and securely strapping. . Cover and prevent damage and deterioration during storage on site and transport.
- .4 Store salvaged material on site where directed by Departmental Representative and/or provide transport to location as directed by Departmental Representative.
- .5 Provide transport for items removed from site to be restored or worked on in shop.

#### **1.08 QUALITY ASSURANCE**

- .1 Fort George is a National Historic Site. All construction activities must be managed, sequenced, planned and executed in order to ensure the preservation of its specific characteristics, in accordance with Section 01 35 91 – Heritage Protective Measures.
- .2 Rejected Work
  - .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
  - .2 Make good other Contractor's work damaged by such removals or replacements promptly.
  - .3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

**1.09 PROTECTION**

- .1 Protect finished work against damage until take-over.
- .2 Protect adjacent work against the spread of dust and dirt beyond the work areas.
- .3 Protect interior areas adjacent to work. Coordinate the displacement of any furniture and equipment with Departmental Representative. Reinstall all displaced furniture and equipment once the work is complete.
- .4 Protect operatives and other users of site from all hazards.
- .5 Refer to Section 01 35 91 – Heritage Protective Measures and to Section 01 56 00 – Temporary Barriers and Enclosures for exterior and interior protection.

**1.10 CUT, PATCH AND MAKE GOOD**

- .1 Cut existing surfaces as required to accommodate new work.
- .2 Remove all items so shown or specified.
- .3 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish and texture.

**1.11 EXAMINATION**

- .1 Examine site and conditions likely to affect work and be familiar and conversant with existing conditions.
- .2 Prior to undertaking any on-site work, provide high resolution digital photographs of surrounding properties, objects and structures liable to be damaged by the work of the Contract, or be the subject of subsequent claims. Carry out a joint inspection with the Departmental Representative.
- .3 All documentation will serve as a benchmark on existing conditions. Provide a written report together with progress photographs every two months on existing conditions for the Departmental Representative's review and comment.

**1.12 ACCESS AND EGRESS**

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, ramps or ladders, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.
- .2 Keep within limits of work access and egress routes. Review proposed routes with Departmental Representative.

**1.13 GUARANTEES AND WARRANTIES**

- .1 Before completion of work collect all manufacturer's guarantees and warranties and deposit with Departmental Representative.

**1.14 BUILDING SMOKING ENVIRONMENT**

- .1 Smoking is not permitted on property.

**1.15 WASTE MANAGEMENT AND DISPOSAL**

- .1 Comply with the Environmental Protection Act, Ontario Regulations O.Reg. 102/94 and O. Reg. 103/94 for waste management program on construction and demolition projects.

- .2 Comply with the Canadian Environmental Protection Act, 1999.
- .3 Conduct "waste audit" to determine waste generated during demolition or construction operations, prepare written "waste reduction work plan" and implement procedures to reduce, reuse and recycle materials to the extent possible.
- .4 Provide a "source separation program" to disassemble and collect in an orderly fashion the following "materials designated for alternative disposal" from the "general waste" stream.
  - .1 cardboard (corrugated).
  - .2 steel.
  - .3 wood (not including treated or laminated wood).
- .5 Separate wood waste in designated areas in the following categories for recycling: Solid wood/softwood/hardwood, treated, painted, or contaminated wood, sheet materials, off-cuts.
- .6 Do not burn scrap at the project site.
- .7 Fold up sheet metal, flatten, and place in designated area for recycling.
  - .1 Unused or damaged masonry materials must be diverted from landfill to a local facility as authorized to receive the material.
- .8 Waste Management and Disposal for painting:
  - .1 Separate waste materials for recycling.
  - .2 Paint, stain and wood preservative finishes and related materials are hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.
  - .3 Materials that cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
  - .4 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
  - .5 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground the following procedures shall be strictly adhered to:
    - .1 Retain cleaning water for water-based materials to allow sediments to be filtered out. In no case shall equipment be cleaned using free draining water.
    - .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
    - .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
    - .4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
    - .5 Empty paint cans are to be dry prior to disposal or recycling (where available).

- .6 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.
- .9 Submit complete records of all removals from site for both "materials designated for alternative disposal" and "general waste" including:
  - .1 Time and date of removal
  - .2 Description of material and quantities.
  - .3 Proof that materials have been received at an Approved Waste Processing Site or certified Waste Disposal Site as required.
  - .4 Certificates: Submit copies of certified weigh bills receipts from authorized disposal sites and reuse and recycling facilities for material removed from site upon request of Departmental Representative.
- .10 Provide and use clearly marked separate bins for recycling.

#### **1.16 SCHEDULING**

- .1 On award of contract submit bar chart construction schedule for work, indicating anticipated progress stages within time of completion. When schedule has been reviewed by the Departmental Representative, take necessary measures to complete work within scheduled time. Do not change schedule without notifying Departmental Representative.
- .2 Provide a separate two-week look-ahead schedule, based on the detailed project schedule, to show the advancement of work. Submit an updated two-week look-ahead schedule, every other week, 48 hours prior to the project progress meeting.
- .3 Carry out work during "regular hours" Monday to Friday from 08:00 to 17:00 hours. Notify Departmental Representative at least 24 hours prior to carrying out work beyond these hours.
- .4 Pre-Construction Conference
  - .1 One week prior to scheduled start of work of this Section the following parties will attend a site meeting: Project Construction Manager, Departmental Representative, prequalified trades, materials manufacturer / supplier and representatives of other entities directly concerned with Work of this Section.
  - .2 The purpose of the meeting will be to review all pertinent details and specifications, noting any potential problems and making any changes, deletions or additions as deemed necessary. The meeting will address the following:
    - .1 Verify Project requirements.
    - .2 Review installation and substrate conditions.
    - .3 Coordination with other trades.
    - .4 Availability of materials.
    - .5 Submittal requirements.
    - .6 Scheduling.
    - .7 Additional items relating to the Work.
  - .3 Attendees will also inspect the worksite and review condition of site and substrates, protection requirements, determine where mock-ups will be prepared and where or how other requirements such as lighting, heating and ventilation will be implemented.

**1.17 COST BREAKDOWN**

- .1 Before submitting first progress claim submit breakdown of Contract Amount in detail as directed by Departmental Representative and aggregating the Contract Amount. After approval by Departmental Representative cost breakdown will be used as the basis of progress payments.

**PART 2 PRODUCTS**

**2.01 NOT USED**

**PART 3 EXECUTION**

**3.01 NOT USED**

**END OF SECTION**

**Part 1            General**

**1.1                SECTION INCLUDES**

- .1      Title and description of Work.
- .2      Contract Method.
- .3      Work by others.
- .4      Contract Method
- .5      Work sequence.
- .6      Contractor use of premises.
- .7      Owner occupancy.
- .8      Partial Owner occupancy.
- .9      Owner furnished items.
- .10     Pre-Ordered Products

**1.2                WORK COVERED BY CONTRACT DOCUMENTS**

- .1      Work of this Contract comprises or masonry repair, restoration and roof installation of the stone powder magazine, located at Fort George National Historic Site of Canada at 51 Queens Parade, Niagara-on-the-Lake, Ontario Canada.

**1.3                CONTRACT METHOD**

- .1      Construct Work under stipulated price contract.

**1.4                COST BREAKDOWN**

- .1      Within 4 Days of acceptance of bid submit a list of subcontractors.

**1.5                Work sequence**

- .1      Construct Work in stages to accommodate Owner's continued use of premises during construction.
- .2      Coordinate Progress Schedule and coordinate with Owner Occupancy during construction.
- .3      Construct Work in stages to provide for continuous public usage. Do not close off public usage of facilities until use of one stage of Work will provide alternate usage.
- .4      Maintain fire access/control.

**1.6                CONTRACTOR USE OF PREMISES**

- .1      Coordinate use of premises under direction of Departmental Representative.

- .2 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

#### **1.7 OWNER OCCUPANCY**

- .1 Cooperate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

#### **1.8 PRE-ORDERED PRODUCTS**

- .1 Contractor responsibility for purchase, handling, and installation for pre-ordered products is same as for other Contractor-finished products.

#### **1.9 EXISTING SERVICES**

- .1 Construct barriers in accordance with Section 01 56 00 – Temporary Barriers and Enclosures.

#### **1.10 RELICS AND ATTIQUITIES**

- .1 Buried artifacts, the remains and evidence of ancient persons and peoples, and any objects of historic value and worth remain the property of the Crown. Any and all such objects shall be protected and immediately brought to the knowledge or attention of the Departmental Representative.
- .2 Archaeologists may be on site to monitor work to ensure no archaeological resources are damaged. Advise Departmental Representative and receive direction regarding protection of such resources should any be discovered by either archaeology or the contractor. The contractor could be directed to stop work on the area and redirect work elsewhere until the issue is resolved to the satisfaction of the Departmental Representative.

#### **1.11 DOCUMENTS REQUIRED**

- .1 Maintain at the job site, one copy of each document follows:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Reviewed Shop Drawings
  - .5 List of Outstanding Shop Drawings.
  - .6 Change Orders.
  - .7 Other Modifications to Contract.
  - .8 Field Test Reports.
  - .9 Copy of Approved Work Schedule.
  - .10 Health and Safety Plan and Other Safety Related Documents.

**Part 2          Products**

**2.1                NOT USED**

.1          Not Used.

**Part 3          Execution**

**3.1                NOT USED**

.1          Not Used.

**END OF SECTION**

**PART 1 GENERAL**

**1.01 HERITAGE SIGNIFICANCE**

- .1 Fort George National Historic Site is a site of National significance and should be treated as such. Contractor to take whatever steps required to protect from damage to all heritage elements of the site not directly related to this work.
- .2 Fort George Powder Magazine is a Certified Federal Heritage Building. Contractor to ensure all subcontractors and trades employed are aware of the buildings' heritage recognitions and heritage requirements.

**1.02 WORK BY OTHERS**

- .1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from Departmental Representative.
- .2 Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Departmental Representative, in writing, any defects which may interfere with proper execution of Work.

**1.03 WORK SCHEDULING**

- .1 Co-ordinate use of premises under direction of Departmental Representative.
- .2 Fort George Powder Magazine will be closed to the public; however the site is open - visitors will be present on the grounds and around the site.
- .3 Schedule Work to provide for continuous usage. Do not close off usage of facilities until use of one stage of Work will provide alternate usage.
- .4 Coordinate site access with Departmental Representative.
- .5 Construction operations that will generate noise must be carried out between Monday to Friday, hours as per municipal by-laws to regulate noise.
- .6<sup>1</sup> Construction operations while the building is occupied:
  - A disturbance is caused by disruptive work creating vibrations, impacts, noise, dust, fumes or unsightly condition; perceptible to building occupants. The Contractor may be required to cease work for limited periods of time.
- .7 Crane work including delivery and removal to be coordinated with the Departmental Representative.
- .8 Work requiring the obstruction of roads or obstruction of building access/egress to be coordinated with Departmental Representative.

**1.04 SE OF SITE AND FACILITIES**

- .1 Execute work with least possible interference or disturbance to the normal use of premises.
- .2 All site staging must be coordinated and signed off by the Departmental Representative prior to any mobilization on site.
- .3 The Fort George site will be occupied and operational during the construction period.

- .4 For work located within the building, areas must be returned to a safe working environment and thoroughly cleaned after each shift.
- .5 Refer to drawings for permitted use of spaces outside the building. Provide storage as specified in Section 01 52 00 - Construction Facilities.
- .6 Contain deliveries to southeast access gate – refer to drawings. Ensure that the entrance and all access areas are protected as per section 01 35 91 – Heritage Protective Measures.
- .7 Ensure that site personnel become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .8 Where security is reduced by work provide temporary means to maintain security.
- .9 Closures: Protect work temporarily until permanent enclosures completed.
- .10 Any work requiring access to the interior of the building not within scope of work must be coordinated with Departmental Representative.

**1.05 FIRE ROUTE**

- .1 Maintain fire access to property and building, including overhead clearances for use by emergency response vehicles, as directed by Departmental Representative.

**1.06 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY**

- .1 Protect surrounding private and public property from damage during performance of Work. Be responsible for damage incurred.

**1.07 ACCESS TO SITE**

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work. Make good any damage directly related to work activity at no cost to owner.
- .2 Maintain pedestrian access as much as possible around the building, complete with signs. Should this not be possible, provide plan to mitigate the impact to the Departmental Representative.
- .3 Protect travelling public from damage to person and property.

**1.08 DUST CONTROL**

- .1 Refer to Section 01 56 00 – Temporary Barriers and Enclosures.

**1.09 TRAFFIC MANAGEMENT PLAN**

- .1 .1 Access to the Construction Site will be strictly enforced by the Departmental Representative. Maintain access to the Construction Site as indicated and as approved by the Departmental Representative.
- .2 Obtain required permits for road and sidewalk closures for crane and site access. Verify adequacy of existing roads and allowable load limit on these roads. Contractor is responsible for repair of damage to roads caused by construction operations.  
Maintain designated exterior access routes for the duration of the project and make good damage resulting from use for construction purposes. Clean

deposited mud and other debris from surfaces of roads within one hour after its deposition. Immediately thereafter wash down roads and routes to completely remove all traces of soiling to the satisfaction of the Departmental Representative.

Maintain dust control on roadways to ensure safe operation at all times and to approval of the Departmental Representative.

- .2 Arrange delivery of large or heavy or oversized materials using the smallest possible vehicles.
- .3 Accompany vehicles over 10 Tonne gross vehicle weight, with flagmen.
- .4 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.
- .5 Instruct drivers of vehicles associated with the Work to exercise care, patience and courtesy when driving around the site. Give right-of-way to pedestrians and exercise extreme care when vehicles commence motion in any direction.
- .6 Shut down vehicles and machinery when inactive, to reduce noise and generation of fumes.

#### **1.10 DELIVERY SCHEDULING**

- .1 Establish and provide to the Departmental Representative, a written schedule for all deliveries to the Construction Site. Update delivery schedule on a weekly basis or more frequently as directed by the Departmental Representative.
- .2 Schedule deliveries and removals to minimize vehicle waiting time on site or adjacent areas.
- .3 Schedule all deliveries with the Departmental Representative. Comply with all procedures and security requirements as directed by the Departmental Representative.
- .4 Provide 48 hours' notice to Departmental Representative for major deliveries, with the exception of deliveries or removals using articulated tractor trailers or vehicles with large or heavy items, to be scheduled and approved by the Departmental Representative a minimum of 5 business days in advance.
- .5 Materials must be delivered to the designated loading area, unloaded and immediately transported to the designated materials storage area. Do not allow materials or equipment to remain in the vicinity of the loading area.

#### **1.11 ACCESS AND EGRESS**

- .1 Use of existing stairs and entrances by site personnel for construction purposes, unless indicated otherwise, is strictly forbidden.
- .2 Refer to drawings for access routes to the building and to Section 01 35 91 – Heritage Protective Measures. Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.
- .3 Keep within limits of work avenues of access and egress.

- .4 Refer to Section 01 56 00 - Temporary Barriers and Enclosures.

**1.12 EXISTING SERVICES**

- .1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Provide Departmental Representative a minimum of 10 business days' notice if a building system shutdown is required (electrical). Minimize duration of interruptions.
- .3 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.
- .4 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .5 Provide temporary services when directed by Departmental Representative to maintain critical building systems.
- .6 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .7 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .8 Record locations of maintained, re-routed and abandoned service lines.
- .9 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

**1.13 DOCUMENTS REQUIRED**

- .1 .1 Maintain at job site, one copy each document as follows:
  - .2 Contract Drawings.
  - .3 Specifications.
  - .4 Addenda.
  - .5 Reviewed Shop Drawings.
  - .6 List of Outstanding Shop Drawings.
  - .7 Change Orders.
  - .9 Other Modifications to Contract.
  - .11 Site Instructions / Field Clarifications.
  - .12 Field Test Reports.
  - .13 Copy of Approved Work Schedule.  
Health and Safety Plan and Other Safety Related Documents.  
Environmental Protection Plan  
Other documents as specified.

**PART 2      PRODUCTS**

**2.01      NOT USED**

**PART 3      EXECUTION**

**3.01      NOT USED**

**END OF SECTION**

**PART 1 GENERAL**

**1.01 ADMINISTRATIVE**

- .1 Submit to Departmental Representative a log of submittals for review prior to the start of work. Update submittal log and submit to Departmental Representative 24 hours before each bi-weekly Project Meeting.
- .2 Within 10 days after date of award of contract, submit list of submittal items. Include:
  - .1 Project title and number.
  - .2 Expected date of submittal item.
  - .3 Description of items to be submitted; e.g.: shop drawings, test reports, samples.
  - .4 Specification section number/title.
- .3 Submit to Departmental Representative submittals promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .4 Do not proceed with Work affected by submittal until review is complete.
- .5 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .6 Where items or information is not produced in SI Metric units converted values are acceptable.
- .7 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .8 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .9 Verify field measurements and affected adjacent Work are co-ordinated.
- .10 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .11 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .12 Keep one reviewed copy of each submission on site.

**1.02 SHOP DRAWINGS AND PRODUCT DATA**

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion

of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

- .4 Allow 5 working days for Departmental Representative's review of each submission.
- .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, Submissions without transmittal letters will be returned without being examined and must be considered rejected. Include:
  - .1 Date.
  - .2 Project title and number.
  - .3 Contractor's name and address.
  - .4 Identification and quantity of each shop drawing, product data and sample.
  - .5 Other pertinent data.
- .8 Submissions include:
  - .1 Date and revision dates.
  - .2 Project title and number.
  - .3 Name and address of:
    - .1 Subcontractor.
    - .2 Supplier.
    - .3 Manufacturer.
  - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
  - .5 Details of appropriate portions of Work as applicable:
    - .1 Fabrication.
    - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
    - .3 Setting or erection details.
    - .4 Capacities.
    - .5 Performance characteristics.
    - .6 Standards.
    - .7 Operating weight.
    - .8 Wiring diagrams.
    - .9 Single line and schematic diagrams.
    - .10 Relationship to adjacent work.

- .9 After Departmental Representative's review, distribute copies.
- .10 Submit 3 prints and one electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .11 Submit 3 prints and one electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit 3 prints and one electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
  - .2 Testing must have been within 3 years of date of contract award for project.
- .13 Submit 3 prints and one electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
  - .2 Certificates must be dated after award of project contract complete with project name.
- .14 Submit 3 prints and one electronic copy of manufacturer's instructions for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .15 Submit 3 prints and one electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .17 Submit 3 prints and one electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .18 Delete information not applicable to project.
- .19 Supplement standard information to provide details applicable to project.
- .20 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .21 The review of shop drawings is for sole purpose of ascertaining conformance with general concept.
  - .1 This review shall not mean that the Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with

Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

- .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

### **1.03 SAMPLES**

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Departmental Representative's business address.
- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

### **1.04 MOCK-UPS**

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations acceptable to Departmental Representative as specified in specific Section.
- .3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.
- .6 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

### **1.05 PHOTOGRAPHIC DOCUMENTATION**

- .1 Submit electronic copy of colour digital photography in jpg format, fine resolution, organized by date, monthly with progress statement and as directed by Departmental Representative.
  - .1 Photograph quality: well-illuminated, proper exposure, sharply focused, free of glare and motion blur.

- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints: 2 locations.
  - .1 Viewpoints and their location as determined by Departmental Representative.
- .4 Frequency of photographic documentation: weekly as directed by Departmental Representative.
  - .1 Provide a minimum twenty (20) photographs daily of the progress of work.

**PART 2 PRODUCTS**

**2.01 NOT USED**

**PART 3 EXECUTION**

**3.01 NOT USED**

**END OF SECTION**

**PART 1 GENERAL**

**1.01 REFERENCES**

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Safety Data Sheets (SDS).
- .3 Province of Ontario
  - .1 Occupational Health and Safety Act for Construction Projects, R.S.O. 1990, c. 0.1, as amended and O. Reg. 213/91, as amended.

**1.02 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan in an indexed three ring binder: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
  - .1 Results of site specific safety hazard assessment.
  - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
- .3 Submit 3 prints and one electronic copy of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative and or authority having jurisdiction, weekly.
- .4 Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS SDS – Safety Data Sheets to Departmental Representative for all products that will be used during construction. Identify any hazardous products and odour emitting products at time of submission.
- .7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 working days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 3 days after receipt of comments from Departmental Representative. Once revisions complete the Health and Safety Plan binder will be returned to the Contractor for site use.
- .8 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.
- .10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

- .11 Submit proof of training and qualifications of personnel, and alternates, responsible for site health and safety including, but not limited to, the following:
  - .1 Requirements for hazards present on site.
  - .2 Training for use of personal protective equipment.

### **1.03 FILING OF NOTICE**

- .1 File Notice of Project with Provincial authorities prior to beginning of Work.

### **1.04 SAFETY ASSESSMENT**

- .1 Perform site specific safety hazard assessment related to project.

### **1.05 MEETINGS**

- .1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

### **1.06 PROJECT/SITE CONDITIONS**

- .1 Work at site may involve contact with:
  - .1 Silica.
  - .2 Microbiological.
  - .3 Lead.
- .2 Refer also to Section 01 35 43 – Environmental Protection.

### **1.07 GENERAL REQUIREMENTS**

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.
- .3 The contractor will be unable to request extra funding to meet environmental requirements. It is the Contractor's responsibility to be aware of environmental requirements and the best management practices and pollution control measures necessary to meet them.

### **1.08 RESPONSIBILITY**

- .1 Be responsible and assume the role of "Constructor" as described in the Ontario Occupational Health & Safety Act and Regulations for Construction Projects.
- .2 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

### **1.09 COMPLIANCE REQUIREMENTS**

- .1 Comply with Ontario Health and Safety Act and Regulations for Construction Projects, O. Reg. 213/91.
- .2 Comply with NBC 2010 (Part 8, Safety Measures at Construction and Demolition Sites.)
- .3 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.
- .4 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labeling and the provision of Safety Data Sheets (SDS) acceptable to Human Resources Development Canada, Labour Program.

### **1.10 UNFORSEEN HAZARDS**

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

### **1.11 HEALTH AND SAFETY CO-ORDINATOR**

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
  - .1 Have minimum 2 years' site-related working experience specific to activities associated with hazardous materials.
  - .2 Have working knowledge of occupational safety and health regulations.
  - .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
  - .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
  - .5 Be on site during execution of Work and report directly to and be under direction of site supervisor.

### **1.12 POSTING OF DOCUMENTS**

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Departmental Representative.

### **1.13 CORRECTION OF NON-COMPLIANCE**

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

**1.14 POWDER ACTUATED DEVICES**

- .1 Use of powder actuated devices only after receipt of written permission from Departmental Representative.

**1.15 BLASTING**

- .1 Blasting or other use of explosives is not permitted.

**1.16 WORK STOPPAGE**

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.
- .2 Assign responsibility and obligation to Health and Safety Officer to stop or start Work when, at Health and Safety Officer's discretion, it is necessary or advisable for reasons of health or safety. Owner's Representative or Consultant may also stop Work for health and safety considerations.

**PART 2 PRODUCTS**

**2.01 NOT USED**

**PART 3 EXECUTION**

**3.01 NOT USED**

**END OF SECTION**

**PART 1 GENERAL**

**1.01 REFERENCES**

- .1 Federal
  - .1 Statutes of Canada 1999 Chapter 33. "Canadian Environmental Protection Act 1999".
  - .2 "Transportation of Dangerous Goods Act" and pursuant regulations.
  - .3 Revised Statutes of Canada 1985, Chapter F-14. Fisheries Act
- .2 Provincial
  - .1 Ministry of Labour. 2011. Guideline: Lead on Construction Projects.
  - .2 Statutes of Ontario 2000, Chapter 16. "*Technical Standards and Safety Act, 2000*" and pursuant regulations, codes, and standards.
  - .3 Revised Statutes of Ontario 1990, Chapter E.19. "*Environmental Protection Act*".
  - .4 Revised Regulations of Ontario 1990, Regulation 347 "*General—Waste Management*".
- .3 Municipal & Base Standing Orders
  - .1 Municipal Sewer Use By-Law.

**1.02 SUBMITTALS**

- .1 An Environmental Protection Plan to include the following:
  - .1 Spill Response Plan;
  - .2 Waste Transmittals and Transport Schedule;
  - .3 Hazardous Materials Management Plan;
  - .4 Erosion and Sediment Control Plan.

**1.03 DESIGNATED SUBSTANCES**

- .1 In accordance with Section 30 of Ontario's *Occupational Health and Safety Act*, following is a list of designated substances present at the project site:
  - .1 Silica.
  - .2 Microbiological.
  - .3 Lead.
- .2 Disturbances of lead-containing mortar must comply with measures and procedures for working with lead as detailed by the Ontario Ministry of Labour Guideline: Lead on Construction Projects (April 2011).

**1.04 GENERAL**

- .1 Comply with all federal, provincial, and municipal regulatory requirements and guidelines for environmental protection and natural resource conservation, including the References noted above.
- .2 The Work site is subject to inspection by the Departmental Representative, without prior notice.

- .3 Failure to comply with environmental requirements may result in a stop work order or assessment of damages commensurate with repair of damage.
- .4 It is the Contractor's responsibility to be aware of environmental requirements and the best management practices and pollution control measures necessary to meet them.
- .5 Blasting is not permitted.

#### **1.05 FIRES**

- .1 Fires and burning of rubbish are not permitted.

#### **1.06 DISPOSAL OF WASTES – GENERAL**

- .1 Refer to Section 01 00 10 – General Instructions, Waste Management and Disposal.

#### **1.07 HAZARDOUS MATERIALS MANAGEMENT**

- .1 Submit a hazardous materials management plan ("the Plan") to the Departmental Representative before construction work begins at the site.
- .2 The Plan is to encompass both hazardous materials used in the course of the work, and hazardous materials waste.
- .3 The Plan is to comply with legislation, best practices, and with the requirements of the specifications.
- .4 Provide evidence in the Plan that all proposed transport methods, temporary storage procedures, and disposal sites are licensed where applicable.
- .5 Include copies of licenses.
- .6 The Plan is to include handling, storage, transportation, disposal, and emergency response. Specific minimum requirements to be addressed are listed below.
  - .1 Handling:
    - .1 All waste products will be placed in suitable containers and labeled clearly.
    - .2 Waste products are to be segregated by commodity and placed in separate containers based on class.
    - .3 Similar waste products are not to be mixed together without prior approval from the Departmental Representative.
    - .4 Waste products are not to be contaminated with foreign materials such as cigarette packages, coffee cups etc.
  - .2 Storage:
    - .1 Store all petroleum, oil, lubricants, and other hazardous materials within secondary containment, or in an appropriate storage building with containment.
    - .2 Store incompatible materials separated to prevent reaction.
  - .3 Transportation:
    - .1 Transportation of hazardous material must be in accordance with the *Transportation of Dangerous Goods Act*, by a licensed hauler and in approved containers.
  - .4 Disposal:

- .1 Shipments that are hazardous waste require a generator number pursuant to Ontario Regulation 347.
  - .1 Coordinate with Departmental Representative so that shipments are reviewed and documented.
  - .2 Provide copies of all manifests to the Departmental Representative.
  - .3 Notify Departmental Representative 5 days prior to the transport of hazardous materials off site.
- .5 Dispose of leachate toxic lead-based paint as hazardous materials complying with legislation on transport and disposal.
- .7 Disposal to Sewers:
  - .1 Disposal to sewers is not permitted.
- .8 Liquid Spill Response
  - .1 Emergency Response:
    - .1 Establish and submit a spill response plan.
    - .2 With respect to liquid spills, provide enough on-site equipment to control for one hour a liquid spill of 100% of any material brought on to—or handled at—the site.
    - .3 The minimum typical on-site spill response equipment required to include spill kit in on-site vehicles and machinery, absorbent pads, absorbent granular, garbage bags and shovels.
    - .4 In the event of a spill, invoke Contractor's spill response plan and make notifications.
    - .5 In the event of a spill into the natural environment, do everything practicable to prevent, eliminate, and ameliorate adverse effects, and to restore the natural environment.
    - .6 Emergency response planning is to include measures to escalate the response in the event of an emergency that exceeds on-site equipment capabilities.
  - .2 Prior to starting work, provide to the Departmental Representative an inventory of hazardous material to be brought to the site, including volume or mass, and Material Safety Data Sheets (MSDS).

**1.08 DRAINAGE**

- .1 Establish and submit to the Departmental Representative an erosion and sediment control (ESC) plan prior to work on-site.
  - .1 Erosion and Sediment Control Plan to identify type and location of erosion and sediment controls to be provided. Include monitoring and reporting requirements to ensure that control measures are in compliance with ESC Plan, Federal, Provincial, and Municipal laws and regulations
  - .2 Comply with the requirements of Ontario Provincial Standard Specification 805 "Construction Specification for Temporary Erosion and Sediment Control Measures", with the exception that berm barriers are not permitted.

- .3 Store any stock piles of soil or fill material at least thirty metres from the water bodies, and protect them with either a heavy duty or light duty sediment barrier constructed in accordance with Ontario Provincial Standard Specification 805 "Construction Specification for Temporary Erosion and Sediment Control Measures", with the exception that berm barriers are not permitted.

#### **1.09 PROTECTION OF STORM DRAINS**

- .1 Protect storm drains against entry by sediment, debris, oil, or chemicals prior to any work on-site and maintain until completion of work.

#### **1.10 POLLUTION PREVENTION – GENERAL**

- .1 If materials are to be transported between sites, prevent any loss of material during transit.
- .2 Cover or wet down dry materials or rubbish to prevent blowing dust and debris.
  - .1 Cover or otherwise contain loose materials that have potential to release airborne particulates during their transport, installation or removal.
- .3 Secure covers on waste bins and dumpsters at the end of each working day so as to prevent unauthorized use.
- .4 Secure covers on waste bins and dumpsters so as to shed rain.

#### **1.11 POLLUTION PREVENTION – AIR**

- .1 Prevent material from sandblasting, saw-cutting, and other operations from contaminating air beyond application area, by providing temporary enclosures.
- .2 Use new or well-maintained heavy equipment and machinery, preferably fitted with muffler/exhaust system baffles, engine covers.
- .3 Comply with operating specifications for heavy equipment and machinery.
- .4 Minimize the operation and idling of vehicles, and avoid operating and idling vehicles and gas-powered equipment during smog advisories.
- .5 Control emissions from equipment and plan to conform to federal, provincial, and municipal requirements.

#### **1.12 INFORMATION PLACARDS**

- .1 These requirements apply to all Contractor-controlled tanker-type vehicles, trailers, bulk containers, or similar, containing liquids whether hazardous or not.
- .2 Display an information placard on all such material and equipment containing liquid products that will be located overnight or longer on property. Provide the following:
  - .1 Contractor's name and address.
  - .2 Contact person and emergency telephone numbers.
  - .3 Liquid contents.
- .3 Post the information placard either on the exterior of the container, or on the dashboard of the vehicle, where applicable.

#### **1.13 NOISE**

- .1 Refer to Section 01 14 00 – Work Restrictions.

**PART 2      PRODUCTS**

**2.01      NOT USED**

**PART 3      PRODUCTS**

**3.01      NOT USED**

**END OF SECTION**

**PART 1 GENERAL**

**1.01 RELATED SECTIONS**

- .1 Section 01 00 10 – General Instructions
- .2 Section 01 14 00 – Work Restrictions
- .3 Section 01 33 00 – Submittal Procedures.
- .4 Section 01 51 00 - Temporary Utilities.
- .5 Section 02 41 13 – Selective Site Demolition.

**1.02 REFERENCES**

- .1 National Fire Protection Association (NFPA), latest edition
  - .1 NFPA 241 - Standard for safeguarding Construction, Alteration, and Demolition Operations.
- .2 Canadian Standards Association (CSA International), latest editions
  - .1 CAN/CSA-S350- Code of Practice for Safety in Demolition of Structures.
  - .2 CSA O80.20, Fire-Retardant Treatment of Lumbering Pressure Processes.
  - .3 CSA O80.27, Fire-Retardant Treatment of Plywood by Pressure Processes.
- .3 Human Resources and Skills Development Canada.
  - .1 FC 301 Standard for Construction Operations
  - .2 FC 302 Standard for Welding and Cutting.
- .4 Parks Canada, latest edition
  - .1 Standards and Guidelines for the Conservation of Historic Places in Canada, published by Parks Canada.

**1.03 PERFORMANCE REQUIREMENTS**

- .1 The Contractor is responsible for any damage to or loss of Heritage Materials and Finishes occurring as a result of site, handling, transport and storage activities.
- .2 Ensure materials, equipment and procedures safely support existing structure and construction live loads;
- .3 Apply methods that minimize the risk of damage to Heritage Materials and Finishes.
- .4 All methods and techniques utilized in the protection of heritage material, or materials that may have an impact on heritage materials, must conform to Heritage Protection requirements of this Section.

**1.04 DEFINITIONS**

- .1 Heritage Materials: Existing materials within scope of work deemed essential to the heritage value of the building. These include, but are not limited to:
  - .1 Exterior Materials
    - .1 Exterior masonry

.2 Copper clad window shutters and door

.2 Heritage Materials: Existing materials not within scope of work, but deemed essential to the heritage value of the building. These include, but are not limited to:

.1 Interior Materials

.1 Interior render work

.2 Interior brick

.3 Interior floors

.4 Interior exhibits (furniture, equipment, signage and displays)

### **1.05 SHOP DRAWINGS**

.1 Submit shop drawings in accordance with Section 01 33 00 – Submittals Procedures.

.2 Submit detailed plans, sections and details of protective barrier assemblies. Show both typical and atypical configurations.

.3 Identify each assembly and locate all items in plan drawings.

.4 Submit Product data specifications for fasteners, waterproofing and soft padding materials used in barrier assemblies.

### **1.06 PROCEDURES**

.1 Submit detailed demolition procedures indicating tools used inside or near heritage areas. Describe additional measures to be implemented to ensure vibration control and protection of heritage fabric.

.2 Submit plan describing procedures to be followed in the event that undocumented or concealed heritage materials systems are discovered.

### **1.07 MOCK-UPS**

.1 Erect mock-ups in-situ for protective measures for each condition containing heritage elements and materials to be protected.

### **1.08 EXISTING CONDITIONS**

.1 Refer to Drawings showing existing conditions.

.2 Before starting work, verify existing conditions and variations from original contract documents and notify Departmental Representative of any discrepancy. Refer also to Section 02 41 13 – Selective Site Demolition.

### **1.09 SCHEDULING**

.1 Heritage Protection may be required at different times for different areas. Inform the Departmental Representative in a timely manner of upcoming milestone reviews as identified in the schedule and work plans.

.2 Once pre-demolition protective measures are completed, advise the Departmental Representative and schedule a visit of the heritage areas and associated facilities for review.

.3 Unless otherwise indicated, all protective barriers shall remain in place for duration of the Contract.

- .4 During the course of the contract, allow for the temporary removal and reinstatement of Heritage Protection as required.
- .5 When work of the Contract is deemed sufficiently complete by Departmental Representative, carefully remove protective barriers for final review. Ensure that all barriers are removed and that view of all previously concealed materials is unobstructed before advising Departmental Representative to begin review.

## **1.10 QUALITY ASSURANCE**

- .1 Perform work in accordance with The Standards and Guidelines for the Conservation of Historic Places in Canada, published by Parks Canada.
- .2 Workers Abilities:
  - .1 Work shall be performed by personnel having experience with heritage restoration work of the type specified and displaying appropriate abilities as demonstrated through mock-ups.
  - .2 Workers shall be specialized in techniques related to the type of heritage material involved.
  - .3 Unless specifically permitted by the Departmental Representative, only accepted procedures and the personnel that performed them during the mock-ups may be utilized to do that procedure throughout the duration of the project.
  - .4 No approved specialized workers shall be changed during the progress of the work without written acceptance by the Departmental Representative.
  - .5 Workers may be trained to perform new tasks, subject to the approval of the Departmental Representative, following additional procedural mock-ups.
- .3 Accepted mock-ups must be maintained, and remain accessible throughout and for the duration of the project. Accepted mock-ups may become part of the final work.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- .1 Ensure that materials used in exterior barriers conform to Section 01 50 0 – Scaffolding and Enclosures.
- .2 Material grades – general
  - .1 Conform to material grades prescribed in the following paragraphs for protective barriers.
  - .2 Lumber: spruce, pine or fir to CAN/CSA-O141, NLGA #2 grade, S4S, moisture content 19% (S-dry) or less. Where pressure treated lumber is required, treat lumber with Alkaline Copper Quaternary to CSA O80-Series.
  - .3 Plywood: exterior grade softwood plywood to CSA O151, thickness as indicated. Where pressure treated plywood is required, treat plywood with Alkaline Copper Quaternary to CSA O80-Series.
  - .4 Acceptable dust, dirt, liquid barriers, including:
    - .1 Vapour-permeable sheeting: made with flashspun high-density polyethylene fibers.
    - .2 6 mil clear construction grade polyethylene film.

- .3 Polyethylene fastening tape compatible with sheeting.
- .5 Acceptable soft padding:
  - .1 Compressible polychloroprene rubber, minimum 25 mm.
  - .2 Polychloroprene rubber foam sheeting, 13 mm thickness.
  - .3 Resilient medium-density closed-cell Polyethylene foam sheeting
  - .4 Low-density extruded polystyrene, minimum 25 mm.
- .6 Accessories:
  - .1 Use only low impact and low vibration fasteners, including bolts with nuts and washers, wood screws, liquid adhesives, adhesive strips or tapes and removable, non-residue adhesive strips and tapes.
  - .2 No high impact attachment systems are permitted, including spikes, nails, staples, explosive actuated fastening devices and masonry anchoring fastener systems.
- .7 Conform to material grades prescribed in the following paragraphs for crating.
  - .1 Lumber: spruce, pine or fir to CAN/CSA-O141, NLGA #2 grade, S4S, moisture content 19% (S-dry) or less.
  - .2 Plywood: exterior grade softwood plywood to CSA O151, thickness as indicated.
  - .3 Soft padding: Heavy craft paper and resilient medium-density closed-cell polyethylene foam sheeting
  - .4 Low-density extruded polystyrene, minimum 25 mm.
  - .5 Use only low impact and low vibration fasteners, including bolts with nuts and washers, wood screws and removable non-residue adhesive strips and tapes.
- .8 Component tags: sheet brass tag with hole at one end, punched with identification number corresponding to labelling method and secured with 300 Series stainless steel wire.

## **PART 3 EXECUTION**

### **3.01 PROTECTIVE MEASURES – GENERAL**

- .1 Provide protective measures for any and all heritage conditions.
- .2 Anchoring or attachment to historic materials:
  - .1 The use of any mechanical fasteners into or onto any heritage material is prohibited.
  - .2 In the event that dust, dirt, and liquid barriers require attachment to historic materials, only non-permanent removable, non-residue adhesive tapes may be used on the heritage material.
  - .3 No other attachments to historic materials are permitted.

### **3.02 PROTECTIVE MEASURES – EXTERIOR**

- .1 Direct attachment of barriers, construction lifts, scaffolds, and debris chutes to the exterior cladding or other heritage materials or construction is prohibited.
- .2 Passage of materials and construction debris through windows and other openings in the masonry-clad facades is not allowed.
- .3 Provide barriers in all locations where exterior walls may be damaged by normal site activities.
- .4 Scaffold netting shall be tightly fastened to scaffolds
  - .1 Resilient and sturdy enough to prevent tools and workers from accidentally damaging the protected masonry façade.
  - .2 Woven tightly enough to prevent passage of small tools and material fragments.

### **3.03 ARCHAEOLOGY MITIGATION MEASURES**

- .1 Construction lay-down areas are to remain within the previously disturbed areas as indicated on the drawings.
- .2 No additional excavations are allowed.
- .3 Chance Find clause:
  - .1 Archaeological testing is by its nature “sampling” (i.e., not 100% coverage). There is a chance, however low, that features and/or artifact concentrations may be encountered post-archaeological-testing. If significant features (e.g., structural remains and/or high artifact concentrations) are encountered, development work should stop in this immediate area, photographs taken, and the Parks Canada project manager informed. Contractor will redirect work force until otherwise directed by project manager. The project manager will then contact Parks Canada’s Terrestrial Archaeology section for advice. An assessment of the significance will determine what will be required to mitigate the chance find.

### **3.04 PROTECTIVE BARRIERS**

- .1 Final design of protective barriers is the responsibility of the Contractor and is subject to review by the Departmental Representative.

### **3.05 DOCUMENTATION**

- .1 Photographic Record: Prior to any work involving heritage materials, photograph them as per Section 02 41 13 – Selective Site Demolition and as follows:
  - .1 General view of the work.
  - .2 Detail shots of each heritage item showing condition and appearance at commencement of work. Item shall be photographed to show all sides.
  - .3 The location of each item shall be identified in writing on the photograph.
  - .4 Photograph quality: Well-illuminated, proper exposure, free of glare and motion blur. And produced using high-resolution digital equipment.
  - .5 Provide copies of photographs to Departmental Representative. Include copy of photographs on portable digital storage media. Minimum 9 megapixel quality, JPEG format.

- .6 Submit typical photographic sample format to Departmental Representative for review, prior to commencement of Work.
- .2 When heritage materials must be transported to contractor's shop, label and photograph all Heritage Materials prior to their removal. The labelling method shall be sufficiently clear to allow future reinstallation. In addition to numbering, labelling shall identify the following information:
  - .1 Location of origin;
  - .2 N/S/E/W elevation;
  - .3 Vertical orientation;
  - .4 Specifics (as applicable);
  - .5 Open a condition assessment log recording the general condition of each individual Heritage Material. Note any irregularities using the Condition Assessment Form template appended to this section. Sheets shall be assembled in a binder and submitted in 3 copies to the Departmental Representative.
  - .6 Keep an inventory of removed items using the Inventory Form template appended to this section. Attach a corresponding inventory form to each crate in a transparent plastic sleeve. 3 copies of all sheets shall be assembled in binders and submitted in to the Departmental Representative.

### **3.06 PACKING AND CRATING**

- .1 Pack existing heritage materials as follows:
  - .1 Label each component to be removed for restoration using brass tags with stainless steel tie wires on each component being disassembled. Do not use aluminum. If tags cannot be used, place in an approved container and tag container.
  - .2 Wrap with heavy craft paper or polyethylene foam sheeting and crate as follows.
  - .3 Construct crates with lumber and plywood to suit component sizes. Crates shall be designed to be lifted and handled by no more than two persons and to be stored in horizontal position. Line crates with 25 mm thick polystyrene foam to avoid impact damage.
  - .4 Clearly label and identify each crate.
  - .5 Handle crates with care; do not drop or damage packing and crating during transport.
- .2 Transport crates to shop for restoration.

### **3.07 PREVENTION OF WATER / LIQUID / PARTICULATE DAMAGE**

- .1 Maintain proper water-shedding conditions at all times to ensure that rainwater does not infiltrate inside the building.
- .2 Provide waterproofing sheeting and wrapping to cover heritage materials.
- .3 Water or any aqueous mixtures may produce significant damage to heritage items. Protect heritage items to remain in place from all contact with water or other aqueous mixture.
- .4 Maintain the protection for the duration of the work.

**3.08 UNKNOWN HERITAGE MATERIALS**

- .1 If undocumented or concealed materials or systems which are potentially heritage in nature are discovered anywhere within the building inside or outside of identified areas, cease demolition activities in the immediate vicinity, tape off and protect the items, materials, and systems, and alert the Departmental Representative immediately. Areas similar in nature under which similarly undocumented or concealed materials or systems could exist shall also be immediately identified by the Contractor so that advancing demolition is aware of the potential hidden items.

**END OF SECTION**

**HERITAGE INVENTORY FORM**

N.B.: In addition to this form, fill out condition assessment form for each element identified in this list. Identification crate number and identification label must be consistent.

CRATE NUMBER

Label	Removed By (initials)	Packed By (initials)	Date of removal (DD/MM/YY)

**Notes:**

**HERITAGE CONDITION ASSESSMENT FORM**

**ITEM NUMBER:**

**CRATE NUMBER:**

**LABEL:**

Chipping				
Dents				
Breakage				
Rust				
Other (Specify)				

**Notes:**

**Part 1 GENERAL**

**1.1 SECTION INCLUDES**

- .1 Inspection and testing, administrative and enforcement requirements.
- .2 Tests and mix designs.
- .3 Mock-ups.

**1.2 INSPECTION**

- .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections, or approvals by Departmental Representative instructions, or law of Place of Work.
- .3 If Contractor covers, or permits to be covered, Work that has been designated for special tests, inspections, or approvals before such is made, uncover such Work, have inspections, or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

**1.3 INDEPENDENT INSPECTION AGENCIES**

- .1 Provide equipment required for executing inspection and testing by appointed agencies.
- .2 Employment of inspection/ testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .3 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection.

**1.4 ACCESS TO WORK**

- .1 Allow inspection/ testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.

## **1.5 PROCEDURES**

- .1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

## **1.6 REJECTED WORK**

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

## **1.7 REPORTS**

- .1 Submit four (4) copies of inspection and test reports to Departmental Representative.
- .2 Provide copies to subcontractor of work being inspected or tested and manufacturer or fabricator of material being inspected or tested.

## **1.8 TESTS AND MIX DESIGNS**

- .1 Furnish test results and mix designs as requested.
- .2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.

## **1.9 MOCK-UPS**

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations acceptable to Departmental Representative.
- .3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

- .5 If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.
- .6 Mock-ups may remain as part of Work, if reviewed mock-up is deemed acceptable by the Departmental Representative.

**1.10 EQUIPMENT AND SYSTEMS**

- .1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

**Part 2 PRODUCTS**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 EXECUTION**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**PART 1 GENERAL**

**1.01 SUMMARY**

- .1 Section Includes:
  - .1 This Section provides requirements to work such as modular scaffolds and fabric enclosures and applies to all scaffolding to be installed throughout the site.

**1.02 RELATED SECTIONS**

- .1 Section 01 35 91 – Heritage Protective Measures.
- .2 Section 01 50 00 – Temporary Facilities and Control.
- .3 Section 02 41 13 – Selective Site Demolition
- .4 Section 04 03 01 – Heritage Common Work Results for Masonry.

**1.03 REFERENCES**

- .1 Occupational Health and Safety Act (OHSA)
  - .1 Ontario Regulation 213/91 for Construction Projects.

**1.04 INSTALLATION AND REMOVAL**

- .1 Provide construction facilities in order to execute work expeditiously.
- .2 Coordinate with governing authorities and obtain required permits.
- .3 Remove from site all such work after use.

**1.05 FUNCTIONAL REQUIREMENTS**

- .1 Provide all necessary hoists for work.
- .2 Locate hoists where directed by Departmental Representative.

**1.06 DESIGN CRITERIA**

- .1 Scaffolding and scaffold enclosures shall be designed and certified by a Professional engineer, retained by contractor and licensed in the Province of Ontario. The same Professional engineer must approve, in writing, additions or modifications to scaffolding.
  - .1 Scaffold and enclosure must be built to withstand all wind, rain and snow loads applicable to construction site in accordance with NBC, latest edition and OBC, latest edition.
  - .2 Scaffold may be loaded up to 2.40 kPa. No more than 5 (five) working levels shall be loaded at one time.
- .2 Where scaffolding must be supported by existing structures, the condition and capacity of the existing structure should be reviewed by a Professional engineer, retained by contractor and licensed in the Province of Ontario, to complete scaffolding design.

**1.07 GENERAL REQUIREMENTS FOR SCAFFOLDING**

- .1 Provide scaffolding as defined in this Section.

- .2 Power elevated work platforms are not acceptable.
- .3 Design scaffolds as follows:
  - .1 Platforms shall be prefabricated clip platforms, planks are not permitted.
  - .2 Scaffolds shall be built of modular parts whenever possible.
  - .3 Scaffold accessories including braces and jackscrews shall be compatible with the capacity of frames.
  - .4 Provide internal horizontal x-bracing at all planking levels.
  - .5 Platforms shall be wide enough to circulate and temporarily store masonry units.
  - .6 Platforms shall be designed to support extra loads of removed masonry units.
  - .7 Provide steel guardrails, including toe boards, intermediate rails and handrails, at perimeter and around openings of all work platforms.
  - .8 Scaffold design and erection shall be in accordance with the "Occupational Health And Safety Act" and "Regulations For Construction Projects", and relevant municipal, provincial and federal regulations.
- .4 Scaffolding shall be tied back to the masonry using push-pull ties. Scaffolding shall be isolated from masonry with 12 mm thick rubber or neoprene pads. Show all anchor locations and ties on shop drawings; Departmental Representative shall review anchor locations prior to installation.
  - .1 Anchoring into Heritage Materials (i.e. exterior masonry) shall conform to requirements of Section 01 35 91. Anchoring may only be located in mortar joints as directed by Departmental Representative.
- .5 Scaffold roofs shall be waterproof and meet Design Criteria.

## **1.08 GENERAL REQUIREMENTS FOR ENCLOSURES**

- .1 Fabric enclosure must be in place throughout construction. Netting around scaffold is not permitted, unless otherwise noted or directed by Departmental Representative.
- .2 Cold season, defined for the purposes of this contract as the period starting October 15<sup>th</sup> and ending March 31<sup>st</sup>. Provide continuous heating, ventilation and humidity control within the fabric enclosure during this period as specified in Section 04 03 01 – Heritage Common Work Results for Masonry.
- .3 All gaps in the scaffold fabric enclosure must be sealed in such a way to shield the interior from precipitation, wind and cold air. Temporary openings for the purpose of passing materials and providing natural ventilation are permitted but must not compromise the scaffold and fabric's capacity to withstand loads as defined above.

## **1.09 SHOP DRAWINGS**

- .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit for review shop drawings of scaffold and weather enclosure system including:
  - .1 Scaffold assembly drawings.
  - .2 Scaffold anchoring;
  - .3 Enclosure fabric with fastening and support system;
  - .4 Waterproofing details for scaffold roof, including water management.
  - .5 Protection details where scaffolding is adjacent to or in contact with heritage fabric.

- .6 Indicate on drawings distance from platforms to wall surface to be worked on.

### **1.10 MOCK-UPS**

- .1 Construct mock-ups as follows.
- .2 Provide mock-ups showing assembly of scaffold and enclosure at location and to extent required by Departmental Representative.
- .3 Mock-ups shall include scaffolding, platforms, anchoring, enclosures, safety netting and scaffold roof.
- .4 Departmental Representative reserves the right to have additional mock-ups prepared to suit Project conditions.
- .5 Allow three (3) working days for inspection of mock-ups by Departmental Representative before proceeding with work.

## **PART 2 PRODUCTS**

### **2.01 TUBULAR SCAFFOLD**

- .1 Tubular scaffold, scaffold bridge, stair, side brackets, work platforms, guardrails, barricades, and other accessories shall be an engineered type modular tubular scaffold system.
- .2 Complementary 50 mm diameter tube and clamp assemblies may be used where structural reinforcement is required and/or irregular geometry prevents use of modular parts.
- .3 All components shall be hot dip galvanized steel.
- .4 Platforms shall be clip type prefabricated platforms; wood planks are not permitted.

### **2.02 FABRIC ENCLOSURE**

- .1 Fabric: scrim design, woven from high density polyolefin slit tapes, containing flame retardant and ultra-violet stabilizers. Fabric to be free from plasticizers and chlorine.
- .2 Fabric to include an engineered coating to provide resistance to tears and punctures, ultra-violet light and low temperatures. Fabric to be inert to most chemicals and liquids.
- .3 Fabric to have the following minimum properties:
  - .1 Weave count: Woven clear HDPE scrim using natural FR/U tapes
  - .2 Scrim weight: 407 g/m<sup>2</sup>.
  - .3 Coating thickness: LDPE, 4 mil average each side (95g/m<sup>2</sup>/side)
  - .4 Total thickness: 0.59 mm to ASTM D1777
  - .5 Grab tensile: Warp 1598 N x Weft 1555 N to ASTM D-5034-09
  - .6 Strip tensile: Warp 2444 N/5cm x Weft 2222 N/5cm to ASTM D-5035-11
  - .7 Tongue tear: Warp 533 N x weft 533 N to ASTM D-2261-07a
  - .8 Trapezoidal tear: Warp 444 N x Weft 400 N to ASTM D-4533-04(2009)
  - .9 Mullen burst: 4657 kpa to ASTM D-3786-09
  - .10 Max. operating temperatures:-50 to +70 deg. C.
  - .11 UV resistance: >90% to ASTM G154-06.

- .12 Flame resistance to CAN/ULC-S109-M87 (R2001) - Flame tests of flame-resistant fabrics and films.
- .13 Colour: white

### **2.03 FABRIC ENCLOSURE SUPPORT SYSTEM**

- .1 Extruded aluminium track supports: installed vertically at 3600mm c/c spacing maximum. Tracks are attached to horizontal ledgers of tubular scaffold system with galvanized steel tube clamps compatible with scaffold system.
- .2 Install clamp supports at locations and intervals to optimally resist wind loads as defined by performance criteria and indicated on shop drawings.
- .3 Fabric locked into aluminium tracks with continuous nylon ropes inserted into sewn or welded continuous flaps on long edges.

### **2.04 ACCESSORIES**

- .1 Anchoring into Heritage Materials: as specified in Section 01 35 91 – Heritage Protective Measures.
- .2 Spacers and protection pads: rubber or neoprene spacers: 12 mm thick min.
- .3 Pipe fasteners: 3 mm thick min. galvanized steel fasteners designed for 25 mm and for 50 mm exterior diameter tubing.
- .4 Debris netting: lightweight high density polyethylene (HDPE) netting with the following properties:
  - .1 Weight: 135 g/m<sup>2</sup>
  - .2 Density: 35%
  - .3 Tensile strength (MD): 445 N, as per ASTM D751
  - .4 Tensile strength (CD): 400 N, as per ASTM D751
  - .5 Trap tear (MD): 156 N, as per ASTM D4533
  - .6 Trap tear (CD): 120 N, as per ASTM D4533
  - .7 FR performance: Pass NFPA 701 Method 2
- .5 Fabric finishing tape: Water-resistant, one-sided polyethylene tape with synthetic rubber adhesive, color to match enclosure fabric.
  - .1 Use to splice loose ends only in non-structural applications.

### **2.05 ROOF**

- .1 Structure and deck: designed to meet Design Criteria and general requirements.
- .2 Deck: smooth and continuous to receive waterproofing.
- .3 Roof waterproofing system: self-adhesive modified bituminous membrane to CAN/CGSB-37-GP-56M – Membrane, Modified, Bituminous, Prefabricated and Reinforced for Roofing or other waterproofing system approved by Departmental Representative.
- .4 No insulation is required for roofs.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- .1 A competent worker shall supervise erection of the scaffold.
- .2 Professional engineer that prepared shop drawings shall inspect the scaffold before it is used to ensure that it is erected in accordance with design drawings.
- .3 Scaffolds:
  - .1 Install engineered scaffold, stairs and aluminum track system in accordance with approved shop drawings and mock-ups.
  - .2 Protect Heritage Materials at all times, in accordance with Section 01 35 91. Use rubber spacers between scaffolding and existing Heritage masonry walls.
- .4 Enclosure and netting:
  - .1 Use plastic wrap ties to fasten netting securely to scaffolding.
  - .2 Fasten netting to Heritage masonry using wood furring, minimum 3 mm thick synthetic rubber pads and anchor in accordance with approved shop drawings and requirements of Section 01 35 91.
  - .3 Install and fasten enclosure fabric in accordance with the manufacturer's written requirements. Make good any damage to enclosure. Where fabric is fastened to existing masonry, follow installation procedures set out for netting.
  - .4 Track supports must maintain fabric taut and provide constant offset from scaffold and scaffold protrusions to prevent tearing.

**3.02 REMOVAL**

- .1 Remove temporary scaffolding and enclosures when directed by Departmental Representative.
- .2 Coordinate removal work with Heritage Masonry contractor; have anchor holes repointed as scaffolding is being removed.
- .3 Remove temporary work carefully; protect Heritage Materials at all times in accordance with Section 01 35 91 – Heritage Protective Measures.
- .4 Leave all areas clean, free of rubbish, tools and extra materials.

**END OF SECTION**

**PART 1 GENERAL**

**1.01 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

**1.02 INSTALLATION AND REMOVAL**

- .1 Provide temporary utilities controls in order to execute work expeditiously.
- .2 Remove all temporary installations at the end of the work and return the conditions to those that existed prior to undertaking this work of this Contract to the approval of the Departmental Representative.

**1.03 INTERRUPTION OF SERVICES**

- .1 Notify Departmental Representative and utility companies of intended interruption of services; obtain requisite permission.
- .2 Give Departmental Representative 10 working days' notice for each interruption of mechanical or electrical service throughout the course of the work. Keep duration of interruption to a minimum. Carry out interruptions during off hours.

**1.04 WATER SUPPLY**

- .1 Departmental Representative will designate the access point and provide continuous supply of potable water for construction use.
- .2 Provide temporary lines and related infrastructure as required to bring water from the designated supply point to the Construction site as required for specific construction activities. Pay all associated costs.
- .3 Departmental Representative will pay for utility charges at prevailing rates.
- .4 Assume that relative humidity levels within the enclosure will follow (within 10% of relative humidity) ambient exterior humidity levels.

**1.05 TEMPORARY HEATING AND VENTILATION**

- .1 Provide temporary heating required during construction period, including attendance and maintenance.
- .2 Construction heaters must be vented to outside or be flameless type. Solid fuel salamanders are not permitted.
- .3 Provide temporary heat and ventilation in enclosed areas as required to:
  - .1 Facilitate progress of Work.
  - .2 Protect Work and products against dampness and cold.
  - .3 Prevent moisture condensation on surfaces.
  - .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
  - .5 Provide adequate ventilation to meet health regulations for safe working environment.
- .4 Maintain temperatures in areas where construction is in progress.

- .5 Ventilating:
  - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
  - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
  - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
  - .4 Ventilate temporary sanitary facilities.
  - .5 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
- .6 Pay costs for maintaining temporary heat.
- .7 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
  - .1 Conform to applicable codes and standards.
  - .2 Enforce safe practices.
  - .3 Prevent abuse of services.
  - .4 Prevent damage to finishes.
  - .5 Vent direct-fired combustion units to outside.
- .8 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.
- .9 Provide and maintain environmental monitoring equipment (temperature and humidity sensors) at curing locations.

#### **1.06 TEMPORARY POWER AND LIGHT**

- .1 Contractor to provide and pay for temporary power and lighting.
- .2 Arrange for connection with Parks Canada Fort George Site. Pay all associated costs for installation and maintenance of power supply line from connection point to Construction site. Contractor to pay for all associated costs for temporary power connection.
- .3 Provide for temporary lighting and operating of power tools, to a maximum supply of 120 volts 15 amps. Power is not to be used for heavy load items such as temporary heating or cooling.
- .4 Provide and maintain temporary lighting throughout project. Pay all associated costs.

#### **1.07 TEMPORARY COMMUNICATIONS FACILITIES**

- .1 Provide and pay for temporary communication (telephone, fax, data, fire alarm) hook up, lines, equipment necessary for own use.

#### **1.08 FIRE PROTECTION**

- .1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.
- .2 Burning rubbish and construction waste materials is not permitted on site.

**PART 2      PRODUCTS**

**2.01          NOT USED**

**PART 3      EXECUTION**

**3.01          NOT USED**

**END OF SECTION**

**PART 1 GENERAL**

**1.01 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

**1.02 INSTALLATION AND REMOVAL**

- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, avenues of ingress/egress to fenced area and details of fence installation.
- .2 Identify areas which have to be gravelled to prevent tracking of mud.
- .3 Indicate use of supplemental or other staging area.
- .4 Provide construction facilities in order to execute work expeditiously.
- .5 Remove from site all such work after use.

**1.03 SCAFFOLDING**

- .1 Scaffolding in accordance to CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding and enclosures as specified in Section 01 50 01 – Heritage Scaffolding and Enclosures.
- .3 Provide and maintain scaffolding, ramps, temporary stairs, cranes, aerial man-lifts and ladders.
- .4 Lifting devices to be operated by qualified operator.

**1.04 HOISTING**

- .1 Provide, operate and maintain hoists required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.
- .2 Hoists to be operated by qualified operator.

**1.05 SITE STORAGE/LOADING**

- .1 Maintain, in clean and orderly condition, exterior storage space assigned by the Departmental Representative. Refer to drawings.
  - .1 Laydown area as identified to be used for equipment, tool and material storage, including overnight man-lift storage.
- .2 Confine work and operations of employees to inside of Construction Site. Do not unreasonably encumber premises with products.
- .3 Move stored products or equipment which interfere with operations or other contractors.
- .4 Do not load or permit to load any part of Work with weight or force that will endanger Work.
- .5 Provide and pay for use and transport of materials to additional storage, or workspace, needed for work.
- .6 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

**1.06 CONSTRUCTION PARKING**

- .1 Parking may be permitted within the public parking area. Final locations to be coordinated with Departmental Representative.
- .2 Provide and maintain adequate access to project site.

**1.07 OFFICES**

- .1 No space within building will be provided for a site office. Locate site office within designated site staging area, final locations to be coordinated with Departmental Representative. Refer to drawings.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Make own arrangements for wireless voice and data communications services.

**1.08 EQUIPMENT, TOOL AND MATERIALS STORAGE**

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof chests for storage of tools, equipment and materials. Locate as directed by Departmental Representative. Maintain in clean and orderly condition.

**1.09 SANITARY FACILITIES**

- .1 No use of permanent sanitary facilities will be provided. Contractor to procure and provide for own use.

**1.10 USE OF SITE AND FACILITIES**

- .1 Execute work with least possible interference or disturbance to the normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
- .2 Maintain existing services to building.
- .3 Where security is reduced by work provide temporary means to maintain security. Provide security services contact information to Departmental Representative.
- .4 Protect from damage, safety hazards and overloading of existing equipment.

**1.11 CONSTRUCTION SIGNAGE**

- .1 Provide common-use signs related to traffic control, information, instruction, use of equipment, public safety devices, etc.
- .2 Provide all signs and notices for safety and instruction in both official languages or by the use of commonly understood internationally accepted graphic symbols to the Departmental Representative's approval.
- .3 No signs or advertisements, other than warning signs, are permitted on site.
- .4 Maintain approved signs and notices in good condition for duration of project, and dispose offsite on completion of project or earlier if directed by Departmental Representative.
- .5 Provide a construction safety board immediately adjacent to each construction access/egress point.
- .6 Provide signage to manage occupants inside buildings, pedestrians on sidewalks, and vehicular traffic.

- .7 Submit proposed changes to approved locations of signage and contents to Departmental Representative for approval.

**1.12 PROTECTION AND MAINTENANCE OF TRAFFIC**

- .1 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
- .2 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.
- .3 Protect travelling public from damage to person and property.
- .4 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .5 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
- .6 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .7 Dust control: adequate to ensure safe operation at all times.
- .8 Lighting: to assure full and clear visibility for work areas during night work operations.

**1.13 CLEAN-UP**

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

**PART 2 PRODUCTS**

**2.01 NOT USED**

**PART 3 EXECUTION**

**3.01 NOT USED**

**END OF SECTION**

**PART 1 GENERAL**

**1.01 INSTALLATION AND REMOVAL**

- .1 Provide temporary controls in order to execute Work expeditiously.
- .2 Remove from site all such work after use.

**1.02 HOARDING**

- .1 Provide and maintain temporary hoarding with access points around areas as indicated.
- .2 Hoarding must be continuous and act as an anti-climb element.
- .3 Erect temporary site enclosures using construction grade lumber framing and exterior grade fir plywood to CSA 0121.
- .4 Apply plywood panels vertically as indicated, flush and butt jointed.
- .5 Provide drawing details and procedures for site enclosures, directly adjacent to the building and other barriers, in accordance with Section 01 33 00 - Submittal Procedures.
- .6 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

**1.03 GUARD RAILS, FENCES AND BARRICADES**

- .1 Provide secure, rigid guard rails and barricades around open edges of roofs, and as required by governing authorities.
- .2 Provide guards and protections for existing items inside the Construction site. Maintain for duration of Construction activities and reinstate to previous condition and to approval of Departmental Representative.
- .3 All fencing to be self-supported and without ground piercing.

**1.04 WEATHER CLOSURES**

- .1 Provide weather tight closures to exterior door and window openings.
- .2 Design enclosures to withstand wind pressure and snow loading.

**1.05 TEMPORARY ENCLOSURES**

- .1 Interior enclosures: erect interior dust-proof temporary enclosures where required. Enclosure to be complete with door, fastenings, lock and two keys for construction, constructed as follows:
  - .1 38 mm x 89 mm wood framing
  - .2 One layer of 0.25 mm thick polyethylene, or
  - .3 Two layers of 0.15 mm thick polyethylene
  - .4 Erect enclosure to form a dust-proof installation. Install slab door, opening toward the Work, complete with lock.
- .2 Establish impervious barriers between occupied and construction areas to prevent dissemination of dust. Gypsum board walls are preferable to taped plastic drapes (which are easily pushed aside) and should extend from floor to ceiling.

- .3 Vacuum the attic area, duct work and pipes prior to construction.
- .4 Establish traffic control patterns which prevent construction dust from being tracked into occupied areas. Adhesive strips on floors to catch dust on shoes may be useful.
- .5 Ventilate construction areas with negative pressure with respect to adjacent areas. Exhaust air from construction areas directly outside the building.
- .6 Clean construction areas before occupancy.
- .7 Maintain and relocate protection until such work is complete.

**1.06 DUST TIGHT SCREENS**

- .1 Provide dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2 Maintain and relocate protection until such work is complete.

**1.07 PROTECTION OF BUILDING FINISHES**

- .1 Provide protection for finished and partially finished building finishes during performance of Work.
- .2 Provide necessary temporary screens and covers to protect interventions during the progress of work. Install to allow easy access to perform work.
- .3 Select appropriate material, and leave in place no longer than required.
- .4 Secure protections such that fasteners do not damage the historic fabric. Anchor into existing joints at discretion of the Departmental Representative.
- .5 Confirm with Departmental Representative locations and installation schedule three (3) working days prior to installation.
- .6 Be responsible for damage incurred due to lack of or improper protection.

**1.08 SITE SEPARATION AND IDENTIFICATION**

- .1 Install proper site separation and identification at all times throughout the life of the project.
- .2 When Departmental Representative requires access to equipment in order to operate the building, carry out coordination and communication activities so that all parties are aware of the Work.

**1.09 WASTE MANAGEMENT AND DISPOSAL**

Separate waste materials for reuse and recycling in accordance with Section 01 00 10 – General Instructions, Waste Management.

**PART 2 PRODUCTS**

**2.01 NOT USED**

**PART 3 PRODUCTS**

**3.01 NOT USED**

**END OF SECTION**

**PART 1 GENERAL**

**1.01 REFERENCES**

- .1 Within text of each specifications section, reference may be made to reference standards.
- .2 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .3 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .4 Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

**1.02 QUALITY**

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

**1.03 STORAGE, HANDLING AND PROTECTION**

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

- .6 Store sheet materials, lumber and finished parts on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

**1.04 TRANSPORTATION**

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Pay transportation costs of products supplied by Departmental Representative. Unload, handle and store such products.

**1.05 MANUFACTURER'S INSTRUCTIONS**

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

**1.06 QUALITY OF WORK**

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.
- .4 Use qualified licenced workers or apprentices.

**1.07 CO-ORDINATION**

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

**1.08 CONCEALMENT**

- .1 Before installation inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

**1.09 REMEDIAL WORK**

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

**1.10 FASTENINGS**

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent galvanic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable unless otherwise noted.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.
- .7 Submit to Departmental Representative product data of all proposed fasteners prior to commencing work.

**1.11 PROTECTION OF WORK IN PROGRESS**

- .1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

**1.12 EXISTING UTILITIES**

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants and pedestrian and vehicular traffic.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

**PART 2 PRODUCTS**

**2.01 NOT USED**

**PART 3 EXECUTION**

**3.01 NOT USED**

**END OF SECTION**

**Part 1      General**

**1.1            RELATED REQUIREMENTS**

- .1      Section 01 00 10 General Instruction
- .2      Section 01 11 00 Summary of Work
- .3      Section 01 14 00 Work Restrictions
- .4      Section 01 33 00 Submittal Procedures
- .5      Section 01 74 21 Waste Management

**1.2            ACTION AND INFORMATIONAL SUBMITTALS**

- .1      Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2      Submit written request in advance of cutting or alteration which affects:
  - .1      Structural integrity of elements of project.
  - .2      Integrity of weather-exposed or moisture-resistant elements.
  - .3      Efficiency, maintenance, or safety of operational elements.
  - .4      Visual qualities of sight-exposed elements.
- .3      Include in request:
  - .1      Identification of project.
  - .2      Location and description of affected Work.
  - .3      Statement on necessity for cutting or alteration.
  - .4      Description of proposed Work, and products to be used.
  - .5      Alternatives to cutting and patching.
  - .6      Effect on Work of Owner or separate contractor.
  - .7      Written permission of affected separate contractor.
  - .8      Date and time work will be executed.

**1.3            MATERIALS**

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

**1.4            PREPARATION**

- .1      Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2      After uncovering, inspect conditions affecting performance of Work.
- .3      Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

## **1.5 EXECUTION**

.1 Execute cutting, fitting, and patching to complete Work.

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

.3 Uncover Work to install ill-timed Work.

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

.5 Remove samples of installed Work for testing as required.

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

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

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

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

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

## **1.6 WASTE MANAGEMENT AND DISPOSAL**

.1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

### **Part 2 Products**

#### **2.1 NOT USED**

.1 Not Used.

### **Part 3 Execution**

#### **3.1 NOT USED**

.1 Not Used.

**END OF SECTION**

**PART 1 GENERAL**

**1.01 PROJECT CLEANLINESS**

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Departmental Representative or other Contractors.
- .2 Conduct regular cleaning of the entire Construction site inside the security fence on a weekly basis and more frequently as directed by Departmental Representative.
- .3 Conduct regular cleaning of the spaces within the construction scaffolding daily. Maintain spaces inside the scaffolding clear of dust and debris to approval of Departmental Representative.
- .4 Remove waste materials and debris from site daily at regularly scheduled times and deposit in waste containers at end of each working day. Remove waste materials more frequently as directed by Departmental Representative to ensure a clean and orderly work site.
- .5 Do not burn rubbish or waste materials on site.
- .6 Clear snow and ice from access to building. Bank or pile snow in designated areas only. Remove snow from site as directed by Departmental Representative.
- .7 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris. Dispose of waste materials and debris at designated dumping areas off site.
- .8 Provide on-site containers for collection of waste materials and debris. Provide appropriate sized disposal bins and locate bins on site where directed by Departmental Representative. Empty waste disposal bins daily or more frequently at times as directed by Departmental Representative.
- .9 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.
- .10 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .11 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .12 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .13 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

**1.02 FINAL CLEANING**

- .1 When Work is Substantially Performed and prior to final review, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work. Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .2 Remove stains, spots, marks and dirt from fixtures, fitments and walls.
- .3 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

- .4 Broom clean and power wash exterior walks, steps and surfaces. Rake clean other surfaces of grounds. Sweep and wash clean paved areas. Remove dirt and other disfiguration from exterior surfaces. Remove snow and ice from access to building.
- .5 Clean and sweep roofs, gutters, areaways, and sunken wells. Clean roofs, downspouts, and drainage systems.
- .6 Remove debris and clean all attic spaces.
- .7 Remove debris and surplus materials from other accessible concealed spaces.

**1.03 INTERIOR CLEANING**

- .1 When directed by Departmental Representative, arrange for cleaning of Interior Spaces that have been affected by the work of this contract. Cleaning to be carried out at times as directed by Departmental Representative and is only to address cleaning that is a direct result of exterior and interior work that has resulted in interior dirt and dust migrating to the interior.

**PART 2 PRODUCTS**

**2.01 NOT USED**

**PART 3 EXECUTION**

**3.01 NOT USED**

**END OF SECTION**

**Part 1        General**

**1.1            WASTE MANAGEMENT GOALS**

- .1        Prior to start of Work conduct meeting with Departmental Representative to review and discuss waste management goal and Contractor's proposed Waste Reduction Workplan for Construction, Renovation and /or Demolition (CRD) waste to be project generated.
- .2        Specific material for reuse and/or recycling:
  - .1        Masonry
  - .2        Ceilings and walls
  - .3        Metals
  - .4        Roofing
  - .5        Miscellaneous - furnishing/specialized equipment
  - .6        Packaging
- .3        Target percentage goals are achievable for waste diversion. Contractor to review and confirm Departmental Representative's Waste Audit acceptable values.
- .4        Minimize amount of non-hazardous solid waste generated by project and accomplish maximum source reduction, reuse and recycling of solid waste produced by CRD activities.
- .5        Protect environment and prevent environmental pollution damage.

**1.2            REFERENCES**

- .1        Definitions:
  - .1        Approved/Authorized recycling facility: waste recycler approved by applicable provincial, municipal, authority or other users of material for recycling approved by the Departmental Representative.
  - .2        Class III: non-hazardous waste - construction renovation and demolition waste.
  - .3        Construction, Renovation and/or Demolition (CRD) Waste: Class III solid, non-hazardous waste materials generated during construction, demolition, and/or renovation activities
  - .4        Cost/Revenue Analysis Workplan (CRAW): based on information from Waste Reduction Workplan, and intended as financial tracking tool for determining economic status of waste management practices.
  - .5        Inert Fill: inert waste - exclusively asphalt and concrete.
  - .6        Waste Source Separation Program (WSSP): implementation and co-ordination of ongoing activities to ensure designated waste materials will be sorted into pre-defined categories and sent for recycling and reuse, maximizing diversion and potential to reduce disposal costs.

- .7 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
  - .8 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
  - .9 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
  - .10 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
    - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
    - .2 Returning reusable items including pallets or unused products to vendors.
  - .11 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
  - .12 Separate Condition: refers to waste sorted into individual types.
  - .13 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.
  - .14 Waste Audit (WA): detailed inventory of estimated quantities of waste materials that will be generated during construction, demolition, deconstruction and/or renovation. Involves quantifying by volume/weight amounts of materials and wastes that will be reused, recycled or landfilled.
  - .15 Waste Diversion Report: detailed report of final results, quantifying cumulative weights and percentages of waste materials reused, recycled and landfilled over course of project. Measures success against Waste Reduction Workplan (WRW) goals and identifies lessons learned.
  - .16 Waste Management Co-ordinator (WMC) : contractor representative responsible for supervising waste management activities as well as co-ordinating required submittal and reporting requirements.
  - .17 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials generated by project. Specifies diversion goals, implementation and reporting procedures, anticipated results and responsibilities. Waste Reduction Workplan information acquired from Waste Audit.
- .2 Reference Standards:
- .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.
- .2 Ontario Ministry of Environment
  - .1 Ontario 3 R's Regulations (regulation 102/94) for waste management programs applicable to construction and demolition projects greater than 2,000 m<sup>2</sup>.
  - .2 Ontario Environmental Protection Act (EPA)
    - .1 Regulation 102/94, Waste Audits and Waste Reduction Workplans.
    - .2 Regulation 103/94, Source Separation Programs.
  - .3 Canadian Construction Association (CCA)
    - .1 CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.

### **1.3 WASTE REDUCTION WORKPLAN (WRW)**

- .1 Prepare and submit WRW at least 10 days prior to project start-up.
- .2 WRW identifies strategies to optimize diversion through reduction, reuse, and recycling of materials and comply with applicable regulations, based on information acquired from WA.
- .3 WRW should include but not limited to:
  - .1 Applicable regulations.
  - .2 Specific goals for waste reduction, identify existing barriers and develop strategies to overcome them.
  - .3 Destination of materials identified.
  - .4 Deconstruction/disassembly techniques and schedules.
  - .5 Methods to collect, separate, and reduce generated wastes.
  - .6 Location of waste bins on-site.
  - .7 Security of on-site stock piles and waste bins.
  - .8 Protection of personnel, sub-contractors.
  - .9 Clear labelling of storage areas.
  - .10 Training plan for contractor and sub-contractors.
  - .11 Methods to track and report results reliably (Schedule D).
  - .12 Details on materials handling and removal procedures.

- .13 Recycler and reclaimer requirements.
- .14 Quantities of materials to be salvaged for reuse or recycled and materials sent to landfill.
- .15 Requirements for monitoring on-site wastes management activities.
- .4 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.
- .5 Post WRW or summary where workers at site are able to review content.

#### **1.4 WASTE SOURCE SEPARATION PROGRAM (WSSP)**

- .1 As part of Waste Reduction Workplan, prepare WSSP prior to project start-up.
- .2 WSSP will detail methodology and planned on-site activities for separation of reusable and recyclable materials from waste intended for landfill.
- .3 Provide sufficient on-site facilities and containers for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
- .4 Locate containers to facilitate deposit of materials without hindering daily operations.
- .5 Provide training for workers in handling and separation of materials for reuse and/or recycling.
- .6 Locate separated material in areas which minimizes material damage.
- .7 Clearly and securely label containers to identify types/conditions of materials accepted and assist in separating materials accordingly.
- .8 Monitor on-site waste management activities by conducting periodic site inspections to verify: state of signage, contamination levels, bin locations and condition, personnel participation, use of waste tracking forms and collection of waybills, receipts and invoices.
- .9 On-site sale of salvaged materials is not permitted.

#### **1.5 USE OF SITE AND FACILITIES**

- .1 Execute Work with minimal interference and disturbance to normal use of premises.
- .2 Maintain security measures established by facility provide temporary security measures approved by Departmental Representative.

#### **1.6 WASTE PROCESSING SITES**

- .1 Contractor is responsible to research and locate waste diversion resources and service providers. Salvaged materials are to be transported off site to approved and/or authorized recycling facilities or to users of material for recycling.

#### **1.7 STORAGE, HANDLING AND PROTECTION**

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.

- .2 Unless specified otherwise, materials for removal become Contractor's property.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .5 Protect structural components not removed and salvaged materials from movement or damage.
- .6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.
- .7 Protect surface drainage, mechanical and electrical from damage and blockage.
- .8 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.
- .9 Separate and store materials produced during project in designated areas.
- .10 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
  - .1 On-site source separation is recommended.
  - .2 Remove co-mingled materials to off site processing facility for separation.
  - .3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.
  - .4 Materials reused on-site are considered to be diverted from landfill and as such are to be included in all reporting.

## **1.8 DISPOSAL OF WASTES**

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste into waterways, storm, or sanitary sewers.
- .3 Remove materials on-site as Work progresses.
- .4 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in the waste audit.

## **1.9 SCHEDULING**

- .1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 APPLICATION**

- .1 Do Work in compliance with WRW and WSSP.
- .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

**3.2 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .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 11 - Cleaning.

**3.3 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT**

- .1 Schedule G - Government Chief Responsibility for the Environment:

Province	Address	General Inquires	Fax
Alberta	Alberta Environmental Protection Petroleum Plaza, South Tower 9915 - 108 th Street Edmonton AB T5K 2G8	403-427-2739	
	Alberta Special Waste Management Corporation Pacific Plaza, Suite 610 10909 Jasper Avenue NW Edmonton AB T5J 3L9	403-422-5029	403-428-9627
British Columbia	Ministry of Environment Lands and Parks 810 Blanshard Street, 4 th Floor Victoria BC V8V 1X4	604-387-1161	604-356-6464
	Waste Reduction Commission Soils and Hazardous Waste 770 South Pacific Blvd, Suite 303 Vancouver BC V6B 5E7	604-660-9550	604-660-9596
Manitoba	Manitoba	204-945-7100	

	Environment Building 2, 139 Tuxedo Avenue, Winnipeg, MB R3N 0H6		
	The Clean Environment Commission 284 Reimer Avenue, Box 21420 Steinback MB R0A 2T3	204-326-2395	204-326-2472
New Brunswick	Department of the Environment 364 Argyle Street, Box 6000 Fredericton NB E3B 5H1	506-453-3700	506-453-3843
Newfoundland and Labrador	Department of Environment, Confederation Building, Box 8700 St. John's NL A1B 4J6	709-729-2664	709-729-1930
Northwest Territories	Department of Renewable Resources Scotia Centre Building, Box 21 5102 - 50 Avenue Yellowknife NT X1A 3S8	403-873-7420	403-873-0114
Nova Scotia	Department of the Environment 5151 Terminal Road, 5th Floor, Box 2107 Halifax NS B3J 3B7	902-424-5300	902-424-0503
Nunavut	Department of Sustainable Development Environmental Protection Service, Box 1000, Station 1195 Iqaluit NU X0A 0H0	867-975-5910	
Ontario	Ministry of Environment and Energy, 135 St. Clair Avenue West Toronto ON M4V 1P5	416-323-4321 800- 565-4923	416-323-4682
	Environment Canada Toronto ON	416-734-4494	

Prince Edward Island	Department of Environmental Resources 11 Kent Street, 4th Floor, PO Box 2000 Charlottetown PE C1A 7N8	902-368-5000	902-368-5830
Québec	Ministère de l'Environnement et de la Faune, Siège social 150, boul, René-Lévesque Est Québec QC G1R 4Y1	418-643-3127 800-561-1616	418-646-5974
	Conseil de la conservation et de l'environnement 800, place d'Youville, 19e étage Québec QC G1R 3P4	418-643-3818	
Saskatchewan	Saskatchewan Environment and Resource Management 3211 Albert Street Regina SK S4S 5W6	306-787-2700	306-787-3941
Yukon	Yukon Renewable Resources PO Box 2703 Whitehorse YT Y1A 2C6	403-667-5683	403-667-3641

**END OF SECTION**

**Part 1            General**

**1.1                ADMINISTRATIVE REQUIREMENTS**

- .1    Acceptance of Work Procedures:
  - .1    Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
    - .1    Notify Departmental Representative in writing of substantial completion of Contractor's inspection and submit verification that corrections have been made.
    - .2    Request Departmental Representative inspection.
  - Departmental Representative Inspection:
    - .3    Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
    - .4    Contractor to correct Work as directed.
  - .2    Completion Tasks: submit written tasks have been performed as follows:
    - .1    Work: completed and inspected for compliance with Contract Documents.
    - .2    Defects: corrected and deficiencies completed.
    - .3    Work: complete and ready for final inspection.
  - .3    Final Inspection:
    - .1    When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.
    - .2    When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.
  - .4    Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
  - .5    Final Payment:
    - .1    When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
  - .6    .

**1.2                FINAL CLEANING**

- .1    Clean in accordance with Section 01 74 11 - Cleaning.
  - .1    Remove surplus materials, excess materials, rubbish, tools and equipment.

- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**PART 1 GENERAL**

**1.01 ADMINISTRATIVE REQUIREMENTS**

- .1 Pre-warranty Meeting:
  - .1 Convene meeting one week prior to contract completion with contractor's representative and Departmental Representative:
    - .1 Verify Project requirements.
    - .2 Review manufacturer's installation instructions and warranty requirements.
  - .2 Departmental Representative to establish communication procedures for:
    - .1 Notifying construction warranty defects.
    - .2 Determine priorities for type of defects.
    - .3 Determine reasonable response time.
  - .3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
  - .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

**1.02 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, 3 final printed copies of operating and maintenance manuals in contract language.
- .3 Provide evidence, if requested, for type, source and quality of products supplied.
- .4 Copy will be returned after final inspection, with Departmental Representative's comments. Revise content of documentation as required prior to final submittal.

**1.03 FORMAT**

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings. Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.

.1 Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in DWG format on CD or USB key with other documentation described herein.

#### **1.04 CONTENTS - PROJECT RECORD DOCUMENTS**

.1 Table of Contents for Each Volume:

.1 provide title of project;

.2 Date of submission;

.3 Names, addresses, and telephone numbers of Departmental Representative and Contractor with name of responsible parties.

.4 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:

.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data.

.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

#### **1.05 AS -BUILT DOCUMENTS AND SAMPLES**

.1 In addition to requirements in General Conditions, maintain at site for Departmental Representative one record copy of:

.1 Contract Drawings. Specifications.

.2 Addenda. Change Orders and other modifications to Contract.

.3 Reviewed shop drawings, product data, and samples.

.4 Field test records.

.5 Inspection certificates. Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.

.1 Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

**1.06 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS**

- .1 Record information on set of black line opaque drawings, and in copy of Project Manual.
- .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress.
  - .1 Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
  - .1 Field changes of dimension and detail.
  - .2 Changes made by change orders.
  - .3 Details not on original Contract Drawings.
  - .4 References to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
  - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
  - .2 Changes made by Addenda and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.
- .7 Provide digital photos, requested as part of Photographic Documentation, for site records on a USB key.

**1.07 MATERIALS AND FINISHES**

- .1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
  - .1 Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Additional requirements: as specified in individual specifications sections.

**1.08 WARRANTIES AND BONDS**

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative approval.
- .3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:

- .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
- .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
- .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within 10 days after completion of applicable item of work.
- .4 Verify that documents are in proper form, contain full information, and are notarized.
- .5 Co-execute submittals when required.
- .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Include information contained in warranty management plan as follows:
  - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
  - .2 Provide list for each warranted equipment, item, feature of construction or system indicating:
    - .1 Name of item.
    - .2 Model and serial numbers.
    - .3 Location where installed.
    - .4 Name and phone numbers of manufacturers or suppliers.
    - .5 Names, addresses and telephone numbers of sources of spare parts.
    - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
    - .7 Cross-reference to warranty certificates as applicable.
    - .8 Starting point and duration of warranty period.
    - .9 Summary of maintenance procedures required to continue warranty in force.
    - .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
    - .11 Organization, names and phone numbers of persons to call for warranty service.
    - .12 Typical response time and repair time expected for various warranted equipment.
  - .3 Procedure and status of tagging of equipment covered by extended warranties.
  - .4 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .9 Respond in timely manner to oral or written notification of required construction warranty repair work.

- .10 Written verification to follow oral instructions.
  - .1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

**PART 2 PRODUCTS**

**2.01 NOT USED**

**PART 3 EXECUTION**

**3.01 NOT USED**

**END OF SECTION**

## **PART 1 GENERAL**

### **1.01 REFERENCES**

- .1 Definitions:
  - .1 Demolish: Detach items from existing construction and legally dispose of them off site, unless indicated to be removed and salvaged or removed and reinstalled.
  - .2 Remove and Salvage: Detach items from existing construction and deliver them to the Departmental Representative.
  - .3 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
  - .4 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed, removed and salvaged, or removed and reinstalled.
  - .5 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well-being or environment if handled improperly.
- .2 Reference Standards:
  - .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
    - .1 Safety Data Sheets (SDS).
  - .2 Transport Canada (TC)
    - .1 Transportation of Dangerous Goods Act (TDGA), c. 34, latest editions.

### **1.02 ADMINISTRATIVE REQUIREMENTS**

- .1 Site Meetings.
  - .1 Convene pre-demolition meeting one week prior to beginning work of this Section to:
    - .1 Verify project requirements.
    - .2 Review installation and substrate conditions.
    - .3 Co-ordination with other building sub-trades.
    - .4 Review manufacturer's installation instructions and warranty requirements.
  - .2 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work, prior to start of Work.
  - .3 Ensure the site supervisor, project manager and subcontractor representatives attend.
  - .4 Departmental Representative will provide written notification of change of meeting schedule established upon contract award 24 hours prior to scheduled meeting.
- .2 Scheduling: meet project time lines without compromising specified minimum rates of material diversion.

- .1 Notify Departmental Representative in writing when unforeseen delays occur.

### **1.03 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
  - .2 Submit for approval drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning, where required by authorities having jurisdiction.
- .3 Hazardous Materials:
  - .1 Provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.
- .4 Waste Management and Disposal:
  - .1 Refer to Section 01 00 10 – General Instructions, Waste Management
- .5 Photographic Documentation:
  - .1 Submit within three (3) working days after of Notice to Proceed, photographs prior to commencing work.
    - .1 Where work is performed in groups, submit with the advancement of each group of work.
  - .2 Photographs, showing existing conditions of work areas and materials:
    - .1 General views of work areas at the interior and exterior of the building, including the landscaping and grounds.
    - .2 Detailed images for historic woodwork showing condition and appearance of all facets, and any unique conditions.
    - .3 Detailed images of existing conditions exposed by demolition work.
    - .4 Detailed images of existing wood shingle roofs and metal roofs.
    - .5 Detailed images of existing metal finial.
    - .6 Detailed images of existing chimneys.
    - .7 Detailed images of interior finishes : floors, walls, millwork and trimwork, fireplaces, and other interior element
    - .8 Detailed images of plaster ceilings and cornices
  - .3 Clearly identify unit number and date of exposure on each photo. Use of an erasable portable whiteboards is recommended.
  - .4 Submit in digital format sample to Departmental Representative for review, prior to commencing work.

### **1.04 QUALITY ASSURANCE**

- .1 Regulatory Requirements: ensure Work is performed in compliance with applicable Provincial regulations.

- .2 Qualifications: provide adequate workforce training through meetings and demonstrations. Have someone on site with deconstruction experience throughout project for consultation and supervision purposes.

#### **1.05 DELIVERY, STORAGE AND HANDLING**

- .1 Storage and Protection.
  - .1 Store materials salvaged for reuse in locations as directed by Departmental Representative.
  - .2 Maximum permitted duration of material storage on site determined in consultation with Departmental Representative.
  - .3 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Departmental Representative.
  - .4 Remove and store materials to be salvaged, in manner to prevent damage.
    - .1 Store and protect in accordance with requirements for maximum preservation of material.
    - .2 Handle salvaged materials as new materials.
  - .5 Prevent movement, settlement or damage of adjacent structures, services, walks, paving, trees, landscaping. Provide bracing shoring underpinning as required. Repair damage caused by deconstruction as directed by Departmental Representative.
  - .6 Prevent debris from blocking surface drainage system, elevators, mechanical and electrical systems.
- .2 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, and packaging materials in accordance with Section 01 00 10 – General Instructions, Waste Management and applicable regulations.

#### **1.06 SITE CONDITIONS**

- .1 Site Environmental Requirements:
  - .1 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
  - .2 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
    - .1 Ensure proper disposal procedures are maintained throughout the project.
  - .3 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.
  - .4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities as directed by Departmental Representative.
  - .5 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.
  - .6 Protect trees, plants and foliage on site and adjacent properties as required.

- .2 Existing conditions:
  - .1 Remove contaminated or hazardous materials as defined by authorities having jurisdiction as directed by Departmental Representative from site, prior to start of demolition Work, and dispose of at designated disposal facilities in safe manner in accordance with applicable regulatory requirements.

## **PART 2 PRODUCTS**

### **2.01 EQUIPMENT**

- .1 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.
- .2 Where possible, use water efficient wetting equipment, trucks or attachments when minimizing dust.
- .3 Demonstrate that tools are being used in manner which allows for salvage of materials in best condition possible.
- .4 Provide debris bins and waste containers. Do not use any occupant-owned containers.
- .5 Ensure that all interior cutting equipment is equipped with HEPA filters to minimize dust.

## **PART 3 EXECUTION**

### **3.01 SITE VERIFICATION OF CONDITIONS**

- .1 Employ necessary means to assess site conditions and structures to determine quantity and locations of hazardous materials.
- .2 Investigate site and structures to determine dismantling, processing and storage logistics required prior to beginning of Work.
- .3 Develop strategy for deconstruction to facilitate optimum salvage of reusable and recyclable materials.

### **3.02 PREPARATION**

- .1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
- .2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .3 Notify and obtain approval of utility companies before starting demolition.

### **3.03 REMOVAL OF HAZARDOUS WASTES**

- .1 Remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

### **3.04 REMOVAL OPERATIONS**

- .1 Remove items as indicated.

- .2 Remove and Reinstall:
  - .1 Items to be remove and reinstall:
    - .1 Shutters and exterior door.
- .3 Salvage:
  - .1 Dismantle items containing materials for salvage and stockpile salvaged materials at locations as indicated.
- .4 Disposal of Material:
  - .1 Dispose of materials not designated for salvage or reuse on site as instructed by Departmental Representative at authorized facilities.

### **3.05 DISASSEMBLY**

- .1 Materials removed from designated structures for disposal and salvage are the property respectively of Contractor and Departmental Representative.
- .2 Throughout course of deconstruction pay close attention to connections and material assemblies. Employ workmanship procedures which minimize damage to materials and equipment.
- .3 Ensure workers and subcontractors are trained to carry out work in accordance with appropriate deconstruction, dismantling and salvage techniques.
- .4 Project supervisor with previous deconstruction experience must be present on site throughout project.
- .5 Workers must utilize adequate fall protection including certified harness and belay systems where necessary.
- .6 Source separate for recycling materials that cannot be salvaged for reuse including wood and metal.
- .7 Remove materials that cannot be salvaged for reuse or recycling and dispose of in accordance with applicable codes at licensed facilities.
- .8 Where existing materials are to be re-used in Work, use special care in removal, handling, storage and re-installation to assure proper function in completed work.

### **3.06 PROCESSING**

- .1 Designate location for processing of materials which eliminates double handling and provides adequate space to maintain efficient material flow.
- .2 Separate materials to ensure best possible condition of salvaged materials.
- .3 Keep processing area clean and free of excess debris.
- .4 Separate processed materials into organized piles for stockpiling. Provide collection area for materials processed. Pile materials on pallets to facilitate transport off-site or to storage areas.

### **3.07 STOCKPILING**

- .1 Label stockpiles, indicating material type and quantity.

- .2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.
- .3 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.
- .4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

**3.08 REMOVAL FROM SITE**

- .1 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project.
- .2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.
- .3 Transport material designated for alternate disposal using approved haulers facilities receiving organizations and in accordance with applicable regulation.
- .4 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.

**3.09 RESTORATION**

- .1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work.
- .2 Restore lawn, landscaping and paving damaged due to use and storage of lifting devices and other equipment used for work.
- .3 Use treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

**3.10 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
  - .1 Leave Work area clean at end of each day.
  - .2 Remove debris, trim surfaces and leave work site clean, upon completion of Work
  - .3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

**3.11 PROTECTION**

- .1 Repair damage to adjacent materials or property caused by selective site demolition.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.01 RELATED REQUIREMENTS**

- .1 Section 04 03 06 – Heritage Masonry Cleaning
- .2 Section 04 03 07 – Heritage Masonry Repointing
- .3 Section 04 03 08 – Heritage Mortars and Grouts
- .4 Section 04 03 42 – Heritage Stone Masonry Replacements and Rebuilding.
- .5 Section 04 03 43 – Heritage Masonry Removals
- .6 Section 04 03 45 – Heritage Masonry Repairs

### **1.02 REFERENCES**

- .1 Canadian Standards Association (CSA International).
  - .1 CSA A179, Mortar and Grout for Unit Masonry.
  - .2 CSA-A371, Masonry Construction for Buildings.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  - .1 Material Safety Data Sheets (MSDS).
- .3 Canada's Historic Places.
  - .1 Standards and Guidelines for the Conservation of Historic Places in Canada-Second Edition.

### **1.03 DESIGNATED SUBSTANCES**

- .1 Refer to 01 35 43 - Environmental Protection.

### **1.04 SUBMITTALS**

- .1 Submit documents and samples in accordance with Section 01 33 00 - Submittal Procedures and as specified in related Sections.
- .2 Product Data: submit manufacturer's printed product literature, specifications and data sheet for each product:
  - .1 Indicate date of manufacture of product and shelf life.
  - .2 Submit WHMIS and MSDS data sheets.
- .3 A list of tools and equipment to be used for all masonry work including for raking and repointing joints and for mortar repairs.
- .4 Departmental may request post award a list of workers, masons and foreman, including a description of their experience with similar masonry heritage restoration works. The lists should be organized into teams of workers to be used for each of the following tasks:
  - .1 Masonry Cleaning:
    - .1 General cleaning of work area.
    - .2 Removal of specific stains such as paint.

- .3 Removal of atmospheric soiling.
- .4 Removal of biological growth.
- .5 Removal of efflorescence.
- .2 Wall restoration:
  - .1 Masonry raking and repointing
  - .2 Masonry dismantling and rebuilding
  - .3 Anchor installation
- .3 Stone repairs
  - .1 Stone dutchman repairs
  - .2 Mortar repairs
  - .3 Shard repairs
  - .4 Stone fracture repairs
  - .5 In situ crack repairs
- .4 Mortar mixing: no more than two people should be assigned the task of mixing all mortars for the project. Both need to have been approved by the Departmental Representative through the mock-up process.
- .5 Shop drawings:
  - .1 As required by other spec sections.
- .6 Samples:
  - .1 One of each type of masonry accessory, anchor and reinforcing.
  - .2 Three samples from the selected quarry, sized and dressed to match existing stone units with direction of bedding marked. Indicate visible markings and finish.
- .7 Scheduling.
  - .1 Submit dates indicating critical stages in masonry work. Include stone supply dates, completion of shop fabrication and delivery to site.
  - .2 Include in schedule time for the required mock-ups, Departmental Representative reviews and repair identification.
  - .3 Include detailing the duration of work on each of the areas indicated in the raking and repointing plan with the duration and sequencing of each task, and the sequencing of each area. Refer to Section 04 03 07.
- .8 Manufacturer's Instructions.
  - .1 Submit manufacturer's installation instructions.
- .9 Test Reports.
  - .1 Submit certified test reports showing compliance of materials with specified performance characteristics and physical properties.

### **1.05 QUALITY ASSURANCE - EXECUTION**

- .1 Perform work in accordance with established procedures for historic masonry conservation and The Standards and Guidelines for the Conservation of Historic Places in Canada.
- .2 Masonry contractor
  - .1 Masonry contractor is to have extensive experience in heritage masonry work of similar size and complexity.
  - .2 Masonry contractor is to have a good level of understanding of structural behavior of masonry walls.
- .3 Masons:
  - .1 Mason is to have extensive experience in heritage masonry work.
  - .2 Masons are to have proof of training for all proprietary restoration mortars and grouting.
- .4 Perform work under the direction of the Departmental Representative.
  - .1 Provide demonstrated, specialized, skilled and competent trades persons who shall have extensive experience in all types of specified work. The skills of individuals will be subject to review and acceptance by the Departmental Representative. Review will include production of basic mock-ups for all types of work specified.
  - .2 Provide a list of the proposed workers a minimum one week prior to commencement of their masonry work in this project.
  - .3 No workers shall be changed during the progress of the work without written acceptance by the Departmental Representative.
  - .4 All workers shall be required to demonstrate competence levels of each masonry procedure to the satisfaction of the Departmental Representative, before being permitted to work on the building.

### **1.06 QUALITY ASSURANCE – MOCK-UPS**

- .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
- .2 Construct mock-ups under supervision of Departmental Representative to demonstrate a full understanding of specified procedures, techniques and formulations are achieved before work commences.
- .3 Construct mock-ups for each type of work procedure specified in part 3 of specifications 04 03 06, 04 03 07, 04 03 08, 04 03 42, 04 03 43, and 04 03 45
- .4 Work cannot proceed for each type of work procedure in part 3 of specifications 004 03 06, 04 03 07, 04 03 08, 04 03 42, 04 03 43, and 04 03 45 without a reviewed and accepted mock-up. There will be no exceptions.
- .5 For all work procedures in part 3 of specifications 04 03 06, 04 03 07, 04 03 08, 04 03 42, 04 03 43, and 04 03 45, only workers who performed a given mock-up will be allowed to perform the specified work procedure in question. There will be no exceptions.
- .6 Construct mock-ups to illustrate:
  - .1 General cleaning and cleaning for each type staining.

- .2 Each type of repair procedure.
- .3 Dismantling of wall areas.
- .4 Deep-raking raking out of mortar: 6 m including horizontal and vertical joints at each of the following locations: areas of walls to be dismantled and reconstructed; areas of removal of the outer stone wall and areas of wall to be repointed.
- .5 Repointing: Each type of stonework and mortar type, including methodology to meet environmental requirements for mortar curing. Include front-pointing color mock-up on wall, minimum size 6 linear meters.
- .6 Backpointing (all depths): each type of stonework and mortar type, including methodology to meet environmental requirements for mortar curing, minimum size 6 linear meters.
- .7 Mock-up will be used:
  - .1 To judge workmanship, substrate preparation, operation of equipment and material application.
  - .2 For testing to determine compliance with performance requirements.
  - .3 Quality and degree of finish required.
- .8 Construct mock-up where indicated by Departmental Representative.
  - .1 All mock-ups indicated above will be in same location.
  - .2 Coordinate and sequence activities accordingly.
- .9 Notify Departmental Representative five business days prior to the start of the mock-up and allow three business days for inspection of mock-up by Departmental Representative before proceeding with work.
- .10 Repeat mock-up until satisfactory results are obtained to satisfaction of Departmental Representative.
- .11 When accepted by Departmental Representative in writing, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.

#### **1.07 QUALITY ASSURANCE – SITE REVIEWS**

- .1 Make mason's workshop accessible to Departmental Representative for site review of current work-in-progress.

#### **1.08 DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 – Common Product Requirements.
- .2 Deliver materials to job site in dry condition.
- .3 Storage and Protection.
  - .1 Keep materials dry until use except where wetting of bricks or stone is specified. Protect from freezing and contamination.
  - .2 Store under on pallets or plank platforms held off ground by means of plank or timber skids.
  - .3 Store in covered enclosed weather protected enclosure.
- .4 Do not use materials which have exceeded manufacturer's recommended shelf life.

### **1.09 ENVIRONMENTAL REQUIREMENTS**

- .1 Execute all mortar work when ambient temperature and humidity meet requirements specified for 04 03 08 – Heritage Mortars and Grouts.
- .2 Provide continuous heating, ventilation and humidity control within the fabric enclosure during the period of October 1st and ending March 31st.
- .3 When ambient temperature drops below 10 degrees Celsius, provide heating and ventilation at own cost around curing area to ensure that stated environmental conditions are maintained for curing period. Take precautions to avoid overheating masonry.
- .4 Submit enclosure system for review by Departmental Representative in accordance with Section 01 33 00 – Submittal Procedures. Refer to 01 51 00 – Temporary Utilities & Facilities.

### **1.10 PRE-CONSTRUCTION CONFERENCE**

- .1 One (1) week prior to scheduled start of work of this Section, the representatives of the following entities shall meet at the project site: Departmental Representative, contractor, and representatives of other entities directly concerned with Work of this Section. This meeting will be coordinated through the Project Contractor.
- .2 Attendees shall review all pertinent details and specifications, noting any potential problems and making any changes, deletions or additions as deemed necessary. The Conference will include but not be limited to the following:
  - .1 Verify Project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Coordination with other trades.
  - .4 Availability of materials and stone delivery rate
  - .5 Warranty and submittal requirements.
  - .6 Scheduling and sequencing of work.
  - .7 Scaffold and site installations
  - .8 Additional items relating to the Work.
- .3 Attendees shall also inspect the worksite and review condition of site and substrates, protection requirements, determine where mock-ups will be prepared and where or how other requirements such as lighting and ventilation will be implemented.
- .4 Minutes will be taken of the meeting, including agreement or disagreement on matters of significance. A copy of the minutes will be furnished to all attendees.

### **1.11 DOCUMENTATION**

- .1 Photographic Record: Prior to commencing any work involving heritage materials, photograph the following:
  - .1 General view of the work.
  - .2 Detail shots of typical conditions and appearance at commencement of work.
  - .3 Location and date of photo must be clearly identified on each photo.
  - .4 Photograph quality: Well-illuminated, sharply focused, and free of motion blur.
  - .5 Resolution: Minimum 9 megapixel quality,

- .6 Photographs to be on portable digital storage media in uncompressed RAW or JPEG format.
- .7 Submit typical photographic sample and digital format to Departmental Representative for review prior to commencement of Work.
- .2 Photographic Record: Documentation must be reviewed and accepted by Departmental Representative before work may proceed.
- .3 Label (number) and photograph ALL masonry units. The labelling method shall be keyed in to 1:50 elevation drawings and sufficiently clear to allow future reinstallation, tracking of repairs for unit price tables, and general identification.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- .1 Refer to related sections for stone, brick, related materials, accessories and material preparation procedures.
- .2 Refer to section 04 03 06 for masonry cleaning procedures.
- .3 Isolation joint: 13mm thick 150mm high asphalt impregnated fibreboard

### **2.02 SOURCE QUALITY CONTROL**

- .1 Retain purchase orders, invoices, suppliers test certificates and documents to prove that materials used in contract meet requirements of specification.
- .2 Produce above upon request by Departmental Representative and allow free access to sources where materials were procured.

## **PART 3 EXECUTION**

### **3.01 SEQUENCE OF WORK**

- .1 Refer to specifications for each item of work listed below.
- .2 Submit the detailed raking and repointing plan, and associated schedule.
- .3 Erect scaffolding around the whole building.
- .4 Submit joint cutting and repointing plan indicating the schedule (sequence and duration) of each work phase and related tasks.
- .5 Complete stone documentation and numbering.
- .6 Allow for time for mock-ups to be completed for each type of cleaning, pointing and repair.
- .7 Remove copper shutters as required.
- .8 Allow access and time for survey by Departmental Representative to identify repairs requiring consolidation prior to cutting out the joints, and other general repairs.
- .9 Cut out of joints as per submitted plan and as per specifications.
- .10 Back point and cure area (note that some repairs may need to be completed prior to back pointing)

- .11 Clean and wash down masonry.
- .12 Complete masonry repairs as per unit price tables and drawings. Provide required shoring.
- .13 Dismantle masonry.
- .14 Review of removed stones by Departmental Representative.
- .15 Repair stones on bench and prepare new stone.
- .16 Rebuild.
- .17 Back point and cure.
- .18 Clean and wash down masonry.
- .19 Wash with biocide and allow for 24 hour dwell time
- .20 Front point and cure.
- .21 Complete final wash down.

### **3.02 VERIFICATION OF CONDITIONS**

- .1 Report in writing, to Departmental Representative, areas of deteriorated masonry revealed and not conforming to specified requirements of the Work.
- .2 Obtain Departmental Representative's approval and instructions of repair and replacement of masonry units before proceeding with repair work.

### **3.03 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

### **3.04 PROTECTION**

- .1 Take necessary safety measures to protect workers, building occupants and environment from silica and lead contamination during removal of mortar. Refer to 01 35 43 – Environmental Protection.
- .2 Ensure workers are informed of hazards and trained in procedures prior to commencing work.

### **3.05 PREPARATION**

- .1 Inspect site with Departmental Representative and verify extent and location of mortar types prior to commencing installation.
- .2 Support:
  - .1 Construct shoring, cradling, and temporary framing work to support structure parts during removal and resetting operations, in accordance with approved drawings. Drawings to be stamped and signed by engineer experienced with historic masonry structures and registered in Province of Ontario.
  - .2 Leave work in safe condition when work is not in progress.
- .3 Take utmost care not to damage historic fabric. Make good any damage.

- .4 Seal and protect openings, doors, windows, and adjacent areas to prevent damage and spread of construction dust, water or other materials into the building.
- .5 Cover sills and projecting courses with rigid protection, secured into joints, for duration of work.
- .6 Prevent scaffolding, hoists or construction equipment from bearing directly against masonry or roof. Provide lumber or plywood with padding of sufficient thickness to prevent damage.
- .7 Obtain Departmental Representative's approval prior to proceeding, for:
  - .1 Extent and type of stone to be replaced, repaired or removed.
  - .2 Methodology and tools to be employed before commencing work.

### **3.06 INSTALLATION**

- .1 Do masonry work in accordance with CSA-A371 except where specified otherwise.
- .2 Build masonry plumb, level, and true to line, with vertical joints in alignment.
- .3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.
- .4 Install isolation joints as indicated on drawings and as per manufacturer's instructions.

### **3.07 CONSTRUCTION**

- .1 Remove, repair and replace masonry as indicated.
- .2 Jointing.
  - .1 Allow joints to set just enough to remove excess water, then finish joint as specified.
  - .2 Finish stone joints as specified in Section 04 03 07 – Heritage Masonry Repointing.

### **3.08 SITE TOLERANCES**

- .1 All joints must line up with existing stone coursing.

### **3.09 FIELD QUALITY ASSURANCE**

- .1 Coordinate, include and complete all the inspection and testing required. The testing is to be completed by a laboratory that has the required experience for testing historic mortars.

### **3.10 PROTECTION – WORK AND MATERIALS**

- .1 At end of each working day, cover unprotected work with waterproof membranes. Membranes should extend to 0.5 m over surface area of work and be tightly installed to prevent finished work from drying out too rapidly.
- .2 Protect masonry and other work from marking and impact damage. Protect completed work from mortar droppings. Use non-staining coverings.
- .3 Maintain protection for minimum three weeks upon completion of the work.

**END OF SECTION**

**PART 1 GENERAL**

**1.01 SUMMARY**

- .1 Section Includes:
  - .1 General cleaning of all the exterior masonry for initial and final wash down to remove soiling and construction related debris.
  - .2 Specific cleaning operations on exterior masonry to remove:
    - .1 Paint.
    - .2 Caulking residue.
    - .3 Tar, bitumen.
    - .4 Thick sulfate and heavy atmospheric.
    - .5 Previous repair material.
    - .6 Removal of salt from stone.

**1.02 RELATED SECTIONS**

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 35 91 – Heritage Protective Measures.
- .3 Section 01 51 00 – Temporary Utilities and Facilities.
- .4 Section 01 78 00 – Closeout Procedures and Submittals.
- .5 Section 04 03 01 – Heritage Common Work Results For Masonry.
- .6 Section 04 03 07 – Heritage Masonry Repointing.
- .7 Section 04 03 08 – Heritage Mortars and Grouts.
- .8 Section 04 03 42 – Heritage Stone Masonry Replacements and Rebuilding.
- .9 Section 04 03 43 – Heritage Masonry Removals.
- .10 Section 04 03 45 – Heritage Masonry Repairs.

**1.03 REFERENCES**

- .1 Federal Legislation.
  - .1 Canadian Environmental Assessment Act, (CEPA).
  - .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
- .2 Material Safety Data Sheets (MSDS).
  - .1 Mine Safety and Health Administration/National Institute for Occupational Safety and Health (MSHA/NIOSH) Standards.

**1.04 QUALITY ASSURANCE**

- .1 Refer to the requirements of Section 04 03 01.

### **1.05 SEQUENCING AND SCHEDULING**

- .1 Perform cleaning prior to start of masonry work, and following completion of replacement of stone and backpointing, and prior to carrying out stone repairs, and following front pointing. Sequence subsequent applications to approval of Departmental Representative.
- .2 Allow period of curing as specified in applicable sections prior to all cleaning operations.

### **1.06 PROJECT CONDITIONS**

- .1 General Project conditions are defined in Section 04 03 01.
- .2 Existing Conditions
  - .1 Existing limestone facades are soiled with bird droppings, classifying it as a hazardous material under specific conditions. Refer to Section 01 35 43 Environmental Protection and to the EACO Mould Abatement Guidelines, Appendix B, Procedures of Clean-up of Bird and Bat Droppings.

### **1.07 ENVIRONMENTAL REQUIREMENTS**

- .1 Do not use wet cleaning methods when there is threat of frost.
- .2 Do not use chemical cleaners when ambient temperature is below 10 degrees Celsius.
- .3 Do not use chemical cleaners when surface temperature of materials to be cleaned is below 10 degrees Celsius.
- .4 Provide shading to wall to avoid cleaning in full, hot sunlight.
- .5 Do not clean if there is risk of cleaning materials being blown onto publicly accessible areas, or if other materials will be damaged by cleaning process.
- .6 Collect and dispose of used cleaning materials and products immediately below and local to area of cleaning. Prevent run off and absorption of water, chemicals or abrasives into masonry below cleaning area.
- .7 Collection and disposal system to approval of Departmental Representative.

### **1.08 MOCK-UPS**

- .1 Submit samples and construct mock-ups in accordance with Section 01 33 00, and Section 04 03 01.
- .2 General
  - .1 Do mock-up tests in accordance with Section 01 45 00 - Quality Control and Section 04 03 01 - Common Work Results for Masonry.
  - .2 The location of the test patches will be identified by Departmental Representative once the scaffolding system is in place.
  - .3 Allow for maximum of 5 cleaning test patches for each type of deposit being removed.
  - .4 Allow for maximum of 6 test patches for each other type of cleaning specified herein and for each type of stones.
  - .5 Allow for 1.5 m<sup>2</sup> test patch for each type of cleaning specified herein and 2m<sup>2</sup> for Black Atmospheric Soiling Cleaning.

- .6 Notify Departmental Representative 2 weeks before commencing cleaning of each test patch. Obtain approval from Departmental Representative before commencing test.
- .7 Conduct tests on building to determine effectiveness of low pressure wash cleaning methods.
- .8 Determine effect of cleaning operations on surrounding historic material and plants.
- .9 Stop work when cleaning has detrimental effect on surrounding material and plants.
- .10 Proceed with cleaning after written instructions are received from the Departmental Representative.
- .11 Protect masonry openings from water/chemical infiltration during cleaning.
- .12 Collect, neutralize and dispose of water and chemicals in accordance with contract requirements, applicable regulations and Canadian Environmental Protection Act, (CEPA).
- .3 Test brushing and spraying as an alternative to pressure washing. Consult Departmental Representative to review test results. Use method approved by Departmental Representative.
- .4 Test rust removal methods to establish effective poultice formulations and dwell times.
- .5 Test a variety of bird dirt removal methods as specified in PART 3 - EXECUTION, to establish the most effective method.
- .6 For other cleaning methods, prepare mock-ups as prescribed under PART 3 - EXECUTION.
- .7 Submit mock-ups for each of the cleaning procedures described in this section. These include but are not limited to:
- .8 General cleaning of atmospheric soiling on stone
  - .1 Cleaning of thick sulphate and heavy atmospheric soiling on stone
  - .2 Removal of caulked sealants
  - .3 Paint removal
  - .4 Surfactant cleaning
  - .5 Removal of salts from stone and wall surfaces using clay poultices
  - .6 Biological growth

#### **1.09 SUBMITTALS**

- .1 Make submittals in accordance with Section 01 33 00.
- .2 Submit WHMIS documentation.
- .3 Comply with the requirements of Workplace Hazardous Materials Information Sheet (WHMIS) and submit documentation to Departmental Representative.
- .4 Submit details of protection measures.
- .5 Submit schedule of cleaning work. Include interfacing of schedule with cleaning of masonry required in other sections.

- .6 Submit data sheets of all cleaning products specified in this section.
- .7 Submit drawings and specification of proposed low Pressure Nebulized Droplet Nozzle System to be installed.
- .8 Test Results:
  - .1 Submit two copies of test results describing cleaning methods used for cleaning of each test patch.
- .9 Samples:
  - .1 Demonstrate machinery, tools and nozzles.
  - .2 Submit samples of each cleaning material.

## **PART 2 PRODUCTS**

### **2.01 GENERAL**

- .1 Any materials or equipment not listed below will not be allowed for use without prior consent by the Departmental Representative.

### **2.02 MATERIALS**

- .1 Water: clean and free from contaminants.
- .2 Surfactant: non-ionic detergent, type suitable for use on masonry.
- .3 Air: free from oil or other contaminants.
- .4 Organic solvents: methylene chloride.
- .5 Petroleum based solvents: xylene, toluene, benzene and proprietary asphalt and tar removers for masonry.
- .6 Sulphate cleaner
  - .1 Cleaning solution of Tetrasodium EDTA, Nonionic surfactant - alkylphenol ethoxylate, and Trisodium Nitrilotriacetate.
- .7 Paint Strippers:
  - .1 Gel form without methylene chloride:
  - .2 Stripper systems:
    - .1 The specific type will be determined by mock-up.
- .8 Acids and Alkalis:
  - .1 Ammonium hydroxide 35%
  - .2 Ethylene-Diamine-Tetra-Acidic Acid (EDTA) (crystal form).
  - .3 Oxalic Acid (crystal form).
- .9 Attapulgit or Diatomaceous clay (Fullers Earth): for use as poultice medium.
- .10 Chemicals:
  - .1 Proprietary alkali masonry pre-wash cleaner.
  - .2 Proprietary ferrous stain remover.

- .11 Biocide: proprietary quaternary ammonia-based biocide.
- .12 Provide for all materials proof of meeting the requirements of the Canadian Environmental Protection Act (CEPA).
- .13 Poultice: absorbent clay, attapulgite clay.
  - .1 Poultice reinforcement and accessories:
  - .2 Fibre reinforcing: fibrillated fibre concrete reinforcement.
  - .3 Plastic mesh reinforcing; alkali resistant.
  - .4 Curing sheet: clear film, household plastic shrink wrap.

### **2.03 TOOLS**

- .1 List described is not definitive.
  - .1 Scrapers: wood, plastic or stainless steel depending on work performed. All steel scrapers will require rounded edges to prevent gouging.
  - .2 Buckets of various sizes with fitted lids
  - .3 Colourfast sponges for aqueous based cleaning chemicals.
  - .4 Stiff nylon brushes.
  - .5 Soft nylon brushes.
  - .6 4 ml and 6 ml polyethylene sheeting
  - .7 Small wooden wedges.
- .2 Protection equipment:
  - .1 Masks, glasses, gloves, suits as required by specific product.

### **2.04 EQUIPMENT**

- .1 Water cleaning and rinsing equipment:
  - .1 Use water pumps fitted with accurate pressure regulators and gauges capable of being preset and locked at maximum required levels.
  - .2 Use air compressors equipped with on-line oil filters to avoid spraying oil onto masonry.
  - .3 Use gun equipped with pressure gauge at nozzle end.
  - .4 Use plastic or non-ferrous metal piping and fittings.
  - .5 Use nozzles that give nebulized droplet spray.
  - .6 Use spray heads equipped with fan type nozzles having spray tips of between 15 and 25 degrees.
  - .7 Equipment flow rate and pressure: 18 to 30 l/min at 35 to 400 kPa.
  - .8 Equip with heaters to provide a range of water temperature.
- .2 Low Pressure Nebulized Droplet Nozzle System: the Contractor will be expected to design a system according to experts in the field who supply such misting systems with a timer off/on ability.
  - .1 Connect system to water supply through pressure regulator and an efficient water-filter to prevent clogging of nozzles.

- .2 For assistance in designing this system, consult greenhouse misting system manufacturers.
- .3 System components: this is not an exhaustive list of all possible components. It is the Contractor's responsibility to ensure a properly functioning system is set up to the satisfaction of the Departmental Representative.
  - .1 Nozzles: Nebulized Spray Nozzle, 5/16 thread, including brushing, brass adapter, brass check valve and filter, and capable of delivering a fine mist. Nozzle spacing must be such that an even fine mist is delivered across the wall.
  - .2 Piping and support structure for piping and nozzles: Custom built piping and nozzle support structures will be required for each different wall surface geometry including window jambs, sills and head, cornices, soffits and wall returns.
  - .3 Spray hose: Polypropylene carbamate spray hose.
  - .4 Solenoid Valve: 25 mm quick action ultraflow valve, solid brass.
  - .5 Interval timer.
  - .6 Transformer: Dry Type Transformer, 200VA, in waterproof enclosure, with on/off power switch.
  - .7 Valve: 25 mm ball valve, full port, solid brass.
  - .8 Pressure Reducing Valve: 25 mm pressure reducing valve, solid brass.
  - .9 Water Supply Line: 38 mm flexible pressure hose or solid copper pipe.
  - .10 Water Supply Filter: 38 mm supply line and 227 l/m.
  - .11 Water Supply Pressure Pump: multistage centrifugal pump.
  - .12 Expansion Tank: 20 litre Water Hammer/ Surge Protection Tank with pressure switch.
- .3 Low pressure water rinsing equipment (under 3.45 MPa). Maximum flow of 15 litres per minute. Pressure gauge at pump. Fan type nozzles.
- .4 Chemical fume extractor filtering system with 100% capability of drawing and filtering chemical fumes produced in all relevant working areas.
- .5 Heavy duty electric heat gun. Heat generated from electric coils. No open flame.
- .6 Vacuum Cleaner designed for industrial use, Hepa type.

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- .1 Biocide wash must be completed prior to the start of the masonry work, and prior to front pointing. Localized biocide treatment will be required in areas of stone dismantling.
- .2 Chemical cleaning must be carried out after joint cut out and deep back pointing are completed, but before final finished repointing work begins. All cleaning must be

completed prior to any wall openings or only after wall openings are made and stones are reset and backpointed. All cleaning must be completed prior to all mortar repair work.

### **3.02 PROTECTION**

- .1 All protection must be in place to protect property from chemicals, water and abrasives used for carrying out work. This includes:
  - .1 Maintain clean air controls to all work areas, ensuring that no fumes are carried to other areas of the building or to the exterior where workers or pedestrians may be present.
  - .2 Provide complete floor, wall, glass and property protection to areas not included in work.
  - .3 Provide effective troughs to collect run-off fluids used in the cleaning processes.
  - .4 Provide full protection to workers.
    - .1 Workers must be informed of the hazards related to the chemicals that they are using.

### **3.03 PREPARATION**

- .1 Provide all protection as stated above and elsewhere in this contract Specification.
- .2 Proceed with cleaning only under well-lit conditions.
- .3 Provide a functioning means of extracting air and control of its directional flow, including filtering where necessary.

### **3.04 GENERAL CLEANING FOR INITIAL AND BIOCIDES WASH DOWN OF WALLS**

- .1 Initial wash cleaning of the walls should take place prior to start of any masonry work, and second biocide wash down should take place prior to front pointing.
- .2 Ensure that temperature is above 10C.
- .3 Cleaning method and materials will only proceed once mock-ups are performed and discussed with Departmental Representative.
- .4 Rinse wall with pressure washers using 600 psi or less.
- .5 Apply biocide undiluted or mixed with water as directed. Reapply if rain occurs within 12 hours of application.
- .6 Allow for 24 hour dwell time.
- .7 Brush surface vigorously by hand with stiff bristle brush.
- .8 Rinse with pressure wash.

### **3.05 GENERAL CLEANING OF ATMOSPHERIC SOILING ON STONE**

- .1 Clean all exterior stone facades with low Pressure Nebulized Droplet Nozzle System. System needs to be designed for the project by the Contractor in consultation with a system expert.
- .2 A low Pressure Nebulized Droplet Nozzle System is defined as follows: a water cleaning system that delivers a fine mist to a large area of the wall at one time. Refer to paragraph 2.4.2.

- .3 Submit a schedule for completing this work, whereby all repairs and front pointing is completed after the cleaning is completed.
- .4 Install wind-proof protection which is transparent or otherwise not opaque or coloured. Judgment of cleaning quality will only take place under natural light conditions. Temporarily remove sections of scaffold tarp to allow for wall to be observed. Provide adequate lighting.
- .5 Using the scaffold as support, install mist spray system.
  - .1 Assume the mist spray system will be required for a period of up to 24hrs at any given location.
  - .2 Assume an operating set-up surface area of 30 x 25 feet.
  - .3 Misting system must reach and make contact with all soiled surfaces of a given area being worked on a given time. This includes, top surfaces, underside surface, all moulded surfaces, and return corners.
  - .4 Ensure that the tubing is of flexible plastic and is installed within 300 mm from the surface of the soiled surface. To be mounted on swivel mounts to maximize positioning.
  - .5 Nozzles must be placed to ensure overlap of surface areas being misted.
  - .6 Nozzles must swivel or otherwise be adjustable to allow exact positioning.
  - .7 The misting system must be operated intermittently using a timer/sensor system. The period of on/off misting cycles will be determined during mock-up procedures, but will likely operate in 5 minute on / 5 minute off intervals.
  - .8 The aim is to keep the amount of water used in the water misting procedures to a minimum in order to prevent unnecessary soaking of the wall.
- .6 Install troughs and necessary temporary flashing along the lower length of the work area in order to collect 100% off run-off as it occurs.
- .7 When the soiling is removable by scrubbing with a stiff nylon brush, the misting system will be stopped and final removal with scrub-brushing procedure will be used. Rinsing with up to 800psi pressure water is acceptable.

### **3.06 CLEANING OF THICK SULFATE AND HEAVY ATMOSPHERIC SOILING ON STONE**

- .1 Protect all adjacent architectural stone details sufficiently to ensure the cleaning medium does not flow or drip on the surface. Trap, retain and safely discard all such dripping or overflowing cleaning medium.
- .2 Apply cleaner liberally to affected soiled surface using a medium firm painters brush. Agitate on surface with swirling motion for several minutes.
- .3 Only apply to surface areas that can be controlled within 30 minute period. Approximately 4 sq. ft. per worker.
- .4 Continue to apply and agitate on surface at 5 minute intervals for 30 minutes, making certain the cleaning material does not begin to dry on the surface. Augment brushing action with a stiff nylon bristle brush if necessary.
- .5 At 30 minutes, rinse all of surface thoroughly using low pressure rinse of 4.8 MPa being certain that the wand is fitted with a fan-tipped nozzle which is held not closer than 12 inches from surface.

- .6 Continue to rinse thoroughly such that all blackened surfaces have been thoroughly gone over several times and the surface pH has neutralized.
- .7 Spot clean following same procedure as above to remove surfaces still retaining black deposits.

### **3.07 REMOVAL OF CAULKED SEALANTS**

- .1 All caulking and sealants are to be removed including:
  - .1 On the perimeter of all windows.
- .2 Full skin and breathing protection is required.
- .3 Methods and procedures
  - .1 Begin by cutting away as much of the caulking as is possible using small sharp knives, combined with pulling away by hand.
  - .2 Liberally apply thickened paint stripper to the stone where the caulking adheres to the grains of the surface and cover immediately with light plastic to prevent drying.
    - .1 Do not apply in direct sunlight. Keep working surface while shaded.
    - .2 Do not let the stripper dry on the surface. Keep covered to prevent drying, adding liberal amounts of the chemical to maintain a wet, active contact with the surface.
  - .3 Allow the stripper to dwell on the surface for approx. 20 minutes.
  - .4 Agitate the surface with a small stiff bristle brush.
  - .5 As it begins to peel and lift, swab the caulking up, being certain that the cotton rag used for swabbing is wetted with additional stripper.
  - .6 Repeat procedure as necessary. A final pass over the surface using a sharp chisel pneumatically driven at low speed may be used if approval is given by the Departmental Representative.

### **3.08 PIGEON DROPPINGS (GUANO)**

- .1 For removal of heavy pigeon dropping (guano) soiling: Comply with provincial and local requirements and these specifications, provided that in any case of conflict, the more stringent requirements shall apply. Work shall be performed under regulations in effect at the time work is performed. Regulations include, but are not limited to:
  - .1 Ministry of Labour Occupational Health and Safety Act and regulations, including Regulations for Construction Projects, as amended.
  - .2 Ministry of Environment regulations for the transportation and disposal of waste, including R.R.O. Reg. 347.

### **3.09 REMOVAL OF BITUMEN, TARS AND PIGEON REPELLANT**

- .1 Scrape and remove thick deposits.
  - .1 Assist this dry removal using CO2 freezing of surface if necessary and according to instructions given by Departmental Representative.
- .2 Apply poultice based on organic solvent.

- .3 Take appropriate care to strictly maintain the tar to the affected area. Do not let the stain transfer or bleed to other areas of the masonry.

### **3.10 PAINT REMOVAL**

- .1 Mechanical removal of paint will precede that of chemical removal.
- .2 Scrape surfaces with non-ferric scrappers to remove loose paint.
- .3 Beyond scraping of loose paint, a number of mock-ups using any of the following procedures and materials under the direction and supervision of the Departmental Representative will be carried out, with the aim of determining the best method and procedure to remove the paint without causing damage to the stones.
  - .1 Carry out a mock-up using a heat gun and scraper to determine the effectiveness of this method.
  - .2 Carry out a mock-up using Paint Stripper in gel form.
    - .1 Work surface must be between 20 and 25 degrees Celsius.
    - .2 Apply paint stripper liberally to surface of paint.
    - .3 Cover with plastic sheeting to avoid evaporation.
    - .4 Leave in contact, making sure that surface is agitated frequently with a stiff brush, and the paint stripper is generously spread over the surface throughout the dwell time.
    - .5 Dwell time will be determined by calculating the maximum effect of the chemical within a given time. This will be determined by the Departmental Representative.
    - .6 Scrape all loosened paint and discard immediately in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.
    - .7 Repeat procedure until natural surface of the stone is exposed.
    - .8 Rinse and scrub by hand with hot water.
  - .3 Carry out mock-ups using Paint Removal systems. Two applications will be required.
- .4 Install air extraction and filter system for all chemical procedures described above where chemical fumes are emitted, and maintain throughout work once the prescribed method to remove paint is determined by Departmental Representative.
  - .1 Fumes originating from any of the paint removing procedures will not be tolerated and must be extracted and filtered at the contained location of work.
  - .2 Contractor must prove the effectiveness of the extraction system by carrying out air quality tests on a daily basis.
  - .3 Failure to provide adequate extraction and filtering equipment will lead to an immediate demand from the Departmental Representative to stop work until the problem is corrected and at no extra cost to the Departmental Representative for delays or equipment improvement.

### **3.11 SURFACTANT CLEANING**

- .1 The following method will be used for cleaning of all light or loosely bonded forms of soiling including areas soiled by site work during project or for any other lightly soiled areas of masonry.
- .2 Dry brush with stiff bristle brush all surfaces to remove accumulated loose dirt, suctioning the dirt with a vacuum as it loosens.
- .3 Provide protection, troughs and all installations necessary to ensure cleaning solution does not spill, drip or in any other way make contact with sensitive areas of wall.
- .4 Liberally wet the surface of the soiled stones with the surfactant and hot water solution.
  - .1 Concentrations of the surfactant and water solution will be determined by the Departmental Representative.
- .5 Brush aggressively by hand using a stiff bristle brush. Do not allow to dry. Work on maximum surface areas which are manageable any one time.
  - .1 Brushes must be of various shapes and sizes to allow easy and certain contact with all shaped surfaces of the stones being cleaned.
- .6 Discard surfactant solution as soon as it becomes dirty and replace with fresh solution.
- .7 Once surface is clean and to the satisfaction of the Departmental Representative, rinse the surface of the cleaned stones by applying liberally with hot water keeping certain to collect all spillage of the rinse water.
- .8 Any damage of adjacent wall surfaces such as mortars, glass, plaster, wood, will be replaced or repaired to the Departmental Representative's satisfaction at the expense of the Contractor.

### **3.12 REMOVAL OF SALTS FROM STONE AND WALL SURFACES USING CLAY POULTICES**

- .1 Brush and vacuum all loose salt efflorescence from the affected surface of stones.
- .2 Soak the affected stone units by wetting with intermittent nebulised water misting system.
  - .1 For salvaged stones to be reused, immerse stones in a water tank for a minimum of 24hrs, or longer as requested by Departmental Representative.
  - .2 Thorough soaking of the stones is necessary for poultice removal of damaging soluble salts.
  - .3 Intermittent misting to ensure thorough and effective soaking must be carried out over a period of 12 hours prior to applying the clay poultice.
  - .4 Trap all water runoff for this intervention in troughs so as to ensure wetting and rinsing water is contained to the work surface only.
- .3 Mix diatomaceous earth in a bucket with sufficient amounts of potable water to create a wet but cohesive consistency. The Departmental Representative will determine the correct consistency for the clay poultice mixture.
- .4 Apply clay poultice to the affected surface of wall to a thickness of 6 mm.
- .5 Cover with polyethylene for 24 hours, remove and allow poultice to dry at a control atmospheric temperature between 18 and 24 degrees Celsius and a relative humidity of 65%.

- .6 When the poultice has thoroughly dried after approximately 7 days, remove the poultice by scraping with wooden scrapers directly into disposable bags and remove from site.
- .7 Brush and vacuum the surface thoroughly.
- .8 Rinse with a low-pressure water rinse.
- .9 Allow wall area to wait 3 days before repeating the procedures, maintaining temperatures between 18 and 24 degrees Celsius and humidity at 65% during this waiting period.
- .10 Repeat procedure above for a minimum of 3 times, or as requested by the Departmental Representative.

### **3.13 GENERAL CLEANING FOR FINAL WASH DOWN OF WALLS.**

- .1 Final wash cleaning of the walls will not take place until 28 days have passed after front-pointing is completed.
- .2 Cleaning method and materials will only proceed once mock-ups are performed and discussed with Departmental Representative.
- .3 Rinse with medium pressure water (3.4 MPa max).
- .4 Apply surfactant mixed with clean water as directed and brush surface vigorously by hand with stiff bristle brush.
- .5 Rinse with pressure wash.

### **3.14 CLEAN-UP**

- .1 Rinse off masonry to the satisfaction of the Departmental Representative.
- .2 Rinse from bottom to top and from top to bottom.
- .3 Upon completion, check the pH levels of stone where chemicals have been used during the cleaning process. If pH levels are not neutral, flush with water. Continue flushing as necessary until pH level of wall surface achieves a neutral pH value of 7 to 8.5.
- .4 Collect and dispose of cleaning materials and clean up work area as work progresses.
- .5 Collect and dispose of chemicals and hazardous waste in accordance with applicable hazardous waste legislation.
- .6 Carefully scrape residue into plastic bags and remove. Remove and dispose of droppings.
- .7 Upon completion, clean and restore areas used for work to condition at least equal to that previously existing.

**END OF SECTION**

**PART 1 GENERAL**

**1.01 SUMMARY**

- .1 Section includes:
  - .1 Cutting out of joints.
  - .2 Back-pointing
  - .3 Finish pointing

**1.02 RELATED REQUIREMENTS**

- .1 Section 04 03 01 – Heritage Common Work Results for Masonry
- .2 Section 04 03 08 – Heritage Mortars and Grouts
- .3 Section 04 03 42 – Heritage Stone Masonry Replacements and Rebuilding
- .4 Section 04 03 43 – Heritage Masonry Removals
- .5 Section 04 03 45 – Heritage Masonry Repairs

**1.03 REFERENCES**

- .1 Canadian Standards Association (CSA International).
  - .1 CSA-A371, Masonry Construction for Buildings.
- .2 Ontario Ministry of Labour/Queen's Printer for Ontario.
  - .1 Guideline – Lead on Construction Projects.
  - .2 Guideline – Silica on Construction Projects.

**1.04 DESIGNATED SUBSTANCES**

- .1 Refer to 01 35 43 - Environmental Protection.
- .2 Lead and silica is present in existing mortar. Refer to Ontario Ministry of Labour's Guideline – Lead on Construction Projects and Guideline – Silica on Construction Projects for abatement procedures.

**1.05 DEFINITIONS**

- .1 Raking: the removal of loose/deteriorated mortar until sound mortar is reached.
- .2 Deep-raking: removal of loose/deteriorated mortar beyond a depth of 100 mm and up to 350 mm.
- .3 Very-deep-raking: removal of loose/deteriorated mortar beyond a depth of 350 mm and up to 600 mm.
- .4 Back-pointing – filling an empty mortar joint to within 40 mm of stone face by either pushing mortar into the joint or by joint grouting
- .5 Deep-back-pointing – back-pointing joints that are deeper than 100 mm to a depth of 350 mm.

- .6 Repointing: the general term for filling and finishing of masonry joints from which mortar is missing or has been raked out. It includes grouting, back-pointing, deep-back-pointing, and very-deep-back-pointing as required, as well as finish pointing.
- .7 Deep-repointing: a specific type of repointing that requires deep-back-pointing, but not very-deep-back-pointing.
- .8 Tooling: finishing of masonry joints using tool to provide final contour.

#### **1.06 SYSTEM DESCRIPTION**

- .1 Work of this Section includes but is not limited to:
  - .1 Visually inspecting for obvious signs of deteriorated masonry and testing/verification of masonry joints.
  - .2 Raking, deep-raking and very-deep raking unsound joints as required. Refer to 3.2 for scope.
  - .3 Preparation of masonry surface including joints surface cleaning, flushing of voids and open joints, and masonry wetting.
  - .4 Repointing, deep repointing and very deep repointing as required joints that have been raked, deeply-raked and very-deeply-raked.
  - .5 Ensuring cure of mortar.

#### **1.07 QUALITY ASSURANCE - EXECUTION**

- .1 Refer to the requirements of Section 04 03 01 – Heritage Common Work Results for Masonry.

#### **1.08 SUBMITTALS**

- .1 Submit documents in accordance with Section 04 03 01 – Heritage Common Work Results for Masonry.
- .2 Provide detailed raking and repointing plan indicating on elevation drawings extent of wall to be raked in each work phase and the sequencing of each area to be raked and repointed.
- .3 Provide a schedule detailing the duration of work on each of the areas indicated in the raking and repointing plan with the duration and sequencing of each task, and the sequencing of each area.
- .4 Refer to 04 03 45, 1.4

#### **1.09 SAMPLES AND MOCK-UPS**

- .1 Submit samples and construct mock-ups in accordance with Section 04 03 01 – Heritage Common Work Results for Masonry.
- .2 Perform following mock-ups:
  - .1 Cutting out mortar joints, 6 linear meters of stone.
  - .2 Cutting out mortar joints including deep and very deep raking as per phased approach, 6 linear meters
  - .3 Back-pointing, 6 linear meters.
  - .4 Front-pointing, 6 linear meters.

### **1.10 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store, handle and protect materials in accordance with Section 04 03 01 – Heritage Common Work Results for Masonry.

### **1.11 EXISTING CONDITIONS**

- .1 Obtain Departmental Representative's approval and instructions before proceeding with raking out of joints.
- .2 Existing pointing mortars contain silica, classifying it as a hazardous material under specific conditions. Follow provincial guidelines for the safe removal and disposal of silica including the Ministry of Labour's Guideline – Silica on Construction Projects. Refer to Section 01 35 43 - Environmental Protection.
- .3 Existing pointing mortars contain lead. Follow provincial guidelines for the safe removal and disposal of lead including the Ministry of Labour's Guideline – Lead on Construction Projects. Refer to Section 01 35 43 - Environmental Protection.
- .4 In general, the existing joints consist of a harder pointing mortar and loose bedding mortar. In many joints, no solid mortar will be found in the beds and in the vertical joints. Jute backing rope will be required at most joints.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- .1 Refer to 04 03 08 - Heritage Mortars and Grouts
- .2 Jute rope

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- .1 Perform work in accordance with CSA-A371 and approved mock-ups.
- .2 Tool and compact using jointing tool to force mortar into joint.
- .3 Finish joints square and slightly recessed.
- .4 Use suitable approved jointing tool to finish joints.
- .5 Obtain Departmental Representative's approval prior to proceeding, for:
  - .1 Determining area to be raked and sequence of work.
  - .2 Condition of raked-out joints prior to commencing grouting, backpointing or repointing operations.
  - .3 Methods to prevent materials entering or penetrating wall cavities of building.

### **3.02 RAKING JOINTS**

- .1 Rake joints free of deteriorated and loose mortar, dirt and other undesirable material up to a depth of 350mm or to solid mortar, whichever is reached first.
- .2 Tools and techniques:

- .1 Tools for cutting out shall be narrower than the joint.
- .2 Cutting out of mortar shall be carried out by one of the following techniques:
  - .1 Cutting out with 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 to the approval of the Departmental Representative for cutting out rock-faced work only.
  - .4 Hand held rotary saws or any type of grinder or wheel are not permitted on this project.
- .3 Clean joints back for the full specified depth, but in no case to less than 40 mm, removing all mortar on the masonry surfaces to a square surface of existing mortar at back of joint or to 350mm depth.
- .4 Supporting stones during deep/very-deep raking and deep/very deep repointing:
  - .1 Sequence of deep raking and deep repointing/grouting will need to be planned such that the wall is sufficiently supported at all times.
  - .2 Cut out 150mm sections of the joint at either ends of stone and insert wood shims.
  - .3 Proceed with the cutting out of the remainder of the joint and the removal of mortar.
  - .4 Install additional intermediate shims for long stones as required to ensure that the stone remains supported.
- .5 Using pressurized air, blow out loosened mortar, being sure to contain dust expelled into the work area while doing so.
- .6 Briefly flush out joints using a low pressure water rinse to remove all small particles of dust.
- .7 Clear out all loose particles and leave ready for inspection.

### **3.03 BACKPOINTING**

- .1 Fill open joints and voids where depths exceed 40 mm.
- .2 Back-pointing is not to begin before approval is given by the Departmental Representative.
- .3 Install wetted jute rope at back (depth of 350mm) to provide a backing for back pointing where no solid mortar is found.
- .4 Provide sufficient wetting of the masonry wall, including joints and stones to ensure wall will remain damp but not wet for at least 1 day. This will require many hours of intermittent wetting of the wall prior to back-pointing commencement.
- .5 Leave surface wet and free of standing water.
- .6 Build-up mortar in layers maximum 50 mm and minimum 12 mm in depth.
- .7 Allow bottom layers to set before applying subsequent layers. Maintain joint width.
- .8 Finish face of mortar to depth of 40 mm.

- .9 Leave the exposed back-pointed surface keyed that is grooved or dimpled, to improve bonding of front-pointing.
- .10 Set up a pre-wetted burlap and polyethylene "curtain" in front of the wall. Provide a temporary structure for securing the burlap-polyethylene curtain such that it remains a uniform 50-100 mm distance from the wall.

### **3.04 FINISH POINTING: MORTAR**

- .1 Immediately prior to pointing, thoroughly wet joints to control absorption.
- .2 Allow water to soak into masonry and mortar. Leave surface wet and free of standing water.
- .3 Completely fill with mortar.
- .4 If surface of masonry units or stone has worn rounded edges keep pointing back from surface to keep same width of joint. Avoid feather edges. Pack mortar solidly into voids and joints with positive adhesion to contact surfaces.
- .5 Keep masonry damp while pointing is being performed.
- .6 Pointing in freezing weather is not permitted. Refer to Section 04 03 01 – Heritage Common Work Results for Masonry for environmental requirements.
- .7 At initial set, finish joints with stippling action using a short stout bristle brush to compact joint. Produce textured finish, exposing aggregate. Do not project mortar beyond arrises or feather mortar.
- .8 Keep recessed joints approximately 1 mm back from arrises.
- .9 Remove excess mortar from masonry face before it sets. Finish jointing neatly.
- .10 Set up a pre-wetted burlap and polyethylene "curtain" in front of the wall. Provide a temporary structure for securing the burlap-polyethylene curtain such that it remains a uniform 50-100 mm distance from the wall.
- .11 Provide full protection from direct sun, wind and temperatures below 10 degrees C during and after completion of all work involving mortars for up to 3 weeks after mortar work completion.

### **3.05 RESETTING LOOSE STONE**

- .1 Fix dislodged masonry units in correct location with water soaked softwood wedges.
- .2 Insert and compress firm mortar to within 40 mm of pointing surface. Allow mortar to set minimum 24 hours.
- .3 Pull out wood wedges when dried and shrunken.
- .4 Point to surface in one layer.
- .5 Set up a pre-wetted burlap and polyethylene "curtain" in front of the wall. Provide a temporary structure for securing the burlap-polyethylene curtain such that it remains a uniform 50-100 mm distance from the wall.

### **3.06 GALLETING**

- .1 In wide joint over 25mm wide, install small stone pieces to reduce the mortar width as approved by Departmental Representative.

**3.07 CLEANING**

- .1 Clean surfaces of mortar droppings, stains and other blemishes resulting from work of this contract as work progresses.
- .2 Do further cleaning after mortar has set and cured.
- .3 Clean masonry with stiff natural bristle brushes and plain water only.

**3.08 CURING**

- .1 Immediately upon completion of stone setting to rebuild, back pointing and finish pointing establish conditions identified in Environmental Conditions Requirements and cure mortars as specified in the applicable section. See Section 04 03 08 – Heritage Mortars and Grouts, paragraph 1.8 Environmental Requirements.

**END OF SECTION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES:**

- .1 The preparation and supply of mortars to be used for masonry work and conservation mortar repair fills.

**1.02 RELATED REQUIREMENTS**

- .1 Section 04 03 01 – Heritage Common Work Results for Masonry
- .2 Section 04 03 07 – Heritage Masonry Repointing
- .3 Section 04 03 42 – Heritage Stone Masonry Replacements and Rebuilding
- .4 Section 04 03 43 – Heritage Masonry Removals
- .5 Section 04 03 45 – Heritage Masonry Repairs

**1.03 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM).
  - .2 ASTM C144, Standard Specification for Aggregate for Masonry Mortar.
  - .3 ASTM C207, Standard Specification for Hydrated Lime for Masonry Purposes.
  - .4 ASTM C780, Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
  - .5 ASTM B29, Standard specification for refined lead.
  - .6 ASTM C141 Standard Specification for Hydraulic Hydrated Lime for Structural Purposes
- .2 Canadian Standards Association (CSA International).
  - .1 CAN/CSA-A3000, Cementitious Materials Compendium.
  - .2 CSA-A179, Mortar and Grout for Unit Masonry.
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS).
  - .1 Material Safety Data Sheets (MSDS).
- .4 European standards.
  - .1 EN 459-1: Building lime. Definitions, specifications and conformity criteria.
  - .2 EN 459-2: Building Lime. Test Methods.

**1.04 QUALITY ASSURANCE**

- .1 The mixing of mortars shall only be done by mechanics having experience in the preparation of cement-lime mortars.
- .2 Material must be fresh with proof of manufacture on labels. Materials that are older than stated date of use are not acceptable.
- .3 Store materials in dry conditions away from wet or moisture.

### **1.05 ALLOWABLE TOLERANCES**

- .1 Mortar compression strength for natural cement and sand: 1.2 MPa minimum and 2.0 MPa maximum at 28 days, 2.0 MPa minimum and 3.0 MPa maximum at 56 days
- .2 Air content of plastic mix, using meter designed to record air content of mortars to EN 459-2: 6 % minimum, 12 % maximum.
- .3 Vicat Cone penetration of mortar mix in plastic state, to ASTM C780: 25 mm minimum, 30 mm maximum, for pointing mortar; penetration of bedding mortar may exceed maximum by not more than 25 %.

### **1.06 SUBMITTALS**

- .1 Submit documents and samples in accordance with Section 01 33 00 - Submittal Procedures, and Section 04 03 01 – Heritage Common Work Results for Masonry.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for mortar and grout and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Prior to mixing or preparation of mortars submit for review to Consultant confirmation of source or product data sheet of:
    - .1 Cement.
    - .2 Lime.
    - .3 Air entrainment agent.
    - .4 Pigments.
- .3 Samples:
  - .1 Colour matched samples for front-pointing mortar: provide up to 5 samples for each mortar type of 100 mm diameter and 25 mm thick. Cure as specified in related sections. Final color review is to occur from mock-ups on wall.
  - .2 Prepare samples to represent same exposure conditions of building. Fully cure minimum 3 days.
- .4 Additional cubes for testing. Provide additional series of cubes for long term testing by Departmental Representative as follows:
  - .1 For all mortar types: up to 5 sets of cubes from selected mortar batches as directed by Departmental Representative.

### **1.07 TEST REPORTS**

- .1 Submit test reports in accordance with Section 01 45 00 – Quality Control.
- .2 Test results to show that properties are appropriate to particular mortar mix.
- .3 Test reports required for each mortar type minimum 30 days prior to commencement of work:
  - .1 Sieve analysis of proposed sand.
  - .2 Air content of mortar mix in plastic state.
  - .3 Vicat cone penetration of mortar mix.

- .4 Compressive Strength of mortar at 7, 14, and 28 days, prior to commencing work, or as directed by Departmental Representative.
- .4 Test reports required following commencement of work. For all mortars and grouts carry out all of the following tests for the first 5 batches and for every 10th subsequent batch:
  - .1 Air content of mortar mix.
  - .2 Vicat cone penetration measurements.
  - .3 Compressive strength of mortars at 7, 14, and 28 days.
- .5 Mock-up: provide colour matched samples on wall for final acceptance of materials.
- .6 Refer to Section 04 03 01 – Heritage Common Work Results for Masonry for other quality assurance requirements.

### **1.08 ENVIRONMENTAL REQUIREMENTS**

- .1 For Hydraulic Lime Mortars, maintain the following conditions.
  - .1 Maintain conditions for a total period of 14 days;
    - .1 Temperature greater than 10 degrees Celsius.
    - .2 Relative Humidity: minimum 80% for the first 7 days.
    - .3 Relative Humidity: minimum 50% for the next 7 days.
  - .2 Where reconstruction/rebuilding of the masonry occurs and /or where complete masonry wall re-assembly occurs and work is completed after August 30, maintain the following conditions until March 31 of the same winter.
    - .1 The target temperature for curing is 15 degrees, but at all times provide and maintain temperature greater than 10 degrees Celsius.
    - .2 Relative Humidity: minimum 50%. Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of MSDS acceptable to Labour Canada.
- .2 Execute work when ambient temperature is between 10 and 27 degrees Celsius. When ambient temperature is below 10 degrees Celsius, provide heating as required. When above 27 degrees Celsius, cool must be provided to lower material temperature to within the required range.
- .3 Prepare and maintain temperature of mortar between 10 and 27 degrees Celsius until used.
- .4 When temperature is 10 degrees Celsius or less:
  - .1 Store cements, limes and sands for immediate use within heated enclosure. Allow these materials to reach minimum temperature of 10 degrees Celsius (that is equilibrium with air temperature in enclosure).
  - .2 Heat water to minimum of 15 degrees Celsius and maximum of 25 degrees Celsius
  - .3 At time of use, the temperature of the mortar is to be minimum of 10 degrees Celsius and maximum of 27 degrees Celsius.
  - .4 Provide monitoring electronic data loggers for that can register low and high temperatures and humidity during the duration of the project and in all seasons. Placement of thermometers and frequency of observations shall be as directed by

the Departmental Representative. As a minimum, hourly temperature readings are required during mortar curing. Submit temperature data on a weekly basis.

- .5 Install data loggers underneath the burlap during curing and provide daily monitoring.
- .5 Do not mix cement with water or with sand or with water-sand mixtures having higher temperature than 25 degrees Celsius. If temperature is higher, contractor must provide a means and methods of cooling the materials and maintain them below 25 degrees Celsius.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- .1 No pre-bagged mortars are to be used.
- .2 Use one and same manufacture and supplier for sources of each mortar material for entire project.
- .3 Water: potable, clean and free from contaminants. Pre-treat water having high iron or other metal content to prevent staining.
- .4 Sand:
  - .1 To CSA-A179-14 sharp, screened and washed siliceous pit sand, free of any organic material, graded as specified to approval of Departmental Representative.
  - .2 Mason must custom blend/grade sand. Sand must be dry sieved.
  - .3 Sand is to be kept dry throughout the work period. Sand to be stored in water proof and lid secured container in a dry and roofed storage location. Provide testing results for percentage moisture in the sand in accordance with CSA 179.
- .5 Sand gradation

Sieve	Pass %	Retained Cum %	Retained Ind. %
4	100.00	0.00	0.00
8	99.89	0.11	0.11
16	93.74	6.26	6.14
30	61.28	38.72	32.47
50	31.32	68.68	29.95
100	12.05	87.95	19.28
140	4.58	95.42	7.46
200	1.54	98.46	3.05
Pan			1.54
Total			100

- .6 Hydraulic Lime: Conform to ASTM C141-97, Fresh (no more than 6 months from the fabricated date), Eminently hydraulic lime, finely ground, Moderately hydraulic. Acceptable product, NHL 13 with air entrainment.
- .7 Hydraulic Lime: Conform to ASTM C141-97, Fresh (no more than 6 months from the fabricated date), Eminently hydraulic lime, finely ground, Moderately hydraulic. Acceptable product, NHL 5

- .8 Hydraulic Lime Grout: Proprietary high fluidity natural hydraulic lime based injection grout for consolidation of voids in masonry. grout, to EN 459-1, to Departmental Representative's approval.
- .9 Natural Cement: to ASTM C10 / C10M
- .10 All cements and limes to be stored and used in accordance with manufacturer's recommendations, including maximum shelf life.
- .11 Colour additives: inorganic pigment, dry powder, mineral oxide type.

## **2.02 EQUIPMENT AND ACCESSORIES**

- .1 A regular paddle mixer: an open rectangular type. Only electric motor mixers are permissible. Mixers run on hydrocarbons are not permitted, due to fumes.
- .2 Mixing by hand for repointing mortars must be pre-approved by the Departmental Representative and must be carried out using a high speed, 2500 rpm, drill with paddle mixer attachment. Mixing to be completed in sufficiently small container so as to allow full contact of the paddle with the mortar during the mixing process, thus insuring thorough incorporation of ingredients and air-entrainment.
- .3 A drill manufactured for the dedicated work of mixing mortars must be used. It should be the open rectangular, double paddle type.
- .4 Submit mixing tools and container for approval prior to starting pointing work.
- .5 A digital electronic balance with a capacity of 2000 g and precision of 0.1 g, and a second digital electronic balance with a capacity of 200 g and a precision of 0.01 g.
- .6 Vicat Cone penetrometer for measuring consistency.
- .7 A standard pressure pot for injecting grout.
- .8 Hard bristle nylon brush.
- .9 Graduated cylinders purchased from a lab supply store, 2 L, 1 L, 500 mL volumes.
- .10 Appropriately sized buckets for mortar mixing: 7.5 L (2 gallon); 13 L (3.5 gallon); and 19 L (5gallon).
- .11 A level table for mixing mortars.
- .12 Clean rags.
- .13 Stopwatches for measuring mortar mixing times.
- .14 Back-pointing and front-pointing protection for curing: a 6 mil polyethylene sheet; burlap fabric; a supporting structure to secure polyethylene-burlap curtain the proper distance from the wall during curing.

## **2.03 MORTAR SHED**

- .1 Provide a mortar shed/dedicated enclosure for the storage and mixing of mortars.
- .2 Provide temperature controls to heat or cool the mortar shed to meet the environmental requirement in paragraph 1.8.
- .3 Provide lighting in the shed to ensure that the colour matching can be completed.

- .4 Provide a structure that is designed to last the duration of the construction project and is provides complete environmental/weather protection.
- .5 Provide floor drainage.
- .6 Provide level table, level table, storage bins, and equipment as per 2.2.

## **2.04 PROPORTIONS**

- .1 Pigments not to exceed 6% of aggregate volume. Pigments to be added for front-pointing.
- .2 Water proportion will be based on a consistency using Vicat cone penetration and as directed by the Departmental Representative.
- .3 Mortar Type 1: hydraulic lime and sand, formulated to the compressive strength parameters in section 1.5 or as reviewed by Departmental Representative. Expected proportions 1 part natural cement: 2.5 part sand.
- .4 The mortar mix proportions may be adjusted from time to time during work to provide specified mortar strength and consistency.
- .5 Grout: Proportions as per Manufacturer's Instructions or as directed by the Departmental Representative. Grout to be injected with a standard pressure pot as per mock-ups.

## **PART 3 EXECUTION**

### **3.01 PREPARATION - GENERAL**

- .1 Place safety devices and signs near the work as directed by Departmental Representative.

### **3.02 MIXING - GENERAL**

- .1 Mix mortar ingredients in quantities for use within periods specified. Do not re-temper.
- .2 Use only power driven paddle mixers. Use one mixer exclusively for each type of mortar. Use one mixer exclusively for natural cements mixes.
- .3 Add water slowly while mixing until all lumps are eliminated.
- .4 Mix to a consistency to meet specified performance requirements. Adjust water content as required.
- .5 Maintain uniformity of each mix throughout project. Contractor is to appoint no more than two individuals to mix mortar, for duration of project. In the event that both these individuals must be changed, mortar mixing must cease until the new individual is trained, and mortar mix is tested.
- .6 Use separate mixers for each type of pigmented mortar.

### **3.03 MIXING GROUT**

- .1 Mix as per Manufacturer's Instructions or as directed by the Departmental Representative.

### **3.04 MIXING – HYDRAULIC LIME-SAND MORTAR**

- .1 Prepare measuring boxes to ensure accurate proportioning of mortar ingredients. Each box to contain exact volume proportion for each specific mix ingredient. Mixing boxes to

be tapped on a level table. Mixing boxes and measuring process will be reviewed prior to starting the work.

- .2 Prepare blend of sand and pigments as specified.
- .3 Add small quantities of water. Mix for approximately 3 minutes after each water addition. Thoroughly mix for 5 minutes after correct water content is attained.
- .4 Add measured quantities of air entraining agent to mixing water.
- .5 Add sufficient water to obtain workable consistency for setting units.
- .6 Allow mix to stand for 15 minutes. Then mix for additional 5 minutes.
- .7 Use mix within 3 hours provided mortar is covered with damp burlap and kept wet.
- .8 Hydraulic Lime-Sand Mortar may be re-tempered for use once but without addition of any moisture.
- .9 Repair mortars will be mixed in small quantities as needed. Mixing will be carried out by hand and small paddle on electric drill. Refer to section 04 03 44

### **3.05 FIELD QUALITY CONTROL**

- .1 Follow proper batching procedure.
- .2 Use batching box.
- .3 Monitor mixing time.
- .4 Record water quantities and repeat for subsequent mixes.
- .5 Record Vicat test.
- .6 Record location where each batch of mortar is placed in wall area.
- .7 Take mortar samples for testing when applicable.

### **3.06 SCHEDULE**

- .1 Mortar Type 1:
- .2 Use: Bedding, back pointing, hand grouting, core filling and finish pointing.
- .3 Locations of use: all locations.

**END OF SECTION**

**PART 1 GENERAL**

**1.01 RELATED REQUIREMENTS**

- .1 Section 04 03 01 – Heritage Common Work Results for Masonry
- .2 Section 04 03 07 – Heritage Masonry Repointing
- .3 Section 04 03 08 – Heritage Mortars and Grouts
- .4 Section 04 03 43 – Heritage Masonry Removals
- .5 Section 04 03 45 – Heritage Masonry Repairs

**1.02 PRICE AND PAYMENT PROCEDURES**

- .1 The lump sum contract price shall include all masonry dismantling, repointing and restoration works as illustrated on the drawings.
- .2 As per Unit Price Table, it describes additional contractual scope to the work illustrated on the drawings that will be paid at the unit price. Unit price items are not to be included in the lump sum contract price.
- .3 The products and execution for both lump sum and unit price scopes are described herein.
- .4 Masonry Replacement Quantities to be calculated as:
  - .1 Height is average vertical height of stone X average width is horizontal length of stone face X average depth is horizontal length to core of wall.
  - .2 Refer to Division 4 of the specification for materials and procedures for scopes.
  - .3 Refer to Unit Rate Table.
  - .4 The cost of a replacement stone that is larger in one or more dimensions than those listed in the categories in the Unit Rate Table, is to be priced as follows:
    - .1 Divide (the unit cost of the stone category that is both the same type, and closest in volume to the stone in question) / by (the maximum volume of the stone category) ; then multiply by (the volume of stone in question)

**PART 2 PRODUCTS**

**2.01 REPLACEMENT STONE**

- .1 Queenston Limestone or equivalent.

**2.02 QUALITY CONTROL AND STONE SELECTION PROCEDURES**

- .1 Only stones that have been reviewed and approved by the Departmental Representative are to be used in construction where replacement stone is required.

**2.03 MORTAR**

- .1 Mortar: refer to Section 04 03 08 – Heritage Mortars and Grouts.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- .1 Dismantled wall is to be left to dry for a minimum of two weeks or until the wall core is deemed to be sufficiently dry by the Departmental Representative. The drying period is also required for individual stone replacements.
- .2 Obtain replacement stones on site, and complete repairs to dismantled stones, prior to rebuilding walls. Leaving openings in walls during rebuilding for future replacements or repairs to be completed will not be accepted.
  - .1 To meet the project completion date, the contractor's schedule must address the stone delivery rate capacity of the quarry and stone fabricator supplying the stone.
  - .2 Contractor is to provide fully tooled stone as per project requirements in the unit price table. The unit prices must include all the related stone preparation costs (including but not limited to handling, transporting, cutting, tooling and carving) whether the work is done in the quarry, in a shop, on site or once the stone set in the wall. The unit price is for the completed product. It is up to the contractor to determine their preferred approach to meet the schedule.
- .3 Prevent absorption of ground water and exposure to rain. Rest stones in their natural bedding.
- .4 Handling:
  - .1 Move and lift stone units using means to prevent damage.
  - .2 Submit stone units dropped or impacted to Departmental Representative for inspection and approval.
  - .3 Do not make holes or indentations for Lewises or dogs on face or top side of stone.
  - .4 Fill holes after moving and lifting.
- .5 Indicate bedding planes of stone units. Duplicate bedding marks on usable pieces of cut stone.
- .6 Place safety devices and signs near work area, as directed.
- .7 Install shoring and supports as required.

### **3.02 CUTTING/SIZING OF STONE**

- .1 Use calipers, squares and levels to measure hole for new stone.
- .2 Site trim by cut-sizing new stone with joint widths not more than existing, or 10mm or less.
- .3 Stone shall be finished to final size and profile using hand tools. Applied finishing and chisel marks to sawn faces of material shall be rejected.
- .4 All finishes are to match the variation in the existing work and shall be to the approval of the Departmental Representative. Finishes include shallow rock-faced stones.
- .5 Cut grooves or textures on concealed surfaces to provide a better bond.

### **3.03 MOVING STONES**

- .1 Use approved methods to move stones horizontally and to lift stones to working level.
- .2 Move, handle and set stones without causing damage.

### **3.04 RESETTING MISALIGNED STONES**

- .1 Where indicated by Departmental Representative, re-set misaligned stone. Construct and brace temporary supports for arches to resist loads.
- .2 Remove stone units as necessary.
- .3 Re-lay stones true to line.
- .4 Remove supports.

### **3.05 LAYING AND RE-LAYING OF STONE**

- .1 Prepare wall to receive stone.
- .2 Obtain Departmental Representative's approval of cleaning of core before commencing inserting stone.
- .3 Mortar fill deep voids of backing/wall cores to within 50 mm of back of stone in maximum 50 mm lifts.
- .4 Build up thicknesses with stone pieces set in mortar to recreate original bonding pattern of core to facework.
- .5 Cut stones for hardware where required.
- .6 Clean stone by washing with water and natural fibre brush before laying.
- .7 Thoroughly dampen surfaces of stone, backing/wall core and apply mortar.
- .8 Set stones plumb, true and level in full bed of mortar and with vertical joints filled full except where otherwise specified. Set stones in same orientation as removed stones with even joint widths.
- .9 Erect face stones ahead of backing/wall core. Fill core with mortar and stone pieces. Size and position stone pieces to interlock with face stones as found. Voids in core construction are not acceptable.
- .10 Set stone in position as original stone, being certain that the replacement stone fits the opening to the dimensions that guarantee original joint widths. Where stone is displaced from its original set lay correcting the displacement.
  - .1 Set stones plumb, true, level and in continuity with adjacent stone in full bed of mortar with vertical joints flushed full except where otherwise specified. Completely fill lifting holes and voids left by removed edges
  - .2 Complete front pointing at time the surrounding wall areas is carried out.
- .11 Lay heavy stones and projecting stones after mortar in courses below has hardened sufficiently to support weight.
- .12 Prop and anchor projecting stones until wall above is set.
- .13 Set large stones on water soaked softwood wedges to support stone in proper alignment until mortar has set. Remove wedges when dry, do not break off.
- .14 Remove mortar dropping from face of stone before mortar is set. Sponge stone free of mortar along joints as work progresses.

**3.06 FINISH POINTING**

- .1 Rake back mortar joints and leave ready for finish pointing.

**3.07 CURING**

- .1 Immediately upon completion of back pointing, finish pointing, or any other mortar works, establish conditions identified in Environmental Conditions Requirements to cure mortars as specified in the applicable section. See Section 04 03 08 – Heritage Mortars and Grouts, paragraph 1.6 Environmental Requirements.

**END OF SECTION**

**PART 1 GENERAL**

**1.01 RELATED REQUIREMENTS**

- .1 Section 04 03 01 – Heritage Common Work Results for Masonry
- .2 Section 04 03 07 – Heritage Masonry Repointing
- .3 Section 04 03 08 – Heritage Mortars and Grouts
- .4 Section 04 03 42 – Heritage Stone Masonry Replacements and Rebuilding
- .5 Section 04 03 45 – Heritage Masonry Repairs

**1.02 STORAGE AND PROTECTION**

- .1 Deliver, store, handle and protect materials in accordance with Section 04 03 01 – Heritage Common Work Results for Masonry.
- .2 Protect stones and facilitate their resetting.
- .3 Protect dismantled masonry units from exposure to water, elements, and potential mechanical damage inside a covered storage and work area at the location assigned by Departmental Representative.

**1.03 EXISTING CONDITIONS**

- .1 Refer to Section 04 03 01 – Heritage Common Work Results for Masonry.

**1.04 QUALITY ASSURANCE - EXECUTION**

- .1 Refer to requirements of Section 04 03 01 – Heritage Common Work Results for Masonry.

**1.05 SUBMITTALS**

- .1 Submit documents in accordance with Section 04 03 01 – Heritage Common Work Results for Masonry.
- .2 Document and mark the following:
  - .1 Stones and other elements that are dismantled are to be numbered and identified on an elevation drawing, 1:50 scale. Dismantling cannot proceed without a reviewed dismantling shop drawing. Elevation drawing can be an annotated photograph. Each stone to be dismantled must be clearly visible and annotated for the drawing to be reviewed.
  - .2 Wood platforms or other equipment used to transport and store stones.
  - .3 Work and storage areas.
- .3 Prepare chart or card-index to help locate any stone or unit when necessary, and to control availability of platforms and of work and storage areas.
- .4 Keep chart or card-index up-to-date and, if required, produce copy every day.
- .5 Ensure chart or card-index contains relevant information as indicated.
- .6 Submit up-to-date copies of chart or card-index, as well as chronological information concerning each numbered unit (individual cards of units), when requested.

## **PART 2 PRODUCTS**

### **2.01 NOT USED**

- .1 Not Used.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- .1 Consider nature of soil, to avoid damage to ground and stones and facilitate expedient execution of work.
- .2 Obtain Departmental Representative's approval prior to proceeding, for:
  - .1 Extent and type of stone to be replaced, repaired or removed.
  - .2 Methodology and tools to be employed before commencing work.
  - .3 Condition of cut out damaged stone for replacement or repair.

### **3.02 DISMANTLING PROCEDURE**

- .1 Dismantling procedure for wall areas.
  - .1 Construct scaffold.
  - .2 Provide elevation and vertical control points for areas to be dismantled. These locations are to be shown on drawing together with reference bench mark.
  - .3 Identify stones with approved numbering system. Chalk should be used for this procedure until the upper bed of the stone can be identified.
  - .4 Record the condition of stone before dismantling.
  - .5 In-situ photographs of stones.
  - .6 Transfer annotations and numbering to CAD, corrected ortho-photographs, or point-cloud scans.
  - .7 Tabular inventory of stone conditions noting cracks, spalls, heavy deterioration and other conditions.
  - .8 Record the thickness of the original existing joints before dismantling.
  - .9 Identify stones that are candidates to be repaired or replaced and measure in-situ.
  - .10 Submit stone record and inventory to Departmental Representative for review.
  - .11 Review recorded conditions with Departmental Representative on site. And confirm stones identified for repair or replacement.
  - .12 Dismantle stones.
  - .13 Place stones in a single layer on skids complete with reference drawing for their location in the wall.
    - .1 Provide separate skids of stones identified for additional repair or replacement.
    - .2 Provide separate skid for previously identified stones for repairs.
  - .14 Review with Departmental Representative "on the bench" repairs of stone.

### **3.03 TEMPORARY MARKING AND RECORDING**

- .1 Mark stone to be removed, on top bed, before removal using latex paint and waterproof marker. Mark adjacent stones not to be removed to ensure accuracy of re-installation.
- .2 Provide associated documents specified in Section 04 03 01 – Heritage Common Work Results for Masonry.
- .3 Use numbering, marking, and positioning system acceptable to Departmental Representative.
- .4 Ensure marking remains clearly visible until resetting of stone.
- .5 Ensure markings and adhesive are removed without damaging units by brushing with vegetable fibre brush used either dry or with water. Use no solvent, acid or other chemical product.
- .6 Work shall not proceed until Departmental Representative approves submission of documentation required in Section 04 03 01, 1.11 Documentation.

### **3.04 PROTECTION**

- .1 Protect adjacent masonry from marking and damage during dismantling.

### **3.05 SUPPORT**

- .1 Provide temporary supports in accordance with Section 04 03 01 – Heritage Common Work Results for Masonry.

### **3.06 LOOSENING STONES (DISMANTLING AND DISASSEMBLY)**

- .1 Use approved methods to loosen stones without causing damage either to stones or to other architectural elements. Remove stones in original integral condition and size. Use of hardwood is acceptable; metal wedges or levering devices are not permitted.
- .2 Do joint cutting and removing of stone in accordance with Section 04 03 01 – Heritage Common Work Results for Masonry.
- .3 Do not use circular millstone or saw, steel tools exerting concentrated pressure on edge of stone. Obtain Departmental Representative's approval for use of power tools before commencing work. Use approved site personnel for the use of power tools for this type of work.
- .4 Obtain Departmental Representative's approval for use of pneumatic tools before commencing work. Use of pneumatic hammers properly sized for joints that will not apply concentrated pressure on edges of stone. Use approved site personnel for the use of pneumatic tools for this type of work.
- .5 Loosen wet masonry only when temperature is above freezing point
- .6 Free large stones using Lewis pins on top bed and lift out with nylon belts. Properly space belts to provide safe and even bearing for stone. Strap or reinforce cracked or damaged stones. Remove in one piece without placing stress at fracture points.
- .7 Clean loose and deteriorated wall cores to sound material to the limits described on structural drawing.

- .8 At locations where the outer stone wythe is to be removed the extent of removal is approximately 500mm and includes the removal of parging coat on the inner core stone to provide a surface suitable for reconstruction.
- .9 Sound material is any material which is not cracked, loose, distressed, stained, unstable or deteriorated in any way as determined on site by the Departmental Representative.
- .10 Remove dust, mortar and stone fragments.
- .11 Remove loose material from deteriorated stones.
- .12 Retain and store stone off-cuts for re-use as wall core material.
- .13 Remove wall core to limits shown on drawings.

### **3.07 HANDLING**

- .1 Place detached stones in a single layer on wood surfaces during handling. Prevent contact with metal.
- .2 When stones are lowered to ground, place directly on wooden platforms that will be used for transport or storage. Do not place stones directly on ground.
- .3 Clean stones free of mortar and provide permanent protection.
- .4 Transport and keep stones on wooden platforms in orderly stacks with markings readily identifiable.
- .5 Ensure that edges of stones do not come into contact with any hard object.
- .6 Protect wet stones from freezing.

### **3.08 TEMPORARY STORAGE**

- .1 Place stones in designated area of site for cleaning, detailed inspection and for final marking, before storage. Storage area must be covered and protected from the elements.
- .2 Place stones in a single layer on skids complete with reference drawing for their location in the wall.
- .3 Provide separate skids of stones identified for additional repair or replacement.
- .4 Provide separate skid for previously identified stones for repairs.
- .5 Review with Consultant "on the bench" repairs of stone.
- .6 Ensure stones are accessible and easily removed, and placed so as to be retrieved quickly, when required.

### **3.09 CLEANING**

- .1 Do cleaning operations at above freezing temperature. After cleaning, protect wet stones against freezing until dry.
- .2 Clean stones by wet scrubbing with vegetable fibre brush unless otherwise instructed by Departmental Representative. Do not use high pressure water jet.
- .3 Remove excess mortar and resins by methods having written approval of Departmental Representative.

- .4 Ensure masonry does not dry out too quickly. Drying process of stones may be accelerated by fans or unit heaters.

### **3.10 SALVAGE AND RE-USE**

- .1 Removed stones intended to be replaced must be salvaged and catalogued. They may be used for repairs if each individual unit meets the following criteria:
  - .1 Sound;
  - .2 Free of salts;
  - .3 Cut to new profile;
  - .4 As directed by Departmental Representative.

### **3.11 EXCESS STONES**

- .1 Any excess stones at end of Work shall remain the property of Departmental Representative. Deliver all excess stones on palettes to Departmental Representative: address to be confirmed.
- .2 Catalogue all excess stones. Submit document indicating size and quantity of all blocks.

**END OF SECTION**

**PART 1 GENERAL**

**1.01 RELATED REQUIREMENTS**

- .1 Section 04 03 01 – Heritage Common Work Results for Masonry
- .2 Section 04 03 07 – Heritage Masonry Repointing
- .3 Section 04 03 08 – Heritage Mortars and Grouts
- .4 Section 04 03 42 – Heritage Masonry Replacements and Rebuilding
- .5 Section 04 03 43 – Heritage Masonry Removals

**1.02 PERFORMANCE REQUIREMENTS**

- .1 Preserve wherever possible, character and materials of existing masonry without necessarily restoring surfaces and building facades to original as-built condition.

**1.03 PRICE AND PAYMENT PROCEDURES**

- .1 The lump sum contract price shall include all masonry dismantling, repointing and restoration works as illustrated on the drawings.
- .2 As per the Unit Price Table, it describes additional contractual scope to the work illustrated on the drawings that will be paid at the unit price. Unit price items are not to be included in the lump sum contract price.
- .3 The products and execution for both lump sum and unit price scopes are described herein.

**1.04 SUBMITTALS**

- .1 Submit documents and samples in accordance with Section 01 33 00 - Submittal Procedures, and Section 04 03 01 – Heritage Common Work Results for Masonry.
- .2 Document and mark the following:
  - .1 All stones are to be numbered and identified on an elevation drawing, 1:50 scale. Elevation drawing can be an annotated photograph. Each stone to be repointed must be clearly visible and annotated for the drawing to be reviewed.
  - .2 Work and storage areas.
  - .3 Prepare chart or card-index to help locate each stone or unit when necessary.
  - .4 Keep chart or card-index up-to-date and, if required, produce copy every day.
  - .5 Ensure chart or card-index contains relevant information as indicated including stone number, location, repairs proposed, and repairs completed.
  - .6 Submit up-to-date copies of chart or card-index, as well as chronological information concerning each numbered unit (individual cards of units), when requested.

## **1.05 MOCK-UPS**

- .1 Execute mock-up for each type of conservation procedure, in accordance with Section 04 03 01 – Heritage Common Work Results for Masonry.
- .2 Where applicable, repeat repair mortar mock-ups as necessary to match variations in stone colour.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS - GENERAL**

- .1 Use materials and equipment approved by Departmental Representative.
- .2 Aggregate: to Section 04 03 08 - Heritage Mortars and Grouts, to pass no. 16 sieve sieve.
- .3 Stone dust: crushed limestone to pass 300 micro sieve.
- .4 Syringes: plastic, 10 to 50 cc.
- .5 Injection needles: length and gauge to suit application.
- .6 Dowels: stainless steel type 304; threaded, length and diameter to suit application.
- .7 Resin: low and high viscosity epoxy resin product types to suit application and to approval of Departmental Representative, moisture insensitive, recommended for stone.
- .8 Resin: Epoxy Resin, UV stable, capable of setting and curing in wet conditions.
- .9 Resin: polyester resin
- .10 Casein glue: compatible with lime mortars as approved by Departmental Representative.
- .11 Sand: Contractor to grade and sieve sand to suit application.
- .12 Pigmentation: dry powdered inorganic pigments. The maximum quantity permitted in dry form will not exceed 8% of the total binder volume.
- .13 Acetone for cleaning.
- .14 Ethyl Alcohol: 10% dilution to repair cracks.
- .15 Clean water: potable, clean and free from contaminants. Pre-treat water having high iron or other metal content, to prevent staining
- .16 Demineralized water.
- .17 Sponges, cotton rags, absorbent towels.
- .18 Tape for curing protection: aluminum type, pressure-sensitive, fluid-resistant, 38 mm minimum width.

### **2.02 EQUIPMENT**

- .1 Equipment for specific interventions are listed in related sections.
- .2 Provide all standard masonry tools, accessories, and equipment used in masonry restoration.

- .3 In addition, supply the following smaller specialized tools and equipment:
- .4 Small 14.5 volt cordless drills of good quality.
- .5 Small 100 mm grinders.
- .6 HEPA vacuum cleaners equipped with thin brush heads.
- .7 Tungsten Carbide tipped drill bits of 2 – 6 mm for drilling small holes.
- .8 Light weight, quick-release clamps of various sizes.
- .9 Strap clamps.
- .10 Plunge-type core drill, capable of coring hole of 6mm.
- .11 Metal artist spatulas of various sizes.
- .12 Carbide-tipped scribe for marking cut lines on stone.
- .13 Neoprene carvers mallet, small size (127 mm diameter).
- .14 Small carbide-tipped chisels of sizes 6 to 13 mm.
- .15 Multi-use "Dremel" tool with diamond discs.
- .16 Carborundum rubbing of fine, medium, and coarse grain.

### **2.03 STONE DUTCHMAN INSERTS**

- .1 Dutchman repairs: to match host stone.

### **2.04 HYDRAULIC LIME REPAIR MORTARS**

- .1 Hydraulic Lime: Conform to ASTM C141-97, Fresh (no more than 6 months from the fabricated date), Eminently hydraulic lime, finely ground, Moderately hydraulic. Acceptable product, NHL 13 with air entrainment; or NHL5 with added casein.
- .2 Repair Mortar Type A: Hydraulic Lime injection slurry mortar: Hydraulic Lime. Stone dust sieved through a 300 micron sieve. Proportion of casein not to exceed 10% or be less than 1% of lime volume. Proportion: 1 part lime :15 parts stone dust, and to be determined by crack depth and size.
- .3 Repair Mortar Type B: Hydraulic Lime crack fill and void filling mortar: Hydraulic Lime, sand sieved through no. 30 sieve. Proportions: 1 part lime:1.25 parts sand, with casein (at 10% of lime volume).

### **2.05 PROPRIETARY REPAIR MORTARS**

- .1 Repair Mortar Type C: proprietary, pre-mixed, pre-pigmented, hydraulic lime putty, aggregates and stone dust mixed in proportion of lime/aggregate and stone dust ratio to suit application and to approval of Departmental Representative.
  - .1 Mortar colour, texture and permeability: custom-formulated for each location.
- .2 Repair Mortar Type D: Proprietary repair mortars for stonework: formulated, pre-mixed and pre-pigmented cementitious powders, free of acrylic, latex or synthetic polymer additives
  - .1 Mortars characteristics: permeability and strength of mortar patching material to be same as the host stone and to comply with specified performance requirements

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- .1 Allow for a thorough review of existing conditions by Departmental Representative before work begins in order to note any unforeseen conditions.
- .2 Obtain Departmental Representative's approval for sequence of treatments for each type and area of stone prior to commencing work.
- .3 The Departmental Representative will mark, on the face of masonry or otherwise give direction at all locations of work to be conducted before work begins. Markings shall be photographed and adjustments in scope shall be recorded by Contractor on full-size elevation drawings on the same day and submitted to Departmental Representative within 5 working days.
- .4 Provide the Departmental Representative with 48 hours' notice prior to commencing each intervention on a new area of the masonry.
- .5 Perform all masonry cleaning prior to masonry repair work.

### **3.02 SHARD REPAIR**

- .1 This refers to detached portions of stone detail which become detached, usually at corners when, for instance, mortar joints are cut away during repointing procedures, etc.
- .2 Clean detached surfaces of dust and dirt by scrubbing with water and brush if necessary.
- .3 Apply small dab of epoxy resin and Repair Mortar Type A to dry, middle area surface of detached portion.
- .4 Working quickly, squeeze the two surfaces together to secure original fitting together.
- .5 Cut any squeeze out of epoxy resin while in the gel stage just prior to hardening.
- .6 Proceed with repair as for crack fill described in above (Mechanical consolidation of cracks in stone), whereby stitching and filling is carried out to complete the repair.

### **3.03 FILLING OF STONE CRACKS IN SITU**

- .1 Flush crack with clean water until all dirt and loose material are removed.
- .2 Carry out final flushing with 10 % ethyl alcohol solution.
- .3 Prepare Repair Mortar Type A lime injection mortar.
- .4 Inject mortar full into cracks. Repeat applications as necessary. Dam deep cracks to ensure complete filling.
- .5 Clean surface of stone free of mortar as work progresses. Do not allow grout to be absorbed into surface.
- .6 Where appropriate, use mortar undiluted to fill outer parts of crack or where width of crack warrants.
- .7 Immediately clean up spills or runs.
- .8 Fill crack flush with adjacent surface and tool as required to blend in with adjacent stone surfaces.

- .9 Apply and fix in place a moistened 100% cotton cloth over which is placed a polyethylene sheet which is fixed and sealed with aluminum tape at the edges securely to control evaporation and to maintain a high humidity. Maintain in place for 7 days. Mist periodically over a 5 days period if required, but not necessary if humidity is observed by beading on the inside surface of the plastic protection sheet.
- .10 Allow mortar to harden.

### **3.04 MECHANICAL CONSOLIDATION OF CRACKS IN SITU**

- .1 Departmental Representative will mark location for stitches.
- .2 Drill small holes as marked by Departmental Representative to a minimum depth of 50 mm beyond line of crack being stitched. Hole diameters and depths will be determined by the Departmental Representative. Do not use percussion or hammer drill. Clean hole thoroughly, first blowing out with forced dry air from compressor, Adapt nozzle as necessary to reach to bottom of hole easily such that all dust is blown from the bottom and evacuated upwards and out of the drilled hole.
- .3 Inject with epoxy, adjusting viscosity to prevent unnecessary flow into unwanted voids. Inject holes with sufficient epoxy resin, thickened to control viscosity, to allow stainless steel rod to be inserted without spilling onto surface of the stone.
- .4 Any spills must be cleaned immediately from surface using appropriate solvent.
- .5 Once epoxy is set, drill out cured epoxy from top 12 mm of hole and fill with a colour matching repair mortar. Do not use percussion or hammer drill
- .6 Complete repair of crack following procedures outlined above for filling stone cracks.
- .7 Where the crack is wider than 4 mm or where voids are considered too large along the edge of the crack, procedures outlined below for mortar fills and repairs will be carried out.
- .8 Cure mortar repair as per 3.03.9

### **3.05 REPAIRING OF REMOVED FRACTURED STONE**

- .1 To remove stone to be repaired, first remove mortar around perimeter. Remove stone from wall without damaging arrises. Maintain support to surrounding masonry as necessary.
- .2 Clean surfaces to be repaired.
- .3 Drill holes for dowels to re-anchor stone together. Do not use percussion or hammer drill.
- .4 Set dowels with epoxy resin.
- .5 Apply Repair Mortar Type A mortar to entire faces of stone to be bonded.
- .6 Clamp stone using softwood shims to protect arrises. Allow mortar to set.
- .7 Cut back mortar upon initial set and fill to surface with Repair Mortar Type A .
- .8 Promptly remove excess mortar from crack to prevent staining.
- .9 Re-lay repaired stone.
- .10 Cure mortar repair as per 3.03.9

### **3.06 DUTCHMAN REPAIRS**

- .1 Location and dimension of cutting required to remove deteriorated stone will be marked and agreed upon by the Departmental Representative prior to cutting.
- .2 Only stones marked on drawings or otherwise marked out by the Departmental Representative shall be cut into for purposes of inserting a dutchman.
- .3 Adjacent masonry units should not be cut into, displaced, or in any way damaged while cutting or removing of masonry units.
- .4 Departmental Representative shall approve methods and tools used for cutting out purposes.
- .5 Cutting out will follow precise incised lines (scribed) which are squared and following right angles, clean sided, and to an even specified depth.
- .6 Cut out deteriorated portion to a minimum of 100 mm behind wall or arris line.
- .7 Smooth the bottom and side surface of the prepared cavity to receive the new stone. For a moulded dutchman cavity, when cutting into a curved profile, cut into the stone along the radius of the curve. All thin edges of a cavity are to be avoided.
- .8 In cases where the dutchman repair includes the full depth of stone make cavity good behind dutchman.
- .9 Cut new stone to dimension to fit prepared cavity snug. A tolerance of 1 mm will be allowed between dutchman insert and host stone joints. 3 mm is the tolerance for the back side of the joint.
- .10 Dutchman inserts are to have the same bedding orientation as the host stone.
- .11 Smooth, tool or carve surface to match exposed surface of stone adjacent to the prepared cavity. Do not rub, tool or in any way affect the original surface of stone adjacent to the dutchman insert. Dutchman insert must be shaped and prepared to fit in all aspects of dimension prior to being fixed in place.
- .12 Provide attachment of insert stone to cavity by inserting one or two stainless steel rods into back side of new stone set in epoxy. The drilled holes should reach 50-75 mm into connecting surface. The holes must be thoroughly cleaned before epoxy is injected. Blow holes clean with compressed dry air through nozzle that reaches to bottom of drilled hole. Adapt nozzle with extension if necessary. Apply viscous epoxy resin adhesive just prior to setting stone in place. Epoxy resin must be insensitive to moisture and wet during curing.
- .13 Dry set dutchman insert stone to insure required tight fit and flush with adjacent surface. It must be aligned with an evenly wide joint of 1 mm maximum surrounding it.
- .14 Use Repair Mortar Type A colour matched to stone colour to set and fill cavity joint around dutchman. This will require thorough soaking of stone surfaces prior to applying the slurry. It is critical that all preparations are made such that the insertion can be made and secure quickly before slurry thickens. Slurries are to be mixed fresh everyday as required. During use, store in a lid-sealed container to prevent drying.

- .15 Wedge in place where possible to do so using adjacent mortar joints.
- .16 Allow epoxy to cure, keeping dutchman insert damp as per curing in 3.03.9. Cut joint slurry flush with surface, sponge clean all stone surfaces to remove slurry stains. Reapply damp protection and leave for 7 days to insure curing.

**END OF SECTION**

**PART 1 GENERAL**

**1.01 RELATED REQUIREMENTS**

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 40 00 – Quality Requirements.
- .3 Section 06 08 99 – Rough Carpentry For Minor Works

**1.02 REFERENCES**

- .1 Copper Development Association (CDA).
  - .1 Copper in Architecture Handbook, latest edition.
- .2 American Society for Testing and Materials International, (ASTM).
  - .1 ASTM B 32-00e1, Standard Specification for Solder Metal.
  - .2 ASTM B 370-98, Standard Specification for Copper Sheet and Strip for Building Construction.
  - .3 ASTM D 822-01, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
- .3 Canadian General Standards Board (CGSB).
  - .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
- .4 Canadian Standards Association (CSA International).
- .5 Department of Justice Canada (Jus).
  - .1 Canadian Environmental Protection Act (CEPA), 1999.
- .6 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  - .1 Material Safety Data Sheets (MSDS).
- .7 National Research Council Canada (NRC)/Institute for Research in Construction (IRC) - Canadian Construction Materials Centre (CCMC).
  - .1 CCMC-2002, Registry of Product Evaluations.
- .8 National Roofing Contractors Association (NRCA).
  - .1 Metal roof systems for steep-slope applications, latest edition.

**1.03 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit WHMIS MSDS - Material Safety Data Sheets. WHMIS acceptable to Labour Canada, and Health and Welfare Canada for adhesives, sealants, cleaning products and membranes.
  - .1 Submit product data sheets for separation sheets and underlayment membranes  
Include:
    - .2 Product characteristics.
    - .3 Performance criteria.

- .4 Limitations.
- .3 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Indicate arrangements of sheets and joints, types and locations of fasteners and special shapes and relationship of panels to structural frame.
- .5 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .6 Submit 2 copies of 300 x 300 mm samples of each sheet metal material.

#### **1.04 DOCUMENTATION**

- .1 Document condition of Heritage Metal Elements prior to removal of existing roofing components.
- .2 Photographic Record shall include:
  - .1 General view of the area where repair or dismantling work is to proceed.
  - .2 Location and date of photo must be clearly identified on each photo. Use of erasable portable whiteboards is recommended.
  - .3 Photograph quality: Well-illuminated, properly exposed, sharply focused, and free of motion blur. Resolution: Minimum 3264 x 2448, or 8MP.
  - .4 Include copy of photographs on portable digital storage media, with minimum compression loss.

#### **1.05 QUALITY ASSURANCE - EXECUTION**

- .1 Perform work in accordance with established procedures for Traditional Sheet metal work described in the Copper Development Association (CDA)'s Copper in Architecture Handbook, latest edition and The Standards and Guidelines for the Conservation of Historic Places in Canada, published by Parks Canada.
- .2 Provide demonstrated, specialized, skilled and competent trades persons. The skills of individuals will be subject to review and acceptance by the Departmental Representative. Review will include production of basic mock-ups for all types of work specified.
- .3 Provide a list of the proposed workers a minimum one week prior to commencement of the work.
- .4 No workers shall be changed during the progress of the work without written acceptance by the Departmental Representative.
- .5 All workers shall be required to demonstrate competence levels to the satisfaction of the Departmental Representative, before being permitted to work on the building.

#### **1.06 QUALITY ASSURANCE**

- .1 Submit mock-ups in accordance with Section 01 45 00 - Quality Control
- .2 Install the following mock-ups, 1 m2 minimum and locate where directed:
  - .1 Typical eave and gutter condition
  - .2 Typical copper gutter control joint.
  - .3 Batten roofing on one eave.
  - .4 Flashing
  - .5 Typical reglet and sealant finish.

- .3 Mock-ups will be used to judge workmanship, substrate preparation, operation of equipment, types of material and application and conformity of sizes, profiles and details with existing conditions.
- .4 Allow 72 hours for inspection of mock-up by Departmental Representative before proceeding with sheet metal roofing work.
- .5 Correct mock-ups at Departmental Representative's discretion until required quality of Work is achieved.
- .6 When accepted, mock-up will demonstrate minimum standard of quality required for this Work. Approved mock-ups may remain as part of finished Work.

#### **1.07 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with applicable regional regulations.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Separate for reuse and recycling and place in designated containers metal waste in accordance with Waste Management Plan.
- .4 Place materials defined as hazardous or toxic in designated containers.
- .5 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .6 Ensure emptied containers are sealed and stored safely.
- .7 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .8 Unused paint, caulking, and sealing compound materials must be disposed of at an official hazardous material collections site as approved by Departmental Representative.
- .9 Unused paint, caulking, and sealing compound materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
- .10 Fold up metal banding, flatten and place in designated area for recycling.

#### **1.08 FIELD CONDITIONS**

- .1 Apply primer and self-adhering underlay membrane at ambient temperatures of no less than 10 degrees Celsius, or to membrane manufacturer's recommendations.
- .2 Install copper sheeting at ambient temperatures of no less than 5 degrees Celsius, or to joint sealant manufacturer's recommendations.
- .3 Underlay membrane shall be covered by copper sheeting within 60 days of its application.

### **PART 2 PRODUCTS**

#### **2.01 SHEET COPPER**

- .1 Copper sheet: to ASTM B370, H01 cold rolled temper 110 copper,
- .2 Weight: 6.10 kg/m<sup>2</sup> minimum weight (16 oz), 0.55 mm thick. unless otherwise indicated.

- .3 For edge strips and cleats, use 7.32 kg/m<sup>2</sup>, 0.8 mm thick copper strips.

## **2.02 ACCESSORIES**

- .1 Except as indicated as work of another specification Section, provide components required for a complete roof system, including trim, copings, fascias, ridge closures, cleats, seam covers, battens, flashings, gutters, sealants, gaskets, and closure strips. Match materials and finishes of roof.
- .2 Sealing Tape: Pressure-sensitive 100 percent solids polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- .3 Joint Sealant: One-part, copper compatible elastomeric polyurethane, polysulfide, butyl or silicone rubber sealant as tested by sealant manufacturer for copper substrates.
- .4 Cleats:
- .1 Concealed type as indicated in the "Copper in Architecture " handbook published by the Copper Development Association Inc. (CDA) for flat seam flat lock seam and batten seam.
  - .2 Fabricate cleats to allow thermal movement of copper roof panels while preventing sheet metal panel distortion due to wind uplift forces.
- .5 Trim, Closure Pieces, and Accessories:
- .1 Same material, thickness and finish as adjacent sheet metal roof panels, brake formed to required profiles.
- .6 Bituminous Coating: SSPC-Paint 12, Cold-Applied Asphalt Mastic (Extra Thick Film), nominally free of sulfur, compounded for 15-mil dry film thickness per coat.
- .7 Brass straps for gutters: 3 mm thick, to ASTM B36/B36M, C23000 alloy, red brass.
- .8 Fasteners:
- .1 Except where indicated, all fasteners shall be concealed.
  - .2 Use brass, hard copper or stainless steel fasteners for copper assemblies
  - .3 Use only stainless steel fasteners for galvanized steel assemblies
  - .4 Nails: for nailing cleats to wood, flathead, barbed, wire slating nails minimum 25 mm long and not less than 2.78mm (12 ga).
  - .5 Screws: where indicated, round head screws and lead washers, dimensions to suit.
  - .6 Where cleats are into stone or masonry work through underlay membrane, use series 300 stainless steel concrete screws.
- .9 Underlay membrane: SBS modified bitumen self-adhesive underlay membrane formulated to resist high temperatures (up to 115° C). Top surface is a UV-resistant, tri-laminated woven polyethylene. Self-adhering underface is protected by a silicone release film. Membrane shall be minimum 1 mm thick and 910 mm wide and supplied in 22.9 m long rolls.
- .1 Material must meet criteria below:
    - .1 Tensile Strength: MD – 11.3 kN/mm, XD – 15.4 kN/mm (ASTM D1970)
    - .2 Static Puncture 400 N (ASTM D5602)
    - .3 Lap Adhesion 2000 N/m (ASTM D1876)

- .4 Peel Strength: 3050 N/m (ASTM D903)
- .5 Tear Resistance: MD – 375 / XD – 400 (ASTM D5601)
- .6 Water Vapor Transmission: (ASTM E96, Method B), 0.016 perms (0.9 ng/(Pa\*s\*m2)
- .7 Primer: to underlay membrane manufacturer's requirements
- .10 Slip sheet: Synthetic, water-resistant and vapour-permeable sheeting for use under copper assemblies.
  - .1 Material must meet criteria below:
    - .1 Nominal Thickness: 0.58mm
    - .2 Tensile Strength: MD - 4.94 N/mm, CD – 3.95 N/mm (ASTM D882)
    - .3 Water Resistance: 55cm hydrostatic head of water for 5 hrs (AATCC 127)
    - .4 Water Vapor Transmission: 1309.7 g/m<sup>2</sup> 24hrs (ASTM E96, Method B), 212 perms (12180 ng/(Pa\*s\*m2)
    - .5 Fasteners: to slip sheet manufacturer's requirements.
- .11 Sealant: Asbestos-free sealant, compatible with systems materials, recommended by system manufacturer.
- .12 Rubber-asphalt sealing compound: to CAN/CGSB-37.29.
- .13 Solder: to ASTM B 32.
- .14 Flux: rosin, cut muriatic acid, or commercial preparation suitable for materials to be soldered.
- .15 Lead wool: to Fed. Spec. QQ-C-40, in rope form.
- .16 Sealant: two part urethane sealant, non sag to CAN/CGSB 19.24, Type 2, Class B, colour selected by Departmental Representative

## **2.03 FABRICATION**

- .1 Fabricate metal flashing work to match approved mock-ups and shop drawings, and in accordance with applicable recommendations and details of CRCA Roofing Specifications, Copper in Architecture Handbook by CDA.
- .2 Form individual pieces in sizes, profiles and with details to match approved mock-up.
- .3 Form individual pieces in 2400 mm maximum lengths. Make allowances for expansion at joints.
- .4 Hem exposed edges on underside 12 mm, mitre and seal.
- .5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .6 Apply minimum 0.2 mm dry film thickness coat of plastic cement to both faces of dissimilar metals in contact.
- .7 Tin edges of copper sheets to be soldered for width of 40 mm both sides with solder.

## **PART 3 EXECUTION**

### **3.01 REMOVAL OF EXISTING SHEET METAL**

- .1 Document existing conditions before removal.
- .2 Remove existing sheet metal as shown on drawings
- .3 When removing flashing in areas contiguous to Heritage Metal Elements, ensure that removal technique minimizes damage to retained steel edge.
- .4 If a Heritage Metal element is damaged during removal activities, or if removal activities reveal previously concealed deteriorations that threaten the integrity of the Element, document condition and advise Departmental Representative immediately.

### **3.02 INSTALLATION**

- .1 Use concealed fastenings except where approved by Departmental Representative before installation.
- .2 Provide underlay under sheet metal roofing. Secure in place and lap joints 100 mm minimum.
- .3 Install sheet metal roof panels using cleats spaced at 300 mm on centre.
- .4 Secure cleats with two fasteners each and cover with cleat tabs.
- .5 Stagger transverse seams in adjacent panels.
- .6 Flash roof penetrations with material matching roof panels, and make watertight.
- .7 Form seams in direction of water-flow and make watertight.
- .8 Perform soldering with well heated coppers, heat seam thoroughly and sweat solder through its full width.
- .9 Clean and flux metals before soldering.
- .10 Follow sheet metal manufacturer's recommendations for soldering procedures.
- .11 As work progresses, neutralize excess flux with 5% to 10% washing soda solution, and thoroughly rinse. Leave work clean and free of stains.

### **3.03 SUBSTRATE EXAMINATION**

- .1 Replace damaged wood decking as required. Assume replacement percentages shown on drawings.
- .2 Examine substrates and immediately inform Departmental Representative in writing of defects.
- .3 Prior to commencement of work ensure:
- .4 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris.

### **3.04 UNDERLAY MEMBRANE INSTALLATION**

- .1 Install continuous underlay membrane to plank deck and miscellaneous blocking and join to adjacent work as indicated.

- .2 Prime substrate to membrane manufacturer's instructions. Avoid ponding and let primer dry prior to membrane installation.
- .3 Cut membrane into 3 to 5 m lengths and reroll loosely. Secure end with a nail and peel back 600 mm of release liner, align membrane and continue to peel release liner; press membrane in place with heavy hand pressure.
- .4 Start from bottom of slope and shi lap joints to shed water. Make side laps minimum 90 mm and end laps minimum 150 mm.
- .5 Take precautions not to damage membrane while installing subsequent materials.
- .6 Follow manufacturer's printed recommendations and safety instructions.
- .7 Slipsheet shall be continuous to ensure complete separation of copper and wood components in gutter support and levelling assembly.
- .8 Fasten slipsheet to underlayment membrane with adhesive tape recommended by manufacturer. Fastening slipsheet with nails, screws, staples or any other metallic fastener is not acceptable.

### **3.05 BATTEN INSTALLATION**

- .1 Install battens to reviewed shop drawings, on underlay membrane.
- .2 Place cleats under battens at maximum 300 mm oc and fasten with a copper nail.
- .3 Fasten battens with appropriate stainless steel, hard copper or brass screws into plywood deck. Fasten at 300 mm oc and at maximum 50 mm from ends.

### **3.06 COPPER BATTEN SEAM ROOFING**

- .1 General:
  - .1 Install sheet metal roof panels using cleats spaced at 300 mm on centre along battens and two cleats per panel at joints.
  - .2 Secure joint cleats with two fasteners each and cover with cleat tabs.
  - .3 Place transverse joints in adjacent panels where shown and to reviewed shop drawings.
  - .4 Form seams in direction of water flow and make watertight.
- .2 Perform soldering with well heated coppers, heat seam thoroughly and sweat solder through its full width.
  - .1 Place two strips of saturated roofing felt between underlay membrane and copper sheet prior to soldering at all times. Heat generated by soldering may damage underlay membrane.
  - .2 Clean and flux metals before soldering.
  - .3 Follow sheet metal manufacturer's recommendations for soldering procedures.
  - .4 As work progresses, neutralize excess flux with 5% to 10% washing soda solution, and thoroughly rinse. Leave work clean and free of stains.
- .3 Use copper sheets of dimensions required to make batten seam roofing as shown on Drawings and reviewed shop drawings. Turn up sides of sheets to exceed top of battens by 12 mm. Turn this 12 mm at right angles to battens.

- .4 Form cross seams with 20 mm fold under on lower end and 50 mm fold over on upper end. Slit folds in cross seams at each corner 25 mm in from batten to form tab. Hook 20 mm fold on lower end of pan into 50 mm fold on upper end of underlaying pan.
- .5 Apply sheet metal roofing beginning at eaves. Make continuous hook strips where indicated; use minimum 50 mm wide hook strips where continuous strips are not called for.
- .6 Place cover strips over battens, locking edges with flanges of pan malleted down against sides of battens.
- .7 Cover batten ends with cap folded and locked into extensions of batten covers and vertical legs of pans.
- .8 At intersections of roof slope with ridge of hip battens, turn up edges of roof pans against ridge or hip battens, and terminate in 12 mm horizontal flange at top of battens.
- .9 Install cover strips over top of hip and ridge battens.
- .10 Form valleys of sheets not exceeding 3 m in length. Lap joints 150 mm in direction of flow. Extend valley sheet minimum 150 mm under roofing sheets. At valley line, flat lock valley and roof sheets.

### **3.07 COPPER GUTTERS:**

- .1 General:
  - .1 Install copper stiffeners and clips using appropriate stainless steel fasteners as indicated and to approved shop drawings.
  - .2 Form copper as shown, as detailed on reviewed shop drawings and to approved mock-ups.
  - .3 Longitudinal joints are not permitted. Provide copper stiffeners as shown
  - .4 Make hooked and soldered cross seams where required.
  - .5 Install 3 mm thick brass straps and twist to form a water drip.
  - .6 Shape copper fascia as indicated.
  - .7 Make gutter expansion joints as detailed on the Drawings, reviewed shop drawings and approved mock-ups.
- .2 Remove all flux, scraps and dirt immediately. As indicated, neutralize excess flux with a 5 to 10% solution of washing soda, then drenched with clean water.

### **3.08 FLASHINGS AND REGLETS**

- .1 Install self-adhering underlay membrane under flashings.
- .2 Use 6.10 kg/m<sup>2</sup>, 0.7 mm thick copper or 6.10 kg/m<sup>2</sup>, 0.7 mm thick lead coated copper for flashings as indicated.
- .3 Install continuous hook strips or individual cleats as shown.
- .4 Use only concealed fastenings.
  - .1 Drill into masonry joints where required for installation of stainless steel concrete screws;
  - .2 Take care not to damage stones. Drilling into stone units is prohibited unless authorized in writing by Departmental Representative.

- .3 Fasten cleats and hook strips using stainless steel flat head concrete anchors as indicated.
- .4 Fold cleat tabs over anchor heads.
- .5 Solder joints where indicated; clean and flux joints prior to soldering. Protect underlay membrane as described above.
- .6 Reglets:
  - .1 Verify that reglets to receive flashings have been raked to the correct depth and cleaned. Advise Departmental Representative of defects that may affect work.
  - .2 Insert flashing sheet into reglets to form weather tight junction.
  - .3 Wedge flashings securely into reglets using lead wool to achieve correct joint depth and shape.
  - .4 Caulk joints with specified sealant in accordance with manufacturer's written instructions.
    - .1 Apply sealant in continuous beads.
    - .2 Apply sealant using gun with proper size nozzle.
    - .3 Use sufficient pressure to fill voids and joints solid.
    - .4 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
    - .5 Tool exposed surfaces before skinning begins to give slightly concave shape.
    - .6 Remove excess compound promptly as work progresses and upon completion.
    - .7 Clean adjacent surfaces immediately and leave Work neat and clean.

**END OF SECTION**