Project Title Fort Henry - Curtain Revetment Wall

Project Number 30026566

Project Date March 2015

PART 1 - GENERAL

1.1 Description

.1 General

.1 These detailed specifications cover the requirements for the furnishing of all labour, materials, tools, equipment, power plant, systems, transportation and supervision necessary to completely perform the work, as described by the Drawings and the Specifications for the repairs/restoration of the stone masonry, windows and doors on Blocks 04 to 10 of the Fort Henry Revetment.

.2 Description of Work

.1 The intent of the project is to complete repairs to the stone masonry, windows and doors on the walls of Blocks 04 to 10, to the limits indicated on the drawings and, in conformance with good historic masonry restoration practice. Note that the work is intended to be completed in two phases; the first phase, Blocks 04 to 06, in the 2015-2016 winter season and, the second phase, Blocks 07 to 10, in the 2016-2017 winter season. More specifically, the work consists of the following and as detailed on the drawings and in these specifications.

.1 All work required for site access, provision of work trailer(s), sanitary facilities, etc. and, including restoration of paved, graveled and grassed areas disturbed by this work.

.2 Provision of all necessary access to complete the work including the supply, installation, inspection, maintenance and removal of scaffolding, protective hoarding and housing and heating as required.

.3 Provision of all protection/barricades to the work site to prevent Public access to the work areas.

.4 Provision of protection to all features which may be affected by the work and, to the satisfaction of the Departmental Representative.

.5 All equipment and vehicle access must be pre-approved by Departmental Representative and Owner. No equipment (skid steering or other) shall be used in the Parade Square area which may cause

damage to the asphalt surface. All travelled surfaces must be protected throughout the course of construction. Any damage that occurs to the asphalt surface as a result of failure to comply with this requirement, or for any other reason as a result of this work, shall be repaired to the satisfaction of the Departmental Representative at no additional cost to the Contract. Cold patching will not be accepted as a method of repair. Any repairs must be done by an experienced paving crew and, full width and/or length of the Parade Square.

.6 No loose debris or new stone shall be stored on the bare asphalt surface. All materials must be stored in bins or on skids and placed on plywood.

.7 Completion of repairs to the masonry including: 100% repointing of all masonry joints, Replacement of deteriorated stone, Full Dutchman and partial Dutchman repairs to deteriorated stone and, Crack Repair/injection to stone units,

.8 Sealing of skyward facing masonry joints.

.9 Installation of masonry vents and lead plug demarcation.

.10 Repairs to windows, doors and hardware.

.11 Repairs to gutter system at Block 10.

.12 Completion of clean-up and reinstatement of site.

1.2 Location of the Work

.1 Fort Henry is located on the east shore of the Cataraqui River , in the City of Kingston at the confluence with Lake Ontario.

1.3 Relics and Antiquities

.1 Relics and antiquities such as cornerstones and their contents, commemorative plaques, the remains and evidence of ancient persons and peoples, and other objects of historic value and worth will remain the property of the Department. When found, protect such articles and request directions from the Departmental Representative.

.2 Should historic objects be uncovered during the work, stop work immediately and notify the Departmental Representative. Do not resume work until such time as directed by the Departmental Representative.

1.4 Standards

.1 Reference is made to OPSS, CGSB, ASTM, CSA and other national and international standards. These standards, when quoted, form an integral part of and are to be read in conjunction with the specification as if reproduced herein. The latest edition is applicable, unless a dated edition is specified and it is the contractor's responsibility to have access to or, have possession of these standards for purposes of completing the work of this contract in accordance with these standards.

1.5 Abbreviations

.1 OPSS - Ontario Provincial Standard Specifications

.2 CGSB - The Canadian General Standards Board.

.3 CSA - Canadian Standards Association.

.4 CWB - Canadian Welding Bureau.

.5 CAN2 - A National Standard of Canada published by CGSB.

.6 CAN3 - A National Standard of Canada published by CSA.

.7 ASTM - American Society for Testing and Materials.

.8 ACI - American Concrete Institute.

.9 ANSI - American National Standards Institute.

.10 NBC - National Building Code of Canada.

.11 JIC - Joint Industrial Conference, Hydraulic Standards for Industrial Equipment.

.12 NLGA - National Lumber Grades Authority.

.13 AWWA - American Water Works Association.

1.6 Definitions

.1 Unless the context clearly indicates otherwise, the following definitions apply.
.1 Redoubt - the main fortress works at Fort Henry consisting of escarp walls and a gorge wall surrounding a parade square.
.2 Plans - the drawings listed in the "List of Drawings".
.3 Specification - the subject matter listed in the "Index to Specifications", Addenda to the Specifications and all relative written communications sent by the Departmental Representative to the Contractor in connection with the work.
.4 Department – Parks Canada – Georgian Bay and Ontario East Field Unit and the Ontario Waterways Group.

1.7 Sub-Surface Information

.1 Sub-surface information, when given, is for general information and is not guaranteed.

1.8 Pedestrians and the Public

.1 Provide barricades of not less than 1.8 m high modular fencing complete with dust screen/scaffold netting where indicated to block off work areas from public access. Posts shall not be anchored by drilling into the existing pavement or other existing features, nor shall existing loose rock or other site materials be used as counter balance material. Contractor shall obtain approval on "securing" measures for post stability prior to proceeding with work.

.2 Provide secure coverings to all openings to prevent Public access to the work areas at all times during construction.

.3 The interior corridor of Block 10 (interpretation wing / officer's quarters) is to remain open to the Public during masonry work. This corridor is to be closed to the Public during windows and doors repair work.

.4 The access stairs to the terreplein level at Blocks 04 and 08 shall only have one stair closed off at any one time in order to maintain access to the terreplein level.

.5 The full width and 2.0 m height of the entrance archway to the Parade Square shall be kept open at all times. This will require that full protective hoarding be erected at this opening to ensure the safety of the public is maintained whenever work is carried adjacent to or over this archway.

1.9 Protection of the Work

.1 Protect the work from damage by adverse climatic conditions.

1.10 Measurement for Payment

.1 No quantities associated with items of work described in this section will be measured for payment purposes.

1.11 Basis of Payment

.1 The lump sum price for the item "Site Work" will cover the costs for the following.

.1 Supply, installation and maintenance of site barricades (ie. modular fence).
.2 Provision and maintenance of temporary facilities.
.3 Layout of the work.
.4 Scheduling.
.5 Permits and taxes.
.6 Environmental protection measures.
.7 Rectification of existing surfaces, materials and access routes including topsoil, finish grading, seeding and mulching.
.8 Site Clean-up and restoration.
.9 Any other miscellaneous work items called for on the drawings and specifications and not specifically covered by other payment items of the Contract.

PART 2 - MATERIALS

2.1 Acceptance of Materials

.1 Where materials and equipment are specified to OPSS, CSA, CGSB, ASTM or similar standards, submit a written request to the Departmental Representative for approval of the relevant items. Include all relevant items. Do not use until written approval has been received from the Departmental Representative.

.2 Use new, unused material only, except as noted or approved by the Departmental Representative, in writing.

.3 Materials and equipment specified by a manufacturer's name, catalogue number or trade name are intended to establish a standard of quality. Materials or equipment at least equivalent thereto may be submitted to the Departmental Representative for approval along with proof of equivalence.

2.2 Samples

.1 The Contractor shall be responsible for samples and sampling. The Departmental Representative will be responsible for testing.

2.3 Rectification of Existing Surfaces and Materials

.1 Repair, replace and/or refinish, to the Departmental Representative's approval, existing surfaces and items damaged by the work, including the access route(s).

.2 The repaired, replaced and/or refinished items to be at least equal to those that existed immediately before damage occurred.

.3 Restore topsoil and seed and mulch at the Contractor's expense any grassed areas which have been disturbed by the Contractor's operations under this Contract and which are not covered by other items of the Contract. All topsoil and seeding and mulch repairs to be carried out in accordance with OPSS 570 and 572 (Standard Roadside Mix for seed mix).

.4 Restoration must occur as soon as possible after construction is completed.

.5 Seeded areas will be accepted when the turf is properly established.

PART 3 - EXECUTION

3.1 Requirements of Regulatory Agencies

.1 The Contractor shall be entirely responsible for the design and adequacy of all supports, bracings, blocking, handrails, scaffolding conveyance systems, etc. used in the construction, and shall comply with applicable Provincial and Municipal ordinances.

.2 Adhere to National, Provincial and Municipal requirements relating to the safety, health and protection of workers and the environment.

3.2 Scheduling

.1 The Contract must be completed on or by the date specified in the instructions to tenderers portion of these documents.

.2 Submit the Construction Progress Schedule within five days of award of Contract. No progress payments will be made until the Construction Progress Schedule is approved. Submit a cost breakdown for each lump sum payment item - the breakdown to be in sufficient detail as to permit the calculation of progress payment amounts. Upon receipt of notice from the Departmental Representative, in writing, that the Progress Schedule is not approved or no longer valid, submit a revised Construction Progress Schedule within five days.

.3 Take all necessary measures to complete the work within the scheduled times approved by the Departmental Representative.

.4 Do not make changes to the approved schedule except with the Departmental Representative's approval.

3.3 Layout of the Work

.1 The Contractor to be responsible for all layout and control for the work.

3.4 Temporary Services

.1 The Contractor will be allowed access to the power service at the Fort as approved by the Departmental Representative and within the

capacity of the existing power supply. Any power requirements in excess of that which may be provided by the Fort's supply will be provided for by the Contractor. Temporary sanitary services will be provided by the Contractor. The Contractor shall make his own arrangements to obtain all water required to carry out the work.

3.5 Temporary Facilities

.1 Provide and maintain:

.1 Suitable storage facilities, of types and at locations approved by the Departmental Representative;

.2 A site trailer/office at a location approved by the Departmental Representative, open during working hours;

.3 Necessary scaffolding, ladders and platforms to Canadian Construction Safety Code, NRCC 15562;

.4 All necessary enclosures, guards, guardrails, hoarding, barricades, warning signs, flashing warning lights (for night) and similar items.

3.6 Examination of the Site of the Work

.1 One site visit has been scheduled during the tender period. This visit is tentatively scheduled as indicated in the instructions to tenderer's. Confirmation of attendance is to be made through the Parks Canada Departmental Representative. No other visits will be scheduled by the Owner and, should the tenderer wish to visit the site at other times, it will be his responsibility to make arrangements.

.2 Investigate and be fully informed as to the character and extent of the work to be performed and the difficulties involved, the facilities available for delivering, placing and operating the necessary plant and delivering and handling of materials.

3.7 Clean-Up

.1 Clean and tidy the work area on a daily basis and permit no undue amounts of debris, trash, and/or garbage to accumulate.

.2 At the completion of the work, remove all surplus materials, tools, plant, rubbish and

debris and dispose of them in an approved manner off the site.

3.8 Taxes

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

3.9 Permits

.1 Pay all fees and obtain all permits. Provide authorities with plans and information for acceptance certificates. Notify the Ministry of Labour of the work. Provide inspection certificates as evidence that work conforms with requirements of authority having jurisdiction.

PART 4 - DOCUMENTS

4.1 Documents Required

.1 Maintain at job site, one copy each of following.

.1 Contract Drawings,
.2 Specifications,
.3 Addenda,
.4 Change Orders,
.5 Other modifications,
.6 Field Test Reports,
.7 Copy of approved work schedule,
.8 Manufacturers' installation and application instructions, and
.9 Notice of Project issued by Ministry of Labour.
.10 All items required to be maintained on site as per 01 35 30 - Health and Safety,
.11 Waste Management Plan, and
.12 Site Specific Safety Plan.

PART 5 - ENVIRONMENTAL CONSIDERATIONS

5.1 Fires

.1 Fires and burning of rubbish or any material on site is not permitted.

5.2 Disposal of Waste

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

.2 Do not dispose of waste (including slurry) or volatile materials, such as mineral spirits, oil or paint thinner on site (i.e. into drains and catch basins).

.3 All waste described as subject to Regulation 309, Environmental Act, must be transported with a valid "Certificate of Approval for a Waste Management System" to a site approved to accept the waste.

5.3 Disruption of Site

.1 Minimize disruption of site and restore all damaged features to satisfaction of Departmental Representative and at least to the condition before damage occurred.

PART 6 - PROGRESS PAYMENTS

6.1 Progress Payments

.1 A number of items in this Contract are paid for on a lump sum basis. Prior to submission of the first progress payment claim, the Contractor shall submit to the Departmental Representative a detailed breakdown of these lump sum items in order to facilitate approval and processing of progress payment claims. The detailed breakdown is subject to review by the Departmental Representative.

PART 1 - GENERAL

1.1 General

.1 This section specifies general requirements and procedures for Contractors submissions of shop drawings, product data, samples and mock-ups to the Departmental Representative for review. Note that additional specific requirements for submissions are also specified in other individual sections of these specifications.

.2 Do not proceed with work until relevant submissions are reviewed by the Departmental Representative.

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.4 Where items or information are not produced in SI Metric units, converted values are acceptable.

.5 Contractor's responsibility, for errors and omissions in submission, is not relieved by the Departmental Representative's review of submissions.

.6 Notify the Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by the Departmental Representative's review of submission, unless the Departmental Representative gives written acceptance of specific deviations.

.8 Make any changes in submissions which the Departmental Representative may require consistent with Contract Documents and resubmit as directed by the Departmental Representative.

.9 Notify the Departmental Representative, in writing, when resubmitting any revisions other than those requested by the Engineer.

1.2 Submission Requirements

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

.2 Allow 7 days for the Departmental Representative's review of each submission.

.3 Accompany submissions with transmittal letter containing:
- .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.

.4 Submission shall include:
- .1 Date and revision dates.
- .2 Project title and dates.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractors authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents. Note: submissions without a signed Contractor's stamp will not be reviewed and will be returned to the Contractor for resubmission with the required signed stamp.
- .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.

.5 After the Departmental Representative's review, distribute copies.

1.3 Shop Drawings

.1 Shop drawings: original drawings, or modified standard drawings provided by the Contractor, to illustrate details of portions of the Work, which are specific to the project requirements.

.2 Submit shop drawings as follows:
.1 Minimum of three (3) copies of prints which will be retained by the Departmental Representative plus a reasonable number of prints the Contractor wants returned for the Contractor's use.

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

1.4 Product Data

.1 Product data: manufacturers catalogue sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products.

.2 Submit two (2) copies of product data.

.3 Sheet size: 215 x 280 mm, maximum of 3 modules.

.4 Delete information not applicable to project.

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

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

1.5 Samples

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

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

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

1.6 Mock-ups

.1 Mock-ups: field-erected example of work complete with specified materials and workmanship.

.2 Erect mock-ups at locations acceptable to the Departmental Representative.

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

1.7 Shop Drawings Review

.1 The review of shop drawings by the Departmental Representative is for the sole purpose of ascertaining conformance with the general concept. This review shall not mean that the Departmental Representative approves the detailed design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the construction and contract documents. Without restricting the generality of the foregoing, the Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and, for co-ordination of the work of all sub-trades.

PART 2 - PRODUCTS

2.1 Not used

.1 Not Used.

PART 3 - EXECUTION

3.1 Not used

.1 Not used.

PART 1 - GENERAL

1.1 References

.1 CSA S269.1-1975 (R1998) Falsework for Construction Purposes.

.2 CAN/CSA-S269.2-M87 (R1998) Access Scaffolding for Construction Purposes.

1.2 Related Work

.1 Section 01 54 23 - Access and Protection.

1.3 Construction Safety Measures

.1 Observe construction safety measures of National Building Code, Provincial Government, Workers'/Workmen's Compensation Board and municipal authority provided that in any case of conflict or discrepancy more stringent requirements shall apply.

.2 Comply with requirements of FCC No. 301.

.3 If using a crane for movement of materials and equipment, comply with all applicable regulations including OHSA and CAN/CSA - Z/50-98 (2004).

1.4 Overloading

.1 Ensure no part of Work is subjected to loading that will endanger its safety or will cause permanent deformation.

1.5 Falsework

.1 Design and construct falsework in accordance with CSA S269.1.

1.6 Scaffolding

.1 Design and construct scaffolding in accordance with CSA S269.2

1.7 WHMIS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Labour Canada and Health and

Welfare Canada.

.2 Deliver copies of WHMIS and Materials Safety Data Sheets (MSDS) to Departmental Representative on delivery of materials.

PART 2 - PRODUCTS

2.1 Not used

.1 Not Used.

PART 3 - EXECUTION

3.1 Not used

.1 Not used.

PART 1 - GENERAL

1.1 References

.1 Canadian Standards Association (CSA):
.1 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures.
.2 Crane Work: CAN/CSA-Z/50-98(2004) Safety Code on Mobile Cranes AND OHSA for safe housing and rigging practices.
.3 National Building Code 2010 (NBC):
.1 Division B, Part 8 Safety Measures at Construction and Demolition Sites
.4 National Fire Code 2010 (NFC):
.1 NFC 2005, division B, Part 2 Emergency Planning, subsection 2.8.2 Fire Safety Plan.
.5 Province of Ontario:
.1 Occupational Health and Safety Act and Regulations for Construction Projects, Revised Statutes of Ontario 1990, Chapter O.1 as amended, O. Reg. 213/91 as amended, Reg. 834, 0. Reg. 278/05 (Asbestos - Construction).
.2 Workplace Safety and Insurance Act, 1997
.3 Municipal statutes and authorities.
.6 Canada Labour Code - Part II, Occupational Health and Safety Regulations.

1.2 Submittals

.1 Make submittals in accordance with Sections 01 01 00 and 01 33 00.

.2 Submit site-specific Health and Safety Plan: Within 5 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.
.3 Measures and controls to be implemented to address identified safety hazards and risks.
.4 Contractor's and Sub-contractors' Safety Communication Plan.
.5 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations.

.3 Departmental Representative will review Contractor's site-specific Health and Safety Plan and may provide comments to Contractor within 5 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.

.4 Departmental Representative's review of Contractor's final Site Specific Health and Safety Plan should not be construed as an approval and does not reduce the Contractor's overall responsibility for construction site health and safety.

.5 Submit records of Contractor's Safety Meetings at site meetings.

.6 Submit 1 copy of the Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative when requested.

.7 Submit copies of reports or directions issued by safety inspectors of authority having jurisdiction.

.8 Submit copies of incident and accident reports.

.9 Submit Material Safety Data Sheets for all products and items used on site(MSDS)to Departmental Representative.

.10 Submit names of personnel and alternates responsible for site safety and health.

.11 Submit WSIB - Workplace Safety and Insurance Board, Experience Rating Report for Province of Ontario.

.12 Submit signed Attestation and Proof of Compliance with Occupational Health and Safety Parks Canada form prior to start of sitework.

1.3 Filing of Notice

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

1.4 Safety Assessment

.1 Perform site specific safety hazard assessment related to project. Identifying all potential hazards and controls for mitigation of hazards.

1.5 Meetings

.1 Pre-construction meeting: schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of work.

1.6 Regulatory Requirements

.1 Comply with Acts and regulations of the Province of Ontario.

.2 Comply with specified standards and regulations to ensure safe operations at site.

.3 In event of conflict between any provisions of specified standards and regulations, the most stringent provision governs.

1.7 Project Site Conditions

.1 Work at the site will also involve
.1 A Hazard Assessment and listing of designated substances on site.
.2 Contact with
.1 Silica/dust in Concrete and masonry rubble.
.2 Molds around window and door units on adjacent masonry.
.3 Work at heights.
.4 Work in areas with vehicle access.
.5 Work near utilities.
.6 Work with lime and water.
.7 Lead paint on windows and doors.

1.8 General Requirements

.1 Develop an independent written site-specific Health and Safety Plan based on hazard assessment prior to commencing any site Work and continue to implement, maintain, and enforce plan until after final demobilization from site. Health and Safety Plan must address project specifications.

.2 Relief from or substitution for any portion or provision of minimum Health and Safety

Guidelines specified herein or reviewed site-specific Health and Safety Plan shall be submitted to Departmental Representative in writing. Departmental Representative will respond in writing, where deficiencies are noted and request resubmission with correction of deficiencies either accepting or requesting improvements.

1.9 Responsibility

.1 Be responsible for safety of persons and property on site and for protection of environment to extent that they may be affected by conduct of Work.

.2 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.

.3 Where applicable the Contractor shall be designated "Constructor", as defined by Ontario Act.

1.10 Compliance Requirements

.1 Comply with Ontario Health and Safety Act, R.S.O.

1.11 Unforeseen Hazards

.1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, immediately stop work and advise Departmental Representative verbally and in writing.

.2 Follow procedures in place for Employees Right to Refuse Work as specified in the Act for the Province of Ontario.

1.12 Posting of Documents

.1 Provide documents as follow and post on site in a conspicuous location:
- .1 Contractor's Safety Policy.
- .2 Constructor's Name
- .3 Health & Safety Representatives Name.

.4 Ministry of Labour Orders for Province of Ontario.
.5 Occupational Health and Safety Act for Province of Ontario.
.6 Material Safety Data Sheets.
.7 Safety Plans.
.8 Notice of Project.
.9 Joint Health and Safety Committee Members (where required).
.10 Site Specific Safety Plan.

.2 Comply with Provincial general posting requirements.

1.13 Correction of Non-Compliance

.1 Immediately address health and safety non-compliance issues identified by Departmental Representative and regulatory agency having jurisdiction in the Province or any individual who notes a safety related issue.

.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 a perceived non-compliance of health and safety regulations is perceived to not be immediately corrected.

1.14 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 Competent Supervisor to stop or start Work when, at Competent Supervisor's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop work for health and safety considerations.

PART 2 - PRODUCTS

2.1 Not Used

.1 Not used.

PART 3 - EXECUTION

3.1 Not Used .1 Not used.

PART 1 - GENERAL

1.1 Related Requirements Specified Elsewhere

.1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Departmental Representative are specified under various sections.

1.2 Appointment and Payment

.1 Departmental Representative will appoint and pay for services of testing laboratory except for the following:

.1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.

.2 Inspection and testing performed exclusively for Contractor's convenience.

.3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.

.4 Mill tests and certificates of compliance.

.5 Tests specified to be carried out by Contractor under the supervision of Departmental Representative.

.6 Additional tests specified in paragraph 1.2.2.

.2 Where tests or inspections by designated testing laboratory reveal work not in accordance with contract requirements, Contractor shall pay costs for additional tests or inspections as Departmental Representative may require to verify acceptability of corrected work.

1.3 Contractor's Responsibilities

.1 Furnish labour and facilities to:

.1 Provide access to work to be inspected and tested.

.2 Facilitate inspections and tests.

.3 Make good work disturbed by inspection and test.

.4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

.2 Notify Departmental Representative sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

.3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.4 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by the Departmental Representative.

PART 2 - PRODUCTS

2.1 Not used

.1 Not Used.

PART 3 - EXECUTION

3.1 Not used

.1 Not used.

PART 1 - GENERAL

1.1 Description

.1 This section covers the work of supplying, maintaining, and removing temporary access, housing, and supplementary heating and ventilating (if required) for the workspaces and the work described by the drawings and the specifications.

.2 The housing, heating and ventilating must be sufficient:
.1 To ensure a safe working environment.
.2 To facilitate progress of Work in an efficient manner.
.3 To protect Work and products against dampness and cold.
.4 To prevent moisture condensation on surfaces.
.5 To provide ambient temperatures and humidity levels for storage, installation and curing of materials specifically:
- complete housing and heating a minimum of four days in advance of need.
- Heat, for the initial four day period, to a temperature of 20 degrees C and not less than 10 degrees C during other heating periods.

.3 The requirements of this section apply to all other sections of the specification that call for cold and weather protection or where heating is required to ensure the quality or durability of the work.

1.2 Related Sections

.1 Section 01 54 23 - Access and Protection.

.2 Section 04 43 03 - Repair of Stone Masonry.

.3 Section 04 43 04 - Repointing and Miscellaneous Masonry.

.4 Section 04 43 07 - Installation of Masonry.

.5 Section 08 62 10 - Wooden Windows and Doors.

1.3 Definitions

.1 Housing: enclosure placed around work or around scaffolding and work to provide either protection for the work taking place or to provide a micro-climate more suitable to the work than ambient atmospheric conditions, or both.

1.4 Submittals

.1 Heater numbers, types, locations, and capacities.

.2 Number and location of fire extinguishers associated with heating equipment.

1.5 Housing

.1 Provide housing consisting of 2x4 construction c/w plywood, vapour barrier and insulation for portions of the work which must be protected, heated, and/or ventilated during the work. Design housing to be strong enough to withstand rain, wind and snow.

.2 Prior to commencing heating, inform Departmental Representative of the intent and obtain approval prior to starting. The Departmental Representative will make periodic inspections of the housing and heating works throughout the duration of construction. Cooperate with and make adjustments/changes as directed.

.3 Use suitable new materials or used materials in good condition, approved by the Departmental Representative, or use suitable prefabricated, portable components in a good, safe condition, approved by the Departmental Representative as to type, materials and detail.

1.6 Storage

.1 Store heating fuels and gas to the requirements of the Departmental Representative and in accordance with the environmental sections of these specifications.

1.7 Temporary Heating

.1 Provide temporary heating required during construction period.

.2 The Contractor shall be responsible for posting a watchperson when workers are not present to ensure temperatures are maintained and heating equipment is operating safely.

.3 The Contractor shall be responsible for damage to work and/or work area due to failure in providing adequate heat, protection and supervision during construction.

.4 For Masonry Restoration: Apply in strict conformance with this and related masonry sections of these specifications and manufacturers requirements for specific products used for the masonry repairs.

1.8 Temporary Ventilating

.1 Ventilate storage spaces containing hazardous or volatile materials.

1.9 Measurement and Payment

.1 No measurement for payment will be made for the item, "Housing and Heating - Installation and Removal." Payment shall be by lump sum and shall include all costs for labour, materials and equipment necessary to complete the work of installing and removing insulated housing for the work, as well as for all hook-ups/metering (if required).

.2 No measurement for payment will be made for the item, "Heating." An allowance has been provided on the tender form for this item however, payment will be based on the actual invoiced amount for the delivery of fuels or, electricity, for the heater(s) as well as the rental amount for the heaters(s).

.3 No measurement for payment will be made for the work of providing a watchperson, if required. All costs for the provision of a watchperson, shall be deemed as included in the tendered prices for the above items.

PART 2 - PRODUCTS

2.1 Materials

.1 Only new materials are to be used unless approved otherwise by the Departmental Representative.

PART 3 - EXECUTION

3.1 Heating Equipment

.1 Use only heating equipment types acceptable to Departmental Representative.

.2 Heating fuels:

.1 Use electricity, gas, diesel oil or other fuels approved by the Departmental Representative. Note that electricity availability is limited and an outside source will be required. The Contractor will be responsible for all arrangements and paying of accounts with Hydro if this is the selected method of heating.

.2 Fuel Storage: to the requirements of the Fire Commissioner of Canada.

.3 Heating fuel usage quantities will be recorded monthly and the Contractor will be billed "at cost". Monthly cost shall equal total consumption times the effective volume times rate for the given month as dictated by the heating fuel provider.

Note that a natural gas line with operating valve is located at the site. A line with usage meter may be installed for use on project upon approval by the Departmental Representative. Adequate lock and tagging procedures are to be implemented at all times when gas is not in use. (See Drawing S2 for location).

.4 Provide and maintain temporary fire protection equipment during performance of work commensurate with fuel source selected.

.3 All installation and removals of meters and/or piping shall be performed by a Fitter/Installer CSA certified for the type of fuel being used. Contractor is responsible to maintain piping and associated heating systems at no additional cost to the Owner.

.4 Ensure that the heating requirements are met by providing, at optimum efficiency of the equipment, a capacity of 125% of the heat requirement and a sufficient number of standby heaters ready for use at the site.

.5 Vent the exhausts of heating equipment to the outside of the housing and well clear of combustible materials.

3.2 Removal of Heating and Ventilating Equipment

.1 Upon receipt of the Departmental Representative's approval:

.1 Discontinue heating operations;

.2 Remove housing and heating equipment from the site.

3.3 Field Quality Control

.1 Provide acceptable maximum-minimum thermometers inside the housing and maintain to satisfaction of Departmental Representative.

.2 Ensure continuity of protection by posting a watchperson at Contractor's discretion when work is not in progress.

.3 The watchperson's qualifications, under this section of the specification, are to be sufficient to perform, on heating equipment, such duties as:

.1 Preventative maintenance and re-fueling normally performed during any shift.

.2 Emergency repairs of minor complexity.

.3 Place standby items in service.

.4 Record maximum and minimum temperature at each thermometer on a daily basis and re-set the thermometers when requested by Departmental Representative or at prescheduled intervals.

.5 The temperature records are to be available to the Departmental Representative on a daily basis and certified written records are to be provided to the Departmental Representative on a weekly basis.

PART 1 - GENERAL

1.1 Items of Work

.1 This section covers the requirements for the provision of access to permit work to be carried out for restoration of the masonry, windows and doors and, gutter over Block 10, within the limits indicated. The Fort is open for Public tours during construction. NOTE: the interior corridor of 'Block 10', known as the Officer's Quarters, interpretation wing, must remain open to the Public during masonry construction. The corridor is then to be closed at completion of masonry repairs and prior to commencement of doors and windows repair work. Refer to drawings for other specific signage and access protection requirements during construction.

.2 The supply, maintenance and removal of all plywood covers or, other protective measures deemed necessary by the Departmental Representative, to protect existing architectural features.

.3 The supply, maintenance and removal of all plastic sheeting, complete with taping, at all openings that can permit dust entering any of the rooms of the Blocks. Note that the Contractor must use whatever means necessary to ensure that dust does not enter these rooms. A survey of the rooms will be conducted at the commencement of the work and at various "critical" points of the work. Should dust be found to be entering the rooms, the Contractor shall halt all dust generating activities and shall only re-start these activities after further sealing measures have been undertaken and approval to proceed is given by the Departmental Representative. Such approval shall not be considered an endorsement of the method of protection and should the re-sealing measures not be adequate, further measures will be required until such time that dust does not enter these rooms and such measures shall be carried out at no additional cost to the Contract. No sawcutting, sanding or other dust generation activities are permitted in building interior, inside hoarding, or near open doors or windows except where in-situ repair or finish work requires. In such cases provide dust collection devices on tools to limit dust.

.4 Access to permit work to be carried out to the walls shall be by means of standard scaffolding.

.5 Provide shop drawings of all scaffolding methods and locations.

1.2 Related Work

.1 Section 01 01 00 - General Requirements.

.2 Section 01 51 23 - Housing and Heating.

.3 Section 04 43 03 - Repair of Stone Masonry.

.4 Section 04 43 04 - Repointing and Miscellaneous Masonry.

.5 Section 04 43 05 - Masonry Removals.

.6 Section 04 43 06 - Cut Stone.

.7 Section 04 43 07 - Installation of Masonry.

.8 Section 08 62 10 - Wooden Windows and Doors.

.9 Section 07 62 00 – Flashings and Sheet Metal.

1.3 Definition

.1 Scaffolding: any method used for access to carry out the work such as rigid framed scaffolding, mobile access buckets, cranes, ladders, etc.

1.4 Measurement and Payment

.1 No measurement for payment will be made for the item "Access and Protection". Payment shall be by lump sum. All costs for labour, equipment and materials necessary to erect and dismantle the scaffolding, barriers and protective measures to architectural and base support features and to maintain it for the duration of the work are to be included in the lump sum bid for this item.

.2 For purposes of facilitating progress payments, the portion of the lump sum covering all costs related to the item "Access and Protection" shall be considered to be broken down as follows:

.1 50% will be paid on satisfactory completion of scaffolding (or other approved access means) set-up (pro-rated for the percentage of coverage in a given set-up, as proposed by the Contractor).
.2 15% will be paid on satisfactory completion of scaffolding (or other approved means) dismantling and removal from the site.
.3 The remaining 35% shall be pro-rated over the duration of the Contract based on the schedule submitted by the Contractor.

PART 2 - PRODUCTS

2.1 Scaffolding

.1 Scaffolding materials shall be new, or used materials in good condition.

.2 Provide three sets of shop drawings to the Departmental Representative for review and approval.

PART 3 - EXECUTION

3.1 Scaffolding, Hoarding and Barriers

.1 Provide all scaffolding, ladders, access, lifting equipment, etc. as necessary to carry out the work of all trades and as per the requirements of the work. All work to be in accordance with the Occupational Health and Safety Act. Field measure to ensure proper fit of all works.

.2 Access to the northwest Block 11 shall be maintained at all times (closest door to scaffolding) to allow Public access to tour route. Access through the main entrance archway shall also be maintained at all times during the course of the work as well as one of the stairs to the terreplein level at either Blocks 05 or 08.

.3 Scaffolding shall be erected on wood sills which are placed on tarps to prevent discolouration or contamination of surfaces. No stockpiling of materials (new or waste) directly on asphalt surface. Plywood or other protective matting must be placed as a base.

.4 Provide suitable ladders to scaffolding at each section of scaffold isolated from other sections, for full height of scaffold. Access from the ladder(s) to the scaffolding shall be clear of obstructions and cross bracing so workers and materials can easily enter.

.5 Scaffolding, over 15 m in height, shall be designed and inspected by a registered Professional Engineer experienced in this work. Provide shop drawings for review. All drawings shall be stamped and signed by a registered Professional Engineer experienced in this work. Make all changes required by Ministry of Labour officials. All scaffolding to be inspected by competent individual designated by the Contractor prior to each work shift and certified using scaffold safety status tag system. Inspector to initial and date appropriate scaffold status tag and post at scaffold access point. All persons accessing scaffold are to verify scaffold has been certified for access prior to use. Scaffolding tagged as unsafe are to be securely roped off to prevent access, repair as required and certified by competent individual.

.6 Install, maintain and remove all plywood covers or other measures to protect existing architectural features.

.7 Contractor shall be responsible for removal of all anchors from the masonry (Note, anchors shall only be installed in masonry joints and not in stone units). Contractor is responsible to ensure all holes are filled to the satisfaction of the Departmental Representative as scaffolding is dismantled.

.8 Install, maintain and remove all barriers around the site to prevent access by the Public to the immediate work areas. All barriers to be in accordance with the Occupational Health and Safety Act.

.9 Where required to prevent Public access, all hoarding to be panelized 1.2 metres wide x 2.4

metres high. Provide locks on all doors accessing the scaffolding through the hoarding. Securely brace and fasten to resist all wind loads.

3.2 Dust Protection

.1 At all (doors, openings, windows etc.) provide sealing to prevent dust penetration to the room interiors. This shall include sealing on both inside and outside of windows and doors, as well as over the museum windows and doors on the inside of the casemate, to the satisfaction of the Departmental Representative. Note that dust penetration to the room interiors is not permitted and the Contractor shall use whatever means is necessary for ensuring that this requirement is met. Should the Contractor fail to meet this requirement, all costs for cleaning of the rooms and artifacts to the condition existing prior to this work, shall be at the Contractor's expense.

PART 1 - GENERAL

1.1 Items of Work

.1 Unless otherwise noted, provide all necessary shoring to support stonework remaining when removals occur and support from below is lost.

.2 Provide bracing as required to ensure that all masonry remains stable at all times.

1.2 Related Work

.1 Section 01 33 00 - Shop Drawings, Product Data, Samples and Mock-ups.

.2 Section 04 43 05 - Masonry Removals.

1.3 Definitions

.1 Bracing: temporary support installed in structure to increase rigidity in both longitudinal and transversal axes and thus stabilize against deformations.

.2 Shoring: temporary support installed in an excavation or structure to relieve vertical and/or horizontal loads to permit alterations or repairs to foundation or main supporting elements.

1.4 Source Quality

.1 Structural Steel to conform to CSA G40.21-98, Grade 300W or Grade 350W.

.2 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.3 Plywood identification: by grade mark in accordance with applicable CSA standards.

1.5 Measurement and Payment

.1 No measurement for payment will be made for the work of this section. All costs associated with the work of bracing and shoring shall be deemed to be included in the related masonry items.

PART 2 - PRODUCTS

2.1 Material

.1 Structural members: solid timber or built-up timber group A, B, C or D, grade structural No. 1 to CAN/CSA-0141-91.

.2 Structural steel members: to CSA G40.21-98, Grade 300 or Grade 350, Type W.

.3 Wood connections: Canadian soft wood plywood to CSA 0151-M1978, Douglas Fir plywood to CSA 0121-M1978, Poplar plywood to CSA 0153-M1980 sheathing grade.

.4 Steel connections: steel plates and angles to CSA G40.21-98, Grade 300 or 350, Type W.

.5 Nails: to CSA B111-1974.

.6 Bolts: lag screws, nuts and washers to CAN3-086-M84.

.7 High-tensile bolts: to ASTM A325M-86.

.8 Welding materials: CSA W59-M1984.

.9 Temporary Jack Posts: Heavy duty and having capacity as indicated on drawings or as required by design Engineer for bracing and shoring systems to arches, columns/pilasters or removed wall sections.

PART 3 - EXECUTION

3.1 Inspection

.1 Before work is begun, inspect conditions upon which this work depends for damage and weakness and inform Departmental Representative in writing of conditions not discussed in Contract.

3.2 Installation

.1 Erect structural timber to CAN3-086-M84.

.2 Fabricate and erect structural steel work to CAN3-S16.1-M84 and CAN3-S136-M84.

.3 Weld to CSA W59-M1984.

.4 Install braces and/or shoring to support masonry to remain.

.5 Install braces as required to maintain stone masonry in a safe and stable condition.

.6 Install packing behind wall pieces to compensate for unevenness of wall surfaces.

3.3 Maintenance

.1 Maintain effectiveness of system by making adjustments, replacing or repairing damaged and weakened elements of system until final completion of project.

PART 1 - GENERAL

1.1 Description of the Work

.1 This section covers the requirements for the supply and installation of repairs to individual stone units. It is intended that patching and injection materials will be used predominantly to fix surface deteriorated or broken stones but, which are otherwise sound. The Departmental Representative will direct which stones are to be patched or, cracks repaired by the injection of Dispersed Hydrated Lime (DHL)or with patching mortar.

1.2 Submittals

.1 Submit the following items in time to prevent delay of the work and to allow adequate time for review and resubmittal, if needed; do not order materials or start work before receiving the written approval:

.1 Certificates, except where the material is labeled with such certification, by the producers of the materials, that all materials supplied comply with all the requirements of these specifications and the appropriate standards.

.2 Color-match patch samples fabricated on pieces of appropriate masonry from or on the structure using the specified repair mortar as required.

.3 Written verification that all specified items will be used. Provide purchase orders, shipping tickets, receipts, etc. to prove that the specified materials were ordered and received.

1.3 Quality Assurance / Test Requirements

.1 Masonry Repair Mortar (horizontal cracks/delaminations) and DHL (vertical cracks) Color-Match Samples: Prepare a minimum of three samples of the crack repair (patching mortar and DHL) using masonry removed from the structure where designated by the Departmental Representative. Prepare, install, and finish each sample repair according to the specifications. ALL SAMPLES MUST BE APPLIED TO MASONRY. Prepare samples in an area where they will be exposed to the same conditions as on the structure during curing. Allow samples to cure at least three days before obtaining Departmental Representatives approval for color match. Samples should be viewed from a distance

of approximately 3.0 m.

1.4 Delivery Storage and Handling

.1 Materials are to be delivered, stored, and handled to protect them from damage, extreme temperature, and moisture in accordance with Manufacturer's written instructions.

.2 Deliver and store material in Manufacturer's original, unopened containers with the grade, batch, and production date shown on the container or packaging.

.3 Comply with the Manufacturer's written specifications and recommendations for mixing, application, and curing of mortars and adhesive materials.

.4 Use materials from same manufacturer throughout project.

1.5 Protection / Site Conditions

.1 Cold Weather Requirements: Do not work in temperatures below 5°C, when the substrate is colder than 5°C, or when the temperature is expected to fall below 5°C for 48 hours after installation of repair mortars and injection materials. Building an enclosure and heating areas to maintain this temperature may only be done with the written approval of the material Manufacturer. Remove work exposed to lower temperatures as directed by the Departmental Representative.

.2 Hot Weather Requirements: Protect repair mortar from direct sunlight and wind using protection measures submitted and approved when the ambient air temperature exceeds 21°C. Do not use or prepare mortar or adhesive material when ambient air temperature is above 32°C at the location of the work.

.3 Use all means necessary to protect the materials of this section before, during, and after installation and to protect the work and materials of other trades, the building, and the public.

1.6 Measurement and Payment

.1 Measurement for payment for the items “Crack Repair (DHL)”, “Crack Repair (Patching Mortar)”

and, "Patch Repairs", shall be by the cubic decimeter (dm3) (100 mm x 100 mm x 100 mm), acceptably installed and finished. The Contractor shall prepare all areas to be patch repaired (or a grouping agreed to with the Engineer) and, prior to installing any patch repair material, shall notify the Departmental Representative in advance (minimum of 24 hours) to permit measurements to be taken to establish the volume of patch material to be placed. The measurements shall be completed by both the Departmental Representative, and a representative of the Contractor. The data sheet containing the measurements shall be signed off by both individuals who completed the measurements and these measurements shall be considered as the final quantity for payment purposes. Should the Contractor proceed with the installation of patch material before measurements are made, measurements of the completed face area of the patches will be made with the depth to be assessed by the Departmental Representative based on measurements already completed in other areas, areas yet to be completed and/or other reasonable means determined by the Departmental Representative. In all cases, the Departmental Representative's final decision shall be considered the basis on which payment will be made.

.2 Payment at the unit price bid for the above items, shall be full compensation for all labour, equipment and materials necessary to do the complete work for these items in accordance with the Contract Drawings and these Specifications.

PART 2 - PRODUCTS

2.1 Masonry Patching

.1 Acceptable products for repair of horizontal cracks or delaminations and completion of isolated patch repairs to corners/edges of stone: Jahn Restoration Mortar, M70. The Contractor must use premixed cementitious patching material formulated to match the color and texture of the existing masonry that does not contain any acrylic, latex, or other synthetic polymer additives. The mortar need only be mixed with potable water at the site. The mortar must by vapor permeable, frost and salt resistant,

shrink resistant, and be physically compatible with the substrate, including, but not limited to, porosity, tensile, and compressive strength. If proposed alternate product is submitted, thorough lab testing shall be required to establish equivalent performance levels. An independent testing laboratory shall be utilized as determined by the Departmental Representative and paid for by the submitting party.

2.2 Crack Injection (DHL) .1 Dispersed Hydrated Lime (DHL) as supplied by U.S. Heritage Group. Provide pigments as required to obtain acceptable colour match.

PART 3 - EXECUTION

3.1 Workmanship .1 Mortar workmanship should comply with all applicable recommendations of the material manufacturer's written specifications and requirements except as modified in this and the following section.

.2 Do not use any additives, such as bonding agents, accelerators, or retarders, in the mortar without prior written approval from the Manufacturer.

3.2 Preparation for Patching .1 At areas to receive patches, remove all loose mortar and masonry to a sound substrate.

.2 Roughen the substrate surface as necessary to achieve the surface roughness required by manufacturer for good bond, but do not damage the substrate surface.

.3 Clean all dust from surface and pores of the substrate, using clean water and a scrub brush. Leave surface damp for optimum bond.

.4 For very dry or porous surfaces, pre-wet the substrate ahead of time to prevent the substrate from drawing moisture out of the patch too quickly. Re-wet the surface just before applying the patching material.

3.3 Mixing Mortar For Patching

.1 Do not mix more material than can be used within 30 minutes. Discard any material that has been mixed for 30 minutes or more.

.2 Mixing Ratios to be as recommended by manufacturer

.3 Mix water and dry ingredients well. Adjust amount of water depending on the weather and the porosity of the substrate in accordance with the Manufacturer's printed instructions.

3.4 Application of Patching Material

.1 Apply the patching mortar using a trowel/spatula in accordance with the manufacturer’s recommendations. Work mortar firmly into the surface of the masonry.

.2 Build up patching material (for horizontal crack or delamination locations and isolated patches) so that it is slightly above adjacent masonry surface. Allow 15 to 30 minutes to set slightly, (this will vary depending on the weather - much longer in cool weather) then scrape off excess material using a straight edge. Do not press down or "float" the patch. Where patches occur at stone edges or corners, form mortar to match the profile of the surrounding masonry. In all cases, finish patch so that it is as indistinguishable as possible from the adjacent masonry.

3.5 Additional Finishing Techniques

.1 Clean any patch residue from area surrounding the patch by sponging as many times as necessary with clean water. This should be done before patching material sets.

3.6 Curing Procedure

.1 Install patching materials preferably on days when area will be available for misting during the next two consecutive days. If this is not possible, cover patch with plastic, taped in place, and begin misting as soon as possible. Never cover patches with plastic immediately after finishing.

3.7 Application of DHL Injection Material

.1 Mix only as much product as is required for immediate use and apply in strict conformance to manufacturer's recommendations.

.2 Pigment materials to achieve a colour match to the stone. Apply finish in strict accordance with manufacturer's recommendations.

PART 1 - GENERAL

1.1 Description of Work

.1 Work of this section includes, but is not limited to:

.1 The areas of stonework to be chipped and repointed, are as shown on the drawings or as delineated in the tender items.

.2 Re-setting of dislodged masonry units. Portions of the masonry are in a deteriorated condition and therefore great care must be exercised in carrying out the work.

.3 Where voids are encountered in joints, or behind removed masonry units, mortar fill is to be installed as directed by the Departmental Representative.

.4 Installation of masonry vents.

.5 Sealing of skyward facing joints and joints containing electrical feeds.

.6 The careful dismantling of existing wall mounted sconce lights, re-furbishing in accordance with Section 07 62 00, “Flashings and Sheet Metal”, and, re-installation. Note that the electrical feed cables to these lights are buried in the adjoining masonry joints. Ensure all power is off prior to commencing any joint cutting out operations.

.7 The removal of anchors to existing rainwater leaders and installation of new stainless steel anchors.

.8 Removal, supply and installation of scupper stones identified in drawings, to match existing scupper stones in geometry and finish details.

1.2 Related Work

.1 Section 01 54 23 - Access and Protection.

.2 Section 04 43 01 - Bracing and Shoring.

.3 Section 04 43 03 - Repair of Stone Masonry.

.4 Section 04 43 05 - Masonry Removals.

.5 Section 04 43 07 - Installation of Masonry.

.6 Section 08 62 10 - Wooden Windows and Doors.

.7 Section 07 62 00 – Flashings and Sheet Metal.

1.3 Qualifications

.1 All work to be completed by skilled tradesmen, experienced in the type of work specified.

.2 The work of this section shall be executed under the continuous supervision and direction of a competent mason.

.3 One thoroughly experienced, reliable and competent workman shall be in charge of all mortar mixing for the duration of the job.

1.4 Definitions

.1 Repointing: filling and finishing of masonry joints from which mortar has been raked out or omitted.

.2 Tooling: finishing masonry joints to provide final contour.

.3 Repair: using adhesives to sections of fractured masonry.

.4 Consolidation: strengthening masonry units to prevent deterioration (spalling).

1.5 Standards

.1 All masonry restoration to be to CSA A371-94, "Masonry Construction for Buildings" and as augmented by these specifications.

.2 "Mortar and Grout for Unit Masonry" to be in accordance with CSA A179-94 and as augmented by these specifications.

.3 "Connectors for Masonry" to be in accordance with CSA A370-94 and as augmented by these specifications and the Contract drawings.

.4 "Quicklime for Structural Purposes" to be in accordance with ASTM C5-79 (1992).

.5 "Hydrated Lime for Masonry Purposes" to be in accordance with ASTM C207-91 (1992).

1.6 Inspection and Testing

.1 Routine testing of materials, of proposed mortar mix and of final work for compliance with the specification, will be carried out by the Departmental Representative. Mortar samples

shall be taken from time to time for testing.

.2 If test results show that performance criteria are not met, removal and repair of rejected work shall be performed at no additional cost to the Owner. All work must be done to the original specification.

1.7 Standard Reference Test Panel

.1 Before commencement of final pointing work, the Contractor shall complete up to a 2.0 square metre (m^2) test panel demonstrating all aspects of the repair procedure for each type of masonry materials specified.

.2 The panel(s) shall be located as directed by the Departmental Representative.

.3 The completed panel is to be used as the standard reference for acceptance or rejection of all repointing work on the job.

.4 Start work only upon receipt of written approval of the test panel by the Departmental Representative.

1.8 Samples

.1 Submit mortar samples in quantity and size to the requirements of CSA A179M.

.2 Clearly labelled samples of all materials to be used on the job shall be submitted to the Departmental Representative for approval before work starts.

.3 The approved samples shall become the standard for the materials used on the job. Substitutions shall not be permitted without written approval from the Departmental Representative.

1.9 Storage and Handling of Materials

.1 Store cementitious materials in accordance with CSA A5. Store aggregates in accordance with CSA A23.

.2 All materials are to be kept dry and protected from weather and contamination. Masonry units are to be stacked on pallets.

.3 Manufacturers' labels and seals must be intact

upon delivery.

.4 Any material that has deteriorated or has been contaminated shall not be incorporated into the work and must be removed from the site.

.5 Store lime putty in plastic-lined, sealed drums. Do not allow lime putty to freeze at any time.

1.10 Environmental Requirements

.1 When the air temperature is less than 5°C, sand and mixing water shall be heated to produce mortar at a temperature of not less than 5°C or more than 27°C.

.2 No mortar may be placed when the temperature is below 0°C (32°F), or below 4°C (40°F) and falling. Repointing must not be done at temperatures above 27°C (80°) unless shading and water-misted burlap is provided over new work.

.3 All newly laid masonry mortar placed during cold weather, shall be protected and heated in a manner that will maintain an air temperature above 5°C for 24 hours beyond the required curing period, by means of a covering or enclosure and where necessary by supplementary heat. During cold weather and prior to placing new masonry, area is to be heated for a minimum of 48 hours so that the masonry or base materials to which the new masonry is to be placed is completely free of frost and above a temperature of 5°C.

1.11 Protection

.1 All methods of enclosure and protection shall be to the approval of the Departmental Representative.

.2 Newly laid mortar shall be protected from excessive exposure to rain, full sunlight and wind until the surface is thumb-print hardened.

.3 Provide and maintain protection for masonry walls at all times, when work is suspended, to prevent water from entering partially repointed masonry or to prevent rapid drying of the joints resulting in the development of shrinkage cracking.

.4 Protection shall consist of non-staining plastic sheets, tarpaulins or burlap, secured to prevent lifting in high winds.

.5 Provide protection boards to exposed corners and

vulnerable decorative work which may be damaged by construction activities. Maintain protection for the duration of operations. Remove and dispose of protective material as directed by the Departmental Representative.

.6 Provide protection against the spread of dust, debris and water at or beyond the work area by suitable enclosures of sheeting and tarpaulins.

1.12 Existing Condition

.1 The Contractor shall report to the Departmental Representative, in writing, all areas of severely deteriorated masonry revealed during the work, and shall await instruction regarding repair or replacement of masonry units.

1.13 Measurement for Payment

.1 Measurement for payment for the following items shall be as indicated.

.1 Mortar fill .....(m^3)
.2 Remove & Reset Loose Masonry Units..(m3)
.3 Masonry vents .....(each)
.4 Remove Existing Inserts.....(each)

.2 No measurement for payment will be made for the item "Seal Skyward Facing Joints". (vertical joints in top stones on wall, cracks in sill stones and joints containing electrical feeds, as delineated on the Drawings). Payment shall be by lump sum.

.3 No measurement for payment will be made for the item "Chip and Repoint Masonry Joints". Payment shall be by lump sum and shall include the work of installing new caulking to window and door frames, after these units have been repaired and painted, and the installation of new electrical feeds to re-furbished light fixtures. Note that the extent of this item includes all chipping and repointing of masonry joints in the walls and including return wall areas to windows and doors.

.4 Also include under the “Chip and Repoint Masonry Joints” item the removal, re-furbishing and reinstallation of existing wall mounted lights and the removal of existing anchors to rainwater leaders and installation of new stainless steel anchors.

.5 For the removal and resetting of loose masonry units, the volume shall be based on the average dimensions of the void in which the unit is to

be reset. Units dealt with under this item will only be as authorized by the Departmental Representative and shall not be considered as part of the work of sections 04 43 05, Masonry Removals, or 04 43 07, Installation of Masonry. Where large loose units are reset by packing voided joints with mortar, all mortar not paid for under the relevant Chip and Repoint item shall be paid for under the mortar fill item and no payment will be made under the Item "Remove and Reset Loose Masonry Units".

1.14 Basis of Payment

.1 Payment at the unit or lump sum prices bid for the above items shall be full compensation for all labour, equipment and materials necessary to do the work of these items in accordance with the Contract Drawings and these specifications.

PART 2 - PRODUCTS

2.1 Water

.1 Water shall be potable and free from contamination.

2.2 Cement

.1 Cement shall be a white non-staining Portland cement with an acceptable product being that manufactured by Federal Cement Ltd., Ingersoll, Ontario or equal.

2.3 Lime

.1 Lime shall be either:

i) Slaked quicklime putty made from finely ground crushed quicklime conforming to CSA A82.(quicklime for structural purposes, acceptable product as manufactured by Domtar Chemicals Ltd., Beechville, Ontario: 5 mm (3/16") - fines, dry-bagged quicklime)or,

ii) Dolomitic finishing hydrated lime (Type S) or Masons hydrated lime (Type N) conforming to CSA A82.

2.4 Pigments

.1 Pigments shall be approved dry, powdered, inorganic pigments compatible with the materials to which the pigment is added.

2.5 Aggregates

.1 The aggregate shall be well-graded sand (concrete sand conforming to CSA A-179) matching the texture and range of sizes found in both the test sample and the joints that will not be repaired in the surrounding area. The colour of the sand shall match that of the surrounding mortar; a blending of sands may be required to achieve a satisfactory colour match. The colour of the mortar should ideally be achieved through the mixing of colours of sand. Colour match using pigments must only be done after approval is given by the Departmental Representative.

2.6 Caulking

.1 Caulking for sealing joints between the masonry and door or window frames shall be either a 1 part polyurethane based sealant or a 2 part polytreidyne meeting Federal Standard TTS0227E such as "Dymeric" by Tremco or, approved product. Colour to match cured mortar. Approval from Departmental Representative must be given in writing prior to installation. Install caulking according to manufacturer's instructions.

2.7 Sealing Skyward Facing Joints and Joints Containing Electric Cables

.1 Sealing skyward facing masonry joints and joints containing electric cables shall be completed using an acrylic latex sealant. An acceptable product for this work is "Perma Chink", which is used for filling joints in log homes.

.2 Bond Breaker: Use closed cell polyethylene backer rod recommended by sealant manufacturer or, where depth of joint prohibits use of backer rod, use recommended adhesive backed bond breaking tape.

2.8 Air Entraining Agent

.1 Air entrainment of the final mortar mix shall be between 15% to 17% as measured in accordance with CSA A23.2-4c. If this cannot be achieved by mixing, an air entrainment agent (an acceptable product is "AIREXTRA", by Euclid Admixture Canada Inc.), shall be added. Dosage to be as recommended by the Manufacturer.

.2 Note that air entrainment in bedding mortars, for laying new stone units, may be reduced to

facilitate the work.

2.9 Masonry Vents

.1 An approved product is the screened aluminum louvre vent manufactured by "Midget Louvre Co., (Generally available at local construction supply outlets).

2.10 Stainless Steel Anchors

.1 New stainless steel anchors to the existing rainwater leaders shall be of the same size as existing and installed as per good trade practice.

PART 3 - EXECUTION

3.1 Cutting Out Deteriorated Jointing

.1 Unless otherwise noted herein, all joints are to be cut out to the full height of the joint and to minimum depths as follows.

.1 Complete removals in joints to depths as indicated in the drawings.

.2 If loose material is encountered during removal for joints, removal and replacement of up to a 100 mm depth shall be included in the work of chipping and repointing.

.3 For joints greater than 50 mm in width, the Departmental Representative shall provide direction as to whether or not new stone units are to be installed as part of the repointing operation. Where authorized, the supply and installation of new stone units shall be in accordance with Sections 04 43 07, "Installation of Masonry" and 04 43 19, "Cut Stone". Proceed as directed by the Departmental Representative.

.4 Where loose, powdery or sandy joint material is encountered (deeper than that required for re-pointing) during the raking out operation, notify the Departmental Representative who will provide direction on how to proceed. As a guideline, if the joint is otherwise full and the section of masonry is of medium to low structural importance, the joint shall be repointed to contain the loose, powdery material and seal against water penetration. If, on the other hand, the joint is voided and/or of primary structural importance, the joint shall be packed with mortar fill to the level of the base of finish pointing or the unit shall be removed and reset in a complete bed of mortar. The installation of mortar fill shall be covered under the item "Mortar Fill" while removal and

resetting shall be covered under the item "Remove and Reset Loose Masonry Units".

.2 Metal fittings such as nails, brackets, wood wedges, clips and the like must be removed from wall areas as cutting out proceeds.

.3 Foreign materials such as joint caulking and tar shall be considered to be defective and shall be removed in their entirety from the joints under this item.

.4 Ensure that power is off to light fixtures prior to cutting out joints. Carefully cut out joints containing electrical feeds. Departmental inspector will review condition of electrical feeds once removals are completed and provide direction for replacement. For purposes of this contract, assume that all electrical feeds are to be replaced “in kind” and, by a certified electrician.

3.2 Method of Cutting Out

.1 All cutting out is to be done by skilled labourers under the direction of a competent mason experienced in this type of work.

.2 For all joints, tools for removal shall be thinner than the mortar joint to ensure that stone arises are not damaged. Joints are not to be evened out. The Contractor may use a small diameter diamond saw for very fine joints subject to review of the contractor's workmanship by the Departmental Representative.

.3 All cutting out of joints is to be done with hammer and chisel, unless otherwise specified herein or approved by the Departmental Representative.

.4 Joints may be partially cut out with power saws and grinding wheels under the following conditions:

.1 All work to be done under the direct supervision of the foreman.

.2 Power equipment may be used only to score one cut in each joint at the centre of the joint; the cut is to be no more than one half the width of the joint; and cut to the full required removal depth of the joint.

.5 Final cutting out of the joints is to be made with serrated tools or sharp bolsters, to detach the upper and lower fragments remaining. Do not

clean out joints with power equipment. All finish work is to be done by hand.

.6 When cutting out is completed in each area, all joints are to be brushed clean of debris and, in general, the joints blown clean with medium-pressure compressed air. Where loose, powdery joint material is encountered, obtain direction from Departmental Representative on method of final joint cleaning.

3.3 Air Cleaning

.1 After chipping out joints, the joints (unless loose and powdery) shall be blown clean with compressed air with a pressure of at least 345 kPa (50 psi). Water should not be used to remove debris.

.2 In some areas, loose, powdery (sandy) mortar may exist and it is intended to be flushed out with low pressure 69 KPa (10 psi) compressed air or water. Prior to cleaning, the joints will be assessed by the Departmental Representative and direction given.

.3 Care shall be taken so that stones do not lose all support.

3.4 Repointing

.1 Preparation of Lime Putty

.1 Estimate the quantity of lime putty required to complete the work.

.2 Allow at least two weeks storage time for slaked lime putty before it is used.

.1 Slaked quicklime is prepared by filling a large mixing tray with approximately 300 mm of hot water. Lumps of fresh quicklime are added to the water, taking care that the water covers the lime.

.2 Stir and hoe the mass while the lime splits and breaks up with the generation of heat and carbon dioxide gas. Further water and quicklime are added until a sufficient quantity is produced.

.3 The reaction between the lime and water may be fierce and slaking operations must be carried out under strictly controlled conditions.

.4 A slaking operation produces a thick, creamy liquid which must be run through a 3 mm mesh screen into plastic-lined drums when cool.

The putty is stored under 100 mm of water and left to cure, for at least two weeks, undisturbed.

.5 During this time, the consistency of the putty develops and the water over it clears.

.6 The drums should be dated and labelled, and the tops sealed.

.3 Hydrated Lime

.1 Putty can be made from hydrated mason's lime by adding dry-bagged hydrated lime to water. The mass is stirred and hoed to form a thick cream. Allow to stand at least 24 hours under water before use, preferably longer.

.4 Preparation of Roughage

.1 If the Contractor desires, the lime and aggregate may be pre-mixed to produce what is known as roughage or coarse-stuff. This compound may be stored indefinitely if kept sealed from air and kept from freezing

.2 The sand and lime should be accurately proportioned using measuring boxes constructed to contain the exact volume of each ingredient required to make one batch. These materials are to be thoroughly mixed in a mechanical mixer for about ten minutes, then stored in plastic-lined drums and sealed until required.

.3 When required for use, the correct portion of gauging cement should be added, and the mix worked up as specified and used immediately.

.4 As the strength and colour of even slightly different mixes varies dramatically, accurate portioning is a strict requirement of this specification.

.5 Cement Gauging of Mortars

.1 The addition of hydraulic cements to lime and aggregate mixes must be done immediately before the use of the mortar.

.2 All mortar must be used within two hours of gauging; do not re-temper mortars after this time has elapsed.

.3 All batching is to be done with wooden boxes or plastic pails of known volume to ensure standardization and conformity of measurement. Shovel measurement of materials is not permitted. Boxes should be of such a size that a batch sufficient for one mixer load is measured out.

.4 Initially, mortars should be mixed for five minutes without cement or addition of water.

.5 Cement and air-entrainment should be added at the end of the initial 5 minutes of

mixing and the mortar must be mixed for an additional 10 minutes before using. A total of 15 minutes of mixing is preferred to improve workability, increase air entrainment and plasticity, and ensure thorough mixing. The amount of water required should be recorded and added at the start of mixing for future batches. Careful addition of a small amount of water should produce a mortar that is just wet enough to hang on a trowel. Excess water creates a shrinkage problem, and water content in excess of 5% will retard carbonation significantly

.6 All mixing boards and mechanical mixing machines must be cleaned between batches.

.7 Strict control must be exercised so the masons refrain from using too wet a mix. The addition of water does improve workability, but does so at the sacrifice of mechanical strength and the increase in final shrinkage. Mortars must be just damp enough to hang on a trowel. Only water lost through evaporation should be replaced at the mortar-board by the mason; a spray bottle of water is used for this purpose.

.6 Mix Formula

.1 All Mortars.

.1 Cement: Lime: Aggregate (1: 1: 6)

.2 Air Entrainment: (15% to 17%). Add air entraining agent as required to achieve this level of air entrainment

.2 Mixing: Mix mortar as dry as possible to minimize shrinkage and cracking.

.7 Loose Units

.1 Where loose masonry units are encountered, notify Departmental Representative and obtain direction on how to proceed. In general, units less than 0.08 m2 in face area are to be carefully removed and re-set in a full bed of mortar. Large units are not to be removed.

.2 Where units are removed and reset, the unit cavity is to be cleaned out of all loose material and washed with water to remove dust and pre-wet the adjacent material.

.3 Units are to be re-set in a solidly and evenly filled bed of mortar, notwithstanding current trade practice.

.4 Units are to be set true and level matching exactly the existing bond pattern and coursing throughout.

.5 All joint widths are to match existing work. Joints are to be squeezed full of mortar; slushing of joints is not permitted.

.6 Heavy masonry units that are loose are to be wedged tight into position with plastic wedges or wooden wedges previously soaked in water; the joints are to be cleaned out and the units repointed in situ. Wedges are to be removed when joint-filling mortar is set and prior to finish pointing.

.7 All masonry repairs must be completed before commencing repointing. Joints in repaired areas are to be recessed a minimum of 15 mm (back of finish pointing layers) and allowed to set and dry for at least 72 hours to allow shrinkage to take place.

.8 Repointing

.1 Immediately before repointing operations commence, the area to be pointed is to be thoroughly blown clean with compressed air (unless joint material is loose and powdery) to remove all dust and the surface is then to be well "wetted" until suction is controlled and the surface stays wet.

.2 Areas cleaned free of mortar are to be filled with mortar. Pointing is to be built up in layers not exceeding 15 mm in depth when the removal depth is 30 mm or less; the bottom layer must be allowed to set for not less than 24 hours before the subsequent layer of mortar is applied. For joints greater than 3 mm but less than 13 mm a single lift of finished pointing can be used provided that the depth of removal is 26 mm or less. If loose material is encountered in a joint of this dimension it shall be treated in the same manner as a joint wider than thirteen mm including a separate lift of scratch pointing and a separate lift of finish pointing. Where the joint depth is greater than 30 mm, back point in one lift to the 30 mm depth and then complete in two 15 mm lifts (a 15 mm backpoint lift and a 15 mm finish lift). Pointing shall be well pressed in and the surface, except for the finish point layer, shall be "scratched"/roughened to provide mechanical bond between successive layers of pointing.

.3 After the final layer of mortar has set, the joint is to be tooled lightly to give the final required form. Do not overwork the face of the joint. Head joints must be tooled first.

.4 All masons are to use identical jointing tools.

.5 Joints are to be tooled behind the face of the masonry units.

.6 All excess mortar must be removed from the face of the masonry before it sets and the

jointing neatly finished. The preferred joint finish will be slightly concave.

.9 Cleaning Up

.1 Excess mortar shall be immediately removed from adjacent surfaces.

.2 As work proceeds, clean all masonry of mortar droppings, stains and other blemishes with a fibre-bristle brush or plastic brush. Do not use a metal brush at any time. Do not use acids or chemical cleaners.

.3 Wash down the completed sections of wall from top to bottom after the pointing has hardened for three days.

.4 Do not leave clean-up debris from mixes or mortars, etc., laying around the site. Remove excess mortar and debris from the site. Place tarps under the mixing area to facilitate clean up.

.10 Curing

.1 Cover all finish pointing with burlap. The burlap shall be hung approximately 50 mm or less in front of the wall but, shall not be in contact with the wall since this could lead to unacceptable discoloration. The burlap shall be covered with white plastic tarps to reduce evaporation of the water from the masonry.

.2 Cure mortar joints by applying water with a portable pressurized sprayer a minimum of three times a day for three days. Note, more frequent misting, to maintain adequate humidity levels, may be needed if housing and heating is required. Maintain humidity levels to satisfaction of the Departmental Representative.

.3 For the three day curing period, protect all newly placed masonry and repointed joints with tarps, shade covers, etc. so as to prevent drying from wind and direct exposure to the sun or, the effects of housing and heating operations, if applicable.

.4 In the case of large voids, mortar fill shall be installed with stone fill (quality as per Section 04 43 06, "Cut Stone", and angular in form), approximately 50 percent of volume, to form a complete mass. Stone fill to be supplied as per Section 04 43 06, "Cut Stone", but shall be paid for under the item "Mortar Fill" as part of the overall volume. Cut-offs from preparation of cut stone elsewhere on the project, may be used for this application when approved by the Departmental Representative.

3.5 Mortar Fill

.1 Use lime mortar to match pointing mortar.

.2 The intent of the item "Mortar Fill" is to fill voids in the masonry walls or joints where not included under the work of installation of masonry or chipping & repointing joints.

.3 Proceed with filling of voids with mortar fill only as directed by the Departmental Representative.

3.6 Masonry Vents

.1 Drilling of 25 mm countersink and 20 mm diameter holes for installation of masonry vents shall be by drilling, without percussion, from the exterior face only.

.2 Drill 20 mm diameter hole at locations and depth as shown on the Contract Drawings or as directed by the Departmental Representative. Holes are to be angled upwards to permit drainage of interior masonry to the exterior face.

.3 Drill start of hole 25 mm in diameter to countersink and place the screened vent.

.4 After blowing hole clean to the satisfaction of the Departmental Representative, caulk screened aluminum louvre in place ensuring no direct contact between aluminum and masonry.

3.7 Sealing of Skyward Facing Masonry Joints and Cracks in Sill Stones

.1 For skyward facing joints, vertical joints in the top stone units on the wall and, cracks in window sill stones, sealant shall be applied as the finish layer of pointing or crack sealant, rather than mortar. In the case of cracks in window sill stones, crack is to be filled under the "DHL Crack Injection" item (04 43 03) with the top of the crack left unfilled to receive the sealant. For cracks less than 3 mm in width, use a grinder to create a routed recess suitable to receive the sealant.

.2 Install sealant complete with bond breaking tape or foam backer rod in accordance with manufacturer's recommendations.

.3 Colour of sealant to match adjacent stone units and to be approved by Departmental

Representative.

.4 Clean up excess sealant, following installation, to the satisfaction of the Departmental Representative.

PART 1 - GENERAL

1.1 Scope

.1 Where not otherwise indicated on the Contract Drawings, it is intended that the Contractor's Representative and the Departmental Representative shall delineate full Dutchman and partial Dutchman stones (including scupper stones) for removal within the limits of the work. In general, the "massive" nature of the stones will dictate that full and partial Dutchman repairs will be carried out as opposed to full stone replacement. The work of stone removal for full Dutchman shall include cases where during the removal, the full stone comes loose or the remaining parent stone is of minimal depth (ie, 150 mm or less), in which case, the full stone shall be removed but will be treated as a full Dutchman with the volume being that of the full stone unit.

1.2 Related Work

.1 Section 04 43 01 - Bracing and Shoring.

.2 Section 04 43 04 - Repointing and Miscellaneous Masonry.

.3 Section 04 43 06 - Cut Stone.

.4 Section 04 43 07 - Installation of Masonry.

1.3 Precautions

.1 Provide temporary supports, bracing, shoring, etc. to the masonry, in accordance with Section 04 43 01, around areas that are to be removed. All damage as a result of failure to adequately support the surrounding masonry shall be made good at the Contractor's expense.

1.4 Control

.1 Mark the following:
.1 Stones and other elements or components to show identity and position.
.2 Spaces from which stones are removed.

1.5 Measurement for Payment

.1 Measurement for payment for the following items shall be as indicated.
.1 Stone Masonry Removals - Full Dutchman...m3.
.2 Stone Masonry Removals - Partial Dutchman...m3.

For these items, the volume shall be equal to the size of the actual finished new stone to be ordered plus a typical additional removal depth of 50 mm as well as the joint width surrounding the stone being removed. Any additional removal depth beyond 50mm shall only be done as directed by the Departmental Representative. Only additional removals authorized by the Departmental Representative shall be paid for under the removals items. The Contractor and the Departmental Representative shall together make measurements of the depth of removal to establish the average depth. The depth measurement will be taken from the face of mortar joints excluding the stone pitch dimension, if any.

.2 No measurement for payment will be made for the item "Stone Masonry Removals - Scuppers". Payment shall be by lump sum.

1.6 Basis of Payment

.1 Payment at the prices bid for the above items shall be full compensation for all labour, equipment and materials necessary to do the work of these items in accordance with the Contract Drawings and these specifications.

PART 2 - PRODUCTS

2.1 Stone

.1 The Contractor shall dismantle and remove stone as directed by the Departmental Representative. In the case of replacement of full or partial faces (Dutchman repairs) on "large" units, the minimum removal shall generally be 50 mm deeper than the supplied stone thickness.

PART 3 - EXECUTION

3.1 Inspection

.1 Record and report, to Departmental Representative, site conditions not described in Contract.

3.2 Support

.1 Construct shoring and cradling, and other temporary framing work needed to support structure, or parts of it, during removing operations.

3.3 Loosening Masonry (Full Removal)

.1 Loosen stones using approved methods which will cause no damage either to adjacent masonry or to other architectural elements.

.2 Do not use pneumatic chisel or hammer, or steel tools exerting concentrated pressure on edge of adjacent masonry.

.3 When temperature is below freezing point, do not attempt to loosen wet masonry.

3.4 Removal of Stone Faces for Dutchman or Scupper Repair

.1 Where faces of existing stones are to be removed (175 mm nominal depth) for a Dutchman or Scupper repair, remove mortar to removal depth around perimeter of stone portion to be removed prior to removing stone face.

.2 Carefully break out stone face by approved methods and so as to do no damage to adjacent stones or, in the case of a partial Dutchman, the parent stone to remain.

.3 Complete removal so as to produce as "neat" as possible a squared (or in the case of a corner, triangular) opening to receive the Dutchman replacement face unit.

.4 Where portions of the stone removal depth exceed the 175 mm allowance, fill those portions with mortar prior to the Dutchman installation, unless otherwise directed by the Departmental Representative.

3.5 Cleanup

.1 Stone removals, not designated for salvage, shall be removed from the site on a daily basis.

.2 Salvaged stone shall be promptly cleaned and stored on wood pallets within the work and storage areas to the satisfaction of the Departmental Representative.

PART 1 - GENERAL

1.1 Description of The Work

.1 The work of this section covers the requirements for the supply of all new cut stone, and full or partial Dutchman, on this project.

.2 Included with the work of new stone supply shall be that of all chiseled and bush hammer finishes to match the original finish on the stone to be replaced, as shown in the Contract Drawings.

1.2 Related Work

.1 Section 04 43 04 - Repointing and Miscellaneous Masonry.

.2 Section 04 43 05 - Masonry Removals.

.3 Section 04 43 07 - Installation of Masonry.

1.3 References

.1 ASTM C568-08 Specification for Limestone Building Stone.

1.4 Samples

.1 Samples of all types of stones are required. Samples will be of sufficient size to demonstrate all finishes and profiles and shall be clearly marked as to location of quarry of origin and the supplier(s). Samples which are approved may be incorporated in the work provided that they match all dimensions of stones scheduled as being replaced. The finish of any ornamental stone shall match the undeteriorated profile of each type of stone. The surface shall be finished to match the undeteriorated finish of each type of stone and in no case shall the finish be rougher than stones of this type in good condition elsewhere.

.2 Acceptability of the source of stone will also be determined by the weathered colour of the stone samples. Samples should include weathered examples and a possible visit to the quarry may be required for acceptance. In general, the weathered colour should match the predominant stone colour of the overall structure. The colour of the new stone should not be close in colour to the extreme ends of the range of stone colours present in the structure.

.3 Limestone sources which have stylolitic inclusions in the stone matrix (occurs in large bed depths) will not be acceptable for stones that will be bush hammered unless the inclusion is in the middle third and can be shown, to the satisfaction of the Departmental Representative, that the stone is not objectionably weakened. Note that the standard of acceptance of stones with stylolitic inclusions for use in other parts of the construction may vary due to stone supply. The Departmental Representative's decision will be considered final on the acceptance of stones with stylolitic inclusions. In general, stones that have stylolitic inclusions within 40 mm of an edge or if there are more than three inclusions in the stone, will be considered unacceptable.

1.5 Delivery and Storage

.1 Deliver, store and handle cut stone in a manner to prevent damage, adulteration, deterioration and soiling in accordance with the manufacturers' written instructions.

1.6 Measurement for Payment

.1 Measurement for payment for the following items shall be as indicated.
.1 Supply New Dutchman (Full).....m3
.2 Supply New Dutchman (Partial)...m3

.2 Measurement will be taken as equal to the actual finished stone dimensions prior to placement.

.3 Ornamental stone shall be any stone identified for replacement with more finishing required than the typical margins. Included in this item are stones requiring finishing as per the drawings. Any additional ornamental stones will be deemed ornamental by both the Contractor and the Departmental Representative prior to their removal.

.4 No measurement for payment will be made for the item "Supply New Scupper Stones". Payment shall be by lump sum.

1.7 Basis of Payment

.1 Payment at the prices bid for the above items shall be full compensation for all labour, equipment and materials necessary to do the work of these items in accordance with the Contract Drawings and these Specifications.

.2 Payment will normally be made after new stone is placed in its final location. If stone is manufactured in advance to the need for placement in the structure, payment in the amount of 50 percent of the invoiced amount, from the stone supplier, may be authorized by the Departmental Representative provided the stone has been delivered and stored on site and accepted by the Departmental Representative. It is understood that any stone that is damaged after this acceptance will be replaced at no additional cost to the Contract.

PART 2 - PRODUCTS

2.1 Materials

.1 Limestone: to ASTM C568, Category III, high density, colour, pitch and texture to match existing and to have a minimum thickness of 200 mm. Limestone shall be from the Black River Geologic formation (Kingston Limestone and selective areas in Ontario and Quebec). Geologic maps are available for review in the Departmental Representative's office.

.2 Possible Suppliers:
.1 Rideauview Contractors: R.R. #2, Inverary, Ontario, KOH 1X0, (613) 546-7779. Note: variations in colour within the Petworth and Mount Chesney Quarries exist. The Contractor shall ensure that new stone is from an area of these quarries that will weather to the same colour as the existing stone of the Redoubt.
.2 St. Marc Quebec Limestone: various suppliers.

.3 Samples of these and other quarries submitted for acceptance will be required. There are variations in colour within each quarry and not all stone, from each quarry, will be acceptable.

2.2 Cutting

.1 Cut stone to shape and dimensions and full to square with jointing to match existing. Dress exposed faces true. Cut stone to lay on its natural quarry bed and to an accuracy of 3 mm.

.2 Make beds and joints to match adjacent masonry and at right angles to face.

.3 Where applicable, cut stones for support systems. Provide holes, to suit special lifting devices, in pieces which cannot be manually or mechanically lifted without damage. Do not cut holes in exposed surfaces.

2.3 Finish

.1 Tool the face to match the finish of the stone being removed, to match adjacent masonry to which the stone is being placed or, as otherwise indicated on the drawings.

.2 Score machine cut faces to provide a rough surface for mortar adhesion (see Section 04 43 07, Installation of Masonry).

PART 3 - EXECUTION

3.1 General

.1 Early in the project, inspect the masonry with the Departmental Representative and determine as near as possible the extent of stone replacement required. As the work progresses, additional stones for replacement may be identified and shall be replaced as part of the work and as directed by the Departmental Representative. Supply replacement stones by number and size.

.2 Supply stones to the site and protect from damage. Cut stones as required to match existing and to CSA S304.1-94 (R2001). Finish stone to match existing.

.3 In order to expedite stone delivery, the intent is to immediately supply and finish as much stone as possible.

.4 All face finishing debris and end cut-offs which are not used shall be removed from the site.

.5 Cut face stones to match existing coursing or, to dimensions as indicated.

3.2 Stone Finish

.1 Face stones shall be finished with hammer and chisels and where bush hammering is called for, suitable pneumatic tools may be used. Finish stone arrises to match existing. Pitched faces, where required, shall match existing.

.2 Ornamental stones shall be finished to match the existing stone being replaced and/or as directed by the Departmental Representative.

3.3 Setting

.1 Clean stone exposed surfaces by washing with stiff fibre brush and water.

.2 Drench dry stones with clean water just before setting.

3.4 Stone Supply

.1 As part of this Contract, review the work to establish the actual quantity required to finalize the supply and minimize over-supply and losses. The Departmental Representative shall be responsible for acceptance of the supplied and finished stone.

PART 1 - GENERAL

1.1 Description of Work

.1 Work of this section includes the installation of all stone masonry (Full units and, where applicable, Dutchman (full and partial) repairs).

.2 Included with the work of this section shall be the supply and installation of lead bar markers. The intent of these markers is to provide a means of readily identifying new stone that was placed on this project, in the future.

1.2 Related Work

.1 Section 04 43 04 - Repointing and Miscellaneous Masonry.

.2 Section 04 43 05 - Masonry Removals.

.3 Section 04 43 06 - Cut Stone.

1.3 Workshop Inspection

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

1.4 Precautions

.1 Move and lift stone units using means to prevent dropping or sudden impacts. Submit stone units dropped or impacted to Departmental Representative for approval. Do not make holes or indentations, for lifting devices, on face or top side of stone.

.2 Indicate bedding planes of stone units. Duplicate bedding marks on usable pieces of cut stone.

1.5 Protection

.1 Cover top of completed and partially completed wall, not enclosed or sheltered, with

weatherproof coverings at end of each working day. Anchor securely in position.

.2 Protect adjacent work from marking or damage due to work.

.3 Provide temporary bracing of masonry work during erection until permanent structure provides adequate bracing.

1.6 Measurement for Payment

.1 Measurement for payment for the following items shall be as indicated.
.2 "Installation of Stone Masonry - Full Dutchman".....m3.
.3 "Installation of Stone Masonry - Partial Dutchman".....m3.

.2 Measurement will be taken as equal to the actual finished stone dimensions prior to placement.

.3 No measurement for payment will be made for the item "Installation of Stone Masonry - Scuppers". Payment shall be by lump sum.

1.7 Basis of Payment

.1 Payment at the prices bid for the above items shall be full compensation for all labour, equipment and materials necessary to do the work of these items in accordance with the Contract drawings and these specifications including:
.1 Placing of all mortar and back-up masonry to fill the total voids behind full stone units and grout or mortar behind Dutchman repairs.
.2 Placing of the stone and in the case of a partial Dutchman, gluing the new stone piece to the parent stone.
.3 Pointing of joints around the stone units.
.4 Finish of the glued joint between the new stone piece and parent stone with repair mortar (see Section 04 43 03).
.5 Supply and installation of lead plug demarcation markers, for all full stone units, full face Dutchman units and partial face Dutchman units greater that 50% of original stone surface area.
.6 Payment for installation of stone units includes 50 mm (2 in.) of backup mortar. If Departmental Representative requires any additional removals, anything beyond 50 mm (2 in.) will be paid for as mortar fill, the Departmental Representative and Contractor

will measure an average depth for this payment or an alternative method, approved by the Departmental Representative, will be used.

PART 2 - PRODUCTS

2.1 Cut Stone

.1 Supply cut stone in accordance with Section 04 43 06 - Cut Stone. Dress face of cut stone to match existing stonework after unit is roughly sized to opening.

.2 All stone surfaces of new cut stone against which mortar is to be placed shall be intentionally roughened (if the face is "smooth" as a result of sawing) by scoring with saw or grinder. Score lines shall be spaced at no more than 25 mm on centre and shall be not less than 3 mm in depth.

2.2 Lead Bar Markers

.1 Lead bar of suitable diameter to fit the drilled holes in new stone units and capable of being date marked and chiselled to indicate the relevant new stone and date of installation as per the Contract Drawings.

2.3 Adhesive

.1 Adhesive to be used for gluing partial Dutchman pieces to the parent stone shall be an approved mineral based adhesive. An acceptable product is Jahn restoration adhesive.

2.4 Hydraulic Grout

.1 Grout to be used behind Dutchman repairs shall be a premixed hydraulic lime based grout equivalent to "FloMix" supplied by Daubois Inc., 74 Anglerock Drive, Cambridge, Ontario, N2T 1L9 (Tel: 519-740-6691).

PART 3 - EXECUTION

3.1 Cutting / Sizing of Stone

.1 Use calipers, squares and levels to measure opening for new stone. Allow for mortar joints to match existing or, as directed by the Departmental Representative, around the stone perimeter. In the case of wall replacement face

units, the space between the back of the new stone units and face of existing shall be nominally 50 mm (this space to be filled with mortar as part of the work of installation).

3.2 Moving Stones

.1 Use lifting devices, requiring drilling of the stones, on sides of stones only.

.2 Move stones horizontally in wheelbarrows, on carts or on sleds.

.3 Slide stones into place on wood ramps.

3.3 Stone Installation

.1 Clean stone by washing with water and natural fibre brush before laying. Stone should not be dry at time of placing.

.2 All stones shall be placed with the bedding planes horizontal unless, for a specific stone, the Departmental Representative directs otherwise.

.3 Dampen surfaces of slot and apply mortar to stone perimeter.

.4 Where there is more than one course of stone replacement, lay successive stone courses only after mortar in courses below has hardened sufficiently to support weight.

.5 Prop and anchor stones until mortar has set.

.6 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. The use of stone wedges is not permitted.

.7 Remove mortar droppings from face of stone before mortar is set. Sponge stone free of mortar as work progresses.

.8 Set stones plumb, true, level in full bed of mortar with vertical joints flushed full except where otherwise specified. Completely fill anchor, dowel and lifting holes.

.9 Install lead bar markers in new stone units (as part of this work), complete with date marks and chiselled points, as called for on the drawings.

3.4 Dutchman Repair - Grouting

.1 Install new Dutchman facing as per 3.3 above complete with mortar or grout and vent tubes (see drawings). In the case of partial Dutchman, bed the back of the unit with mortar and glue the interface with the parent stone.

.2 After dutchman is in place and joint mortar has set and gained strength (at least 3 days), install hydraulic lime based grout as per Section 04 43 04, "Repointing and Miscellaneous Masonry". For a partial Dutchman, apply repair mortar to glued joint to "blend" new partial Dutchman to parent stone.

.3 Remove grout tubes and complete finish pointing.

3.5 Hydraulic Lime Based Grout

.1 Install hydraulic lime based grout at Dutchman repair locations as directed by the Departmental Representative.

.2 Install grout only after backpointing of masonry joints and repairs to cracks in stone units has been completed.

.3 Grout to be installed by gravity methods through holes drilled through the backpointing or through plastic tubes inserted during the backpointing process.

.4 Mix grout in strict accordance with manufacturer's recommendations and to a consistency to ensure filling of the voids. Monitor the structure throughout the grouting process and promptly plug all holes and cracks through which leakage is occurring. Complete cleanup of all spillage to satisfaction of Departmental Representative.

.5 Remove plastic tubing (if used) and complete clean up to satisfaction of Departmental Representative.

3.6 Filling Joints / Pointing

.1 Fill joints and point: in accordance with Section 04 43 04 "Repointing and Miscellaneous Masonry".

.2 Moist cure new mortar for 3 days.

PART 1 - GENERAL

1.1 Description of Work

.1 The work of this section covers the requirements for all masons to attend an orientation prior to working on the project.

1.2 Related Work

.1 Section 01 35 30 - Health and Safety

.2 Section 01 54 23 - Access and Protection.

.3 Section 04 43 01 - Bracing and Shoring.

.4 Section 04 43 04 - Repointing and Miscellaneous Masonry.

.5 Section 04 43 05 - Masonry Removals.

.6 Section 04 43 07 - Installation of Masonry.

1.3 Measurement and Payment

.1 No measurement for payment will be made for the work of this section. All costs for the work of this section shall be included in the tendered prices for related work items.

.2 The Contractor shall be fully familiar with the specification and inform the Departmental Representative of any direction during the orientation that would result in an extra cost to the contract prior to commencing the work. Work that is completed according to the orientation that contradicts the specification shall not receive extra compensation beyond the tendered prices.

PART 2 - ORIENTATION

2.1 Orientation Meeting

.1 The content of the orientation meeting shall be generally as follows:

.1 Pre-Construction Orientation for Masons.

.1 The intent of this orientation is to have all masons understand what will be expected of them with respect to joint removal, stone removal, stone preparation, stone installation, scratch coat pointing and final coat

pointing. As a result, more consistent results are anticipated from all masons with a minimization of rejected work. ALL MASONS, that will be associated with any element on this project as described above, are required to attend the orientation meeting prior to beginning the work. The orientation time should not last for more than one (1) hour.

.2 The material discussed in this orientation is taken directly from the specification and reflects the expectations of that specification.

.3 Test panels will still be required to establish the standard of workmanship. All masons should be aware of the work in preparing the panels at the various steps. If a mason is not present, for the test panel it will not excuse that mason from understanding and implementing the procedures used for the preparation of that panel.

.2 Joint Removal

.1 Masons shall take care so as not to damage the surrounding stone that is to remain.

.2 If a grinder is required to remove the joint, the mason shall only make one (1) pass on the joint and shall locate the pass in the center of the joint.

.3 The mason is not permitted to allow the grinder to score the surrounding stone that is to remain.

.4 Chisels shall be thin enough so as not to bind on the adjacent stones and potentially damage the stones.

.5 Joint material shall be completely removed back to the required depth as described on the drawings.

.6 Loose jointing material is to be removed; any additional joint material removal is to be reviewed by the Departmental Representative and direction given prior to removal.

.7 Thoroughly clean joint with a non-metallic brush and compressed air. Water is not to be used for the cleaning of the joints.

.3 Stone Removal

.1 Mortar joints shall be removed, as much as possible, on all of the surrounding joints of the stone that has

been marked for removal prior to its removal.

.2 If the stone is to be salvaged, the mason shall exercise care while removing the stone unit. If the stone is not to be salvaged, the mason may use whatever means he feels is necessary to remove the stone while preserving the surrounding stones to remain.

.3 Under no circumstances shall adjacent stones be used as lever points for pry bars, pneumatic chisel bits, percussion drills, etc. to help in the removal of the stone. If the Contractor thinks that removal of an individual stone will not be possible without damaging an adjacent stone, this must be discussed with the Departmental Representative prior to removal. The Contractor will be responsible for damages unless the Departmental Representative agrees that damage is unavoidable.

.4 Damaging adjacent stones will result in the repair or replacement of the stone at the Contractor's expense.

.5 The resulting cavity shall be braced, cleaned, and protected from the elements until a new matching stone is satisfactorily installed in the cavity.

.6 If adjacent stones become loose during the removal process, the mason shall quickly stabilize the area and the Departmental Representative is to be informed.

.4 Stone Preparation

.1 Stones are to be handled carefully so as not to excessively stress or damage the stones.

.2 Cut stones to the dimensions required allowing for the correct joint width, usually 10 to 15 mm or to match the surrounding joint work. Seek direction from the Departmental Representative before creating joints wider than 15 mm.

.3 Stones cut using a saw, must have the smooth cut faces roughened with grooves as described in the specification.

.4 Stones are to be cut square and straight on the exposed faces. The pitch of the exposed face shall match that of the adjacent, existing stone.

.5 In situations where several stones are to be replaced, the mason shall ensure that the layout matches, as closely as possible, the existing stone layout and furthermore avoids small "slivers" of stone to fill irregular spaces. Eliminate stone "slivers" when possible and only use when approved by the Departmental Representative.

.6 Creating stack bonding is to be avoided and will be rejected and must be replaced.

.7 Stones are to be laid with the bedding planes in the horizontal orientation unless otherwise approved by the Departmental Representative.

.8 Stones shall be cleaned with water and a soft, non-metallic, bristle brush, to remove dust.

.9 Carefully transport the stones so as to do no damage.

.5 Stone Installation (The mortar used for the installation of stone units may have a slightly lower air percentage; this should be reviewed on site with the labourer responsible for preparing mortar).

.1 Cavity is to be free of loose mortar or debris.

.2 Lightly wet the cavity with water prior to applying the mortar bedding or backup. Just apply enough water to moisten the area; avoid standing water situations.

.3 The stone unit should also be lightly wetted.

.4 Install stone on a bed of mortar, pack mortar around the stone. Make sure that the head joints are equal in width and that the top and bottom joints are also equal in width.

.5 Stone is to be placed square and plumb and in alignment to adjacent stone. Shim stones as required maintaining the position. The shims shall be soaked softwood wedges. Under no circumstances shall stone chips be used as shims.

.6 Clean excessive mortar away from stones immediately. Clean stone with a damp sponge.

.7 Once the mortar has stiffened remove excess joint material and finish joint to accept the finish coat of mortar. Thin joints should be finished to

the final state as shown on the drawings.

.6 Scratch Coat Pointing

.1 Thoroughly clean joint with a non-metallic brush and compressed air.

.2 Slightly moisten the joints. Over wetting will result in the mortar thinning out and being "messy" to work with. By not wetting the joints prior to mortar installation, the surrounding joint and stone will wick away the water in the newly placed mortar resulting in a weakened mortar joint.

.3 Install mortar to a point just proud of the required depth for the final finished pointing. Press the mortar in firmly. Allow the mortar to stiffen. When the mortar has stiffened, remove the excess mortar being careful not to smooth out the joint.

.4 The finish of the scratch coat pointing should be rough but not "messy". The intent is to provide a good mechanical bond between the scratch and the finish coats of pointing.

.5 Wide joints should be treated in the manner specified, with coarser sand and stone chip aggregate in the mix.

.6 Additional lifts of mortar shall be placed after a minimum of 24 hours of moist curing on the previous lift.

.7 Protect mortar joints, during the curing period, from the effects of weather. Joints should be misted regularly with water but, not overly.

.7 Final Coat Pointing

.1 Lightly clean joints with non-metallic brush and compressed air.

.2 Slightly moisten the joints. Over wetting will result in the mortar thinning out and being "messy" to work with. By not wetting the joints prior to mortar installation, the surrounding joint and stone will wick away the water in the mortar resulting in a weakened mortar joint.

.3 Install mortar to a point just proud of the face of the adjacent stone. Press the mortar in firmly.

.4 Allow the mortar to stiffen to thumb print hard. Once mortar has stiffened, remove the excess mortar with a wooden dowel in a firm consistent

stroke. The mortar is to have a slightly concave appearance. The head joints should be finished first. The dowel will `pull' the mortar exposing the aggregate.

.5 Lightly brush the joint with a bristle brush, taking care not to remove the texture but to ensure consistency in the final appearance.

.6 Clean excessive mortar away from stones immediately. Clean stone with a damp sponge.

.7 Cover the area with burlap and moist cure for three days. If excessive drying of burlap is occurring due to wind or sun, the burlap is to be covered with white plastic. The burlap is not to be in prolonged contact with the masonry since discolouration can occur.

.8 Final Inspection (Acceptance of the completed installation will include conformance to the following. Note that this is not all inclusive).

.1 No joint cracking after drying.

.2 Uniformity of mortar colour.

.3 Consistency of joint profile and texture.

.4 Crisp lines at interface between mortar and stones.

.5 Clean stones.

PART 3 - EXECUTION

3.1 General

.1 Prior to working on the project all masonry personnel shall attend an orientation session conducted by the Departmental Representative in which the expectations of the level of workmanship is described.

.2 The content of the orientation shall generally be as outlined in Part 2 of this section. "Orientation Content."

.3 The orientation will describe the expectations of the Departmental Representative. Any discrepancy between the orientation and the specification should be immediately brought to the attention of the Departmental

Representative. The resulting direction will be confirmed in writing.

.4 Other sections of the specification shall take precedence over all information described in the orientation. It is anticipated that the orientation will not contradict the specification.

.5 The Contractor shall follow the methods described by the Departmental Representative. If the Contractor suggests other methods, they will not be used unless approved by the Departmental Representative.

.6 Any work not completed in conformance to this Section shall be subject to rejection at the discretion of the Departmental Representative.

PART 1 - GENERAL

1.1 Description of Work

.1 Provide all materials and labour for the complete, first class fabrication and installation of zinc/tin coated stainless steel gutter (TCS II) lining, as shown on the Drawings and described herein.

.2 Provide all materials and labour for the re-furbishing of existing metal light fixtures and iron bar grills on windows and door transoms.

1.2 Qualification

.1 The sheet metal fabricator and applicator shall be of recognized standing with a proven record of satisfactory installations using traditional materials and installation techniques.

1.3 Warranty

.1 Furnish a three (3) year warranty on all metalwork installed or repaired under this Contract, undertaking to repair all defects becoming evident during the period of this guarantee, in a prompt and thorough manner.

1.4 Workmanship

.1 All workmanship shall be of the highest quality conforming to the best traditional practice and be to the approval of the Departmental Representative.

1.5 Storage

.1 All materials will be stored in a location approved by the Departmental Representative.

1.6 Related Work

.1 Section 04 43 04 - Repointing and Miscellaneous Masonry.

.2 Section 08 62 10 - Wooden Windows and Doors.

1.7 Measurement and Payment

.1 No measurement for payment will be made for the item "Modifications to Existing Gutter System". Payment shall be by lump sum. All costs for labour, materials, and equipment, are to be included in the lump sum bid for this item in accordance with the Contract Drawings and these specifications.

.2 For measurement and payment concerning the supply and installation of copper work at doors and re-furbishing of bar grills on windows and door transoms, see Section 08 62 10, "Wooden Windows and Doors".

.3 For measurement and payment concerning re-furbishing of existing light fixtures, see Section 04 43 04, “Repointing and Miscellaneous Masonry”.

PART 2 - PRODUCTS

2.1 Membrane

.1 Grace Ice and Water shield or approved alternate product Blueskin PE 200HT by Bakor is approved and does not require the use of a 'slip-sheet'.

2.2 Slip Sheet

.1 Rosin sized paper as 'slip-sheet' weighing approximately 6lb./per 100 square feet between metal and membrane.

2.3 Sheet Metal

.1 ASTM.240 Type 304 Stainless Steel coated both sides with minimum alloy (50 tin/50 zinc) to a minimum of 20 microns, built-in gutters, 26 ga. Plus coating (TCS II).

2.4 Fasteners for TCSII

.1 Nails for metalwork shall be 25 mm large, flat headed Series 300 stainless steel ring shank nail or equal screw type fastener.

.2 Type 304 stainless steel rivets for sheet to sheet connection.

2.5 Expansion Shields

.1 Shields shall be 100% pure lead shields. Plastic or galvanized fixings are not permitted.

2.6 Solder and Flux

.1 Solder to conform to ASTM B-32 and shall be lead free, high tin.

.2 All flux shall be tin-bearing type specifically for soldering stainless steel.

2.7 Blocking

.1 Blocking shall be in non-resinous wood e.g. pine, preservative treated with zinc napthanate brush applied.

Note: any blocking in direct contact with zinc-tin material must be coated with an approved latex paint.

2.8 Expansion Joint

.1 'T-Pren' as manufactured by Mathew Hebden.

2.9 Membrane Cap

.1 Membrane cap to be an EPDM rubber membrane. Skellerap Epiclad by Viking is an acceptable product.

2.10 Paint for Iron Bars

.1 Primer 1: System: Organic
.1 Organic Zinc – Rich Epoxy with a minimum of 85% minimum zinc content in the dry film and to all other requirements of CGSB-1.181. Acceptable Products:

Carbozinc 859 by Carboline, or Amercoat 68HS by Amercoat Canada or alternate product as approved by Departmental Representative.

.2 Intermediate Coat 2:
.1 High – Solids Epoxy Acceptable:

Carbomastic 15 by Carboline, or Amerlock 400 Aluminum Epoxy by Amercoat Canada or alternate product as approved by Departmental Representative.

.3 Topcoat 3:
.1 Aliphatic Acrylic Polyurethane to CAN/CGSB-1.177-M91. Acceptable Products:

Carbothane 133 HB by Carboline Amercoat 450H by Amercoat Canada or alternate product as approved by
Departmental Representative.

.4 All components of the paint system must be from one manufacturer, be compatible and recommended for use together to form one paint system by the manufacturer.

.5 Colour: Submit Samples to be approved by the Departmental Representative.

PART 3 - EXECUTION

3.1 Removals

.1 Complete removals of all existing mastic asphalt, flashings, waterproofing membrane, etc. to a sound concrete/stone masonry substrate and to the limits indicated on the Drawings.

.2 Dispose of removals off site.

3.2 Cleats

.1 Cleats are to be fabricated from 50mm x 75mm long metal, spaced not over 300mm unless otherwise specified.

.2 Secure one end with two nails and fold back over nail heads. Lock free end of cleat into seam or into folded edge of metal sheet.

3.3 Soldering

.1 Remove pre-weather wash coat, around edges to be soldered, either chemically and/or mechanically to produce clean, bright alloy.

.2 Clinch-locked joints and seams are to be closed gently with a block of wood and mallet, then fluxed and filled with molten solder. the work is to be done with sufficient heat to induce the solder to move by capillarity and create a waterproof joint.

.3 Perform soldering slowly with well heated materials, so as to heat thoroughly the seam and sweat the solder through its full width.

.4 All residue at exposed joints are to be neutralized with hot water rinse (60 C +) and removed, wiped clean. All metalwork is to be washed clean with soapy hot water upon completion.

.5 All soldering shall be done with soldering irons only. Torches or welders are not permitted (as per manufacturer's recommendations).

3.4 Edge and Drip Strips

.1 Provide where necessary to secure sheet metal work at locations indicated and elsewhere as may be required.

.2 Form edge strips of 26 ga. TCSII as required unless otherwise specified.

.3 Secure with stainless steel screws set 300mm o. Use lead sleeves to receive screws in masonry.

.4 Install strips in continuous butted lengths to allow metalwork to be hooked over not less than 20mm.

3.5 Seams

.1 Flat lock seam shall be finished not less than 20mm wide.

.2 Soldered lap-seams are to be finished not less than 30mm wide and, riveted 50mm o.

.3 Non-soldered lap-seams shall be finished not less than 90mm wide, and rivetted 50mm o.

.4 All seams are to be made in the direction of flow.

.5 All seams visible from the ground are to be blind-soldered.

3.6 Dissimilar Metals

.1 Dissimilar metals are not to be in direct contact with each other or any other type of metal other than approved lead-plugs or washers, to eliminate galvanic corrosion.

.2 All concealed fasteners and clips are to be of the same metal as the flashings.

.3 Where contact between metals cannot be absolutely assured, paint potential contact surface of galvanized metal with bituminous paint.

3.7 Forming Generally

.1 All new sheet metal is to be formed on the bending-brake. Shaping, trimming and hand seaming are to be done on the bench as far as possible with the proper sheet metal-working tools.

.2 Replacement formed work is to be hand formed over wooden moulds matching the original work.

.3 The angle of bends and the folds of interlocking metal shall be made with full regard for expansion and contraction to avoid buckling of fullness in the metal after it is in service.

.4 Hem all exposed edges 20mm, raw edges are not permitted.

3.8 Joining

.1 All horizontal joints or sloped joints less than 1:5 are to be flat-locked and seam soldered.

.2 All vertical joints and sloped joints more than 1:5 are to be made watertight by forming with double seam corner locks.

.3 All mitred corners visible from grade are to be blind soldered.

3.9 Preparation of Surfaces

.1 Surfaces to which sheet metal is to be applied or reset are to be made smooth, sound, clean, dry and free from any other defects that might adversely affect the installation.

.2 All masonry adjacent to and covered by metalwork is to be isolated from metal work with a continuous layer of underlayment. Sheets of underlayment are to be laid over the stone, as the metal work proceeds, as a bond breaker.

.3 Generally install sheet metal over rosin paper slip sheet which is placed over "Ice and Water Shield" (elastomeric membrane). If using **Blueskin , the rosin paper can be deleted.**

3.10 Installation Standards

.1 Install flashings and sheet metal work dead-level, true to line and square. All work is to fit any rebuilt and repaired masonry exactly.

.2 No exposed fasteners are permitted unless directly called for in these documents and/or approved by the Departmental Representative. All work is to be held in place with cleats or edge strips.

3.11 Built-in Eave Gutters

.1 Clean back asphalt/mastic to location indicated on the Drawings, down to substrate.

.2 Provide new gutter lining to profile details on the Drawings. When exposed, inspect masonry substrate with Departmental Representative to ensure soundness prior to application of gutter lining.

.3 Line with Membrane and slip-sheet.

.4 Form in sheets no longer than 1.8 m in length with not longitudinal seams.

.5 Hook leading edge of gutter to edge strip of same material and secured to face of gutter with Type 304 S.S. Screws. Hook back edge to continuous cleat and solder.

.6 Join gutter sheets with 38mm lapped-riveted and soldered seams.

.7 Provide expansion joints as detailed between rain water leaders and at wall. Form mid-span expansion joint with T-Pren applied full depth and as per manufacturer’s instructions.

3.12 Scuppers

.1 Form scuppers at locations shown and as detailed on the drawings.

.2 Drain scuppers to existing TCS II storm heads (conductor heads) as detailed on the drawings.

3.13 Iron Cleaning and Re-Finishing

.1 Carefully remove existing glazing from light fixtures, clean and, re-install in fixtures after fixtures have been re-furbished/painted.

.2 Remove wiring and other electrical components from light fixtures and install new code compliant components when fixtures have been re-furbished/painted. Work to be completed by a certified electrician.

.3 Set up iron components for cleaning by grit blasting. Prior to blasting, confirm by visual inspection that no element is too sensitive, i.e. overly thinned by corrosion to be treated in this manner. Any such area shall be treated

with corrosion passivation instead of being blasted. Alternately **electrolysis** can be used. See below.

.4 Initially assume a fine grit size with dry compressed air at maximum of 70 p.s.i.

.5 Prior to general cleaning, run test of above method on small section of iron work which contains all components. Begin testing at 40 p.s.i. Notify Departmental Representative minimum of 24 hours before commencement of test. Departmental Representative must be present for test. Modifications to methodology e.g., determination of operator distance, will be established at that time.

.6 Grit blast iron work to remove all dirt, rust and tight mill scale. Following blasting assess with Departmental Representative full extent of corrosion damage. If areas of 'tight' corrosion remain, treat with rust converter (passivation).

.7 Wipe off all dust and oil and prime all re-exposed bare iron within 24 hours of exposure with zinc rich primer. Ensure that shop temperature is above 10 deg. C for priming and painting. (All sections removed off-site can be painted, except for the final coat prior to reinstallation.) Finish with minimum of two coats of epoxy undercoat and 2 coats of urethane paint or as per manufacturer's instructions.

.8 Repair small gaps and fissures (max. 3/8") in ironwork with metal epox.

.9 Reinstate ironwork on site using original attachment locations except as otherwise detailed on the Drawings.

Alternative Method of Coating Removal: Electrolysis

Note: This method of coating removal may be required if grit blasting, as specified above, appears to be in any way injurious to the cast iron components as determined through testing. This method may also be selected at the outset by the Contractor as an accepted alternative to grit blasting.

- Carefully lay sections of iron work into non-conductive vats filled with electrolyte, i.e. vat solution comprised of sodium

bicarbonate, a sacrificial anode and water placed under an electrical charge.

- Following sloughing off of surface rust, clean in warm water and non-ionic detergent.
- Remove black oxidation residue with finishing pad, ensuring no abrading or scratching of the naked iron.
  Prime immediately with zinc rich primer as specified above and apply undercoats and finish coat.

PART 1 - GENERAL

1.1 Description of Work

.1 Undertake repairs to windows and doors (including casings, jambs/frames, sills and, bars on windows and door transoms) as indicated on the Drawings and described on the Window and Door Schedules. Note that work ranges from typical maintenance to full replacement.

.2 Apply window film to Period Museum rooms, as directed by the Departmental Representative, to transom and window glazing to block all light from entering rooms.

.3 All replacements of details and/or full units are to exactly replicate original in material, dimension, profile etc. unless directed otherwise.

.4 Provide 'sprung' copper weather stripping for all operable units.

.5 Carefully label all elements being dismantled as to exact location regarding location of unit and location of component within unit.

.6 Note that the existing paint on the windows and doors has been identified as having lead content. Remove and dispose of in accordance with applicable legislation and the requirements stipulated elsewhere in these specifications.

.7 For re-furbishing requirements to the iron bars on the windows and door transoms, see Section 07 62 00, “Flashings and Sheet Metal”.

1.2 Related Work Specified Elsewhere

.1 Section 09 91 10 - Painting.

.2 Section 04 43 04 - Repointing and Miscellaneous Masonry.

.3 Section 07 62 00 - Flashings and Sheet Metal.

1.3 Qualification

.1 All work of this section is to be done by skilled tradesmen having substantial proven experience in this type of work. In this regard, the workers must have had a minimum of 5 years' experience in this type of work and must be able to prove this before being allowed to complete any of this work.

.2 One carpenter is to be responsible for the complete repair or replacement of any one particular window unit or door assembly.

1.4 Shop Drawings

.1 Based on site-checked measurements, submit detailed shop drawings of replica window and doors and submit to Departmental Representative for approval prior to fabrication.

1.5 Mock-up

.1 Prepare mock-up showing all typical aspects of replicated units, i.e. muntins and rail profiles and joinery.

.2 Prepare mock-up showing window films on transom and window glazing, Contractor shall only proceed with remaining window films upon approval of mock-up installation.

1.6 Backpainting and Backpriming

.1 All removed woodwork to be reinstalled and all new woodwork is to be back painted before installation.

1.7 Storage and Handling

.1 Store all materials in clean, dry location, protected from the weather.

1.8 Measurement and Payment

.1 No measurement for payment will be made for the items "Re-Paint/Repair Woodwork in Doors and Frames", "Re-paint/Repair Woodwork in Windows and Frames" and "Replace Window Sash". Payment shall be by lump sum. As per Clause 3.2, "Scheduling" of Section 01 01 00, provide breakdown of these lump sum prices; as a minimum this being per unit (door or window).

.2 All costs for labour, equipment and materials necessary to complete the work of these items shall be included in the lump sum prices bid for these items and including all related hardware.

Note that all costs for the re-furbishing the iron bars in windows and, door transoms, shall be included in the related lump sum items above, “Re-Paint/Repair Woodwork in Doors and Frames” and “Re-Paint/Repair Woodwork in Windows and Frames”.

PART 2 - PRODUCTS

2.1 General-Lumber

.1 Materials shall be straight, sawn square and true, dressed four sides, properly sized and shaped to correct dimensions based on site check of dimensions shown on the Drawings.

.2 Use #1, #2, #3 Common pine for rough bucks, grounds, blockings, cants, strapping and the like.

.3 Use C Select Eastern white pine for all exposed replacements to trim, sash, doors and the like unless detailed otherwise and for new exposed work. Alternatively, certified reclaimed old growth wood of comparable quality may be substituted.

.4 Use 'Cabinetmaker' quality white oak for sills.

.5 Moisture content to be 15% or less. i.e. grade-stamped MC 15 and confirmed by random check with moisture meter.

2.2 Glue

.1 Waterproof synthetic resinous glue, resorcinol type.

2.3 Rough Hardware

.1 Supply all hardware required for this Section, such as nails, screws, bolts etc. and any other fixing device(s) required not expressly designated to be supplied under another Division.

.2 Generally, all fixing shall be concealed. Where this is not possible, make fixings as inconspicuous as possible. Employ original

fixing methods unless Contractor and Departmental Representative agree the design is flawed to the detriment of the component.

.3 All fasteners to be hot dipped galvanized steel or stainless steel.

2.4 Window Hardware

.1 Reuse existing hardware where possible. Where missing, provide matching replacement. New windows are to have hardware which matches that of the original window indicated as the model window.

2.5 Door Hardware

.1 As for Windows above.

2.6 Epoxy Filler

.1 Wood Epox II, Abatron Inc.; P.C. Woody or equivalent.

2.7 General Wood Filler

.1 Premium latex based wood filler such as Elmer's.

2.8 Glazing

.1 Glass shall be sheet glass, double diamond weight.

.2 Putty shall be pure chalk and linseed oil glazier's putty.

2.9 Tinting Window Film

.1 Opaque window film shall allow 0% visible light transmittance and reject 100% of ultraviolet rays. An acceptable product for this application is NRM M PS3 (Black) window film by Lumar.

2.10 Wood Preservative

.1 Clear zinc napthanate.

2.11 Damp-proof Membrane

.1 Copper Fibrene
.2 Blueskin PHT 200
.3 Ice and Water Shield

2.12 Copper Work

.1 Copper and fasteners shall be as called for in Section 07 62 00 - Flashings and Sheet Metal.

PART 3 - EXECUTION

3.1 Repairs Generally

.1 Original work is to be retained as far as possible with very minor chips etc. accepted as is.

.2 Minor areas of decay shall be cut out, flushed with zinc napthanate and the area consolidated with wood filler. Where strength is required, use epoxy based wood filler. For general cosmetic filling, use latex based wood filler.

.3 Larger areas of decay are to be cut out and repaired with matching wood in the form of "plugs" or "Dutchman". In repairing with plugs, note that the plug should be slightly irregular fitting tightly into the more circular area cut out to avoid future shrinkage problems. "Dutchman" should be cut to maximize surface area for gluing. i.e. tapered scarf joints. Treat both cut out areas and plug/Dutchman with preservative prior to gluing.

.4 Where mouldings or elements are being reproduced they must exactly replicate the original unless otherwise noted herein, on the drawings or with prior approval of the Departmental Representative.

3.2 Windows and Doors

.1 Provide all repairs to the windows/doors as shown on the drawings, or revealed as necessary at further site inspection in order to restore original condition and operability.

Note: See detailed repair schedule on drawings. At barred units coordinate with trade removing and re-furbishing iron bars.

.2 Where indicated or as required, ensure that the frame is securely fastened to the lug set into the masonry.

.3 Isolate wood from masonry with copper-felt (or other approved membrane) without undermining finished appearance.

.4 Treat all exposed bare wood at new "stripped" windows/doors with clear zinc napthanate, prior to painting.

.5 Where undertaking replication of unit, site measure each individual opening as variation is quite possible.

.6 Where replacing full sash unit, rebuild with 'through mortices' wedged and pegged as per the original detail rather than the blind mortice/steel pin treatment on the 1938 replica units (virtually all existing sash).

3.3 Putty and Glazing Repair

.1 Apply approved window film to all transom and window glazing identified as receiving this treatment. All window films shall be installed by an experienced installer prior to the placement of glazing into sash.

.2 All broken, loose or missing glass is to be replaced or repaired. Repair takes precedence over replacement. All putty is to be replaced using the following procedures.

.1 Remove all putty and glass and clean out joints.

.2 Prime paint joints with 1 paint: 4 thinner.

.3 Prime paint joints with 1 paint: 1 thinner.

.4 Apply 2 mm back putty and bedding putty.

.5 Install glass, slightly undersized, in centre of opening, point (with non-corroding points) and apply face putty bevel.

.6 Trim putty to match old work and allow to set and oxidize for 2-3 weeks (depending on environmental conditions).

3.4 Re-instatement

.1 Provide copper weather-stripping to all operable units.

.2 Reinstate as close to plumb and level as the masonry opening will allow.

.3 Reinstate shutters and louvres following final painting.

PART 1 - GENERAL

1.1 Description of the Work

.1 This section describes the requirements for painting all exterior woodwork, including windows, doors, and trim associated with the windows, doors and window surrounds.

Note: Paint colours for woodwork to be specified by Departmental Representative. Approval will be based on mock-up applications as directed by the Departmental Representative.

.2 All of the windows and doors (casings, transoms, shutters, embrasures, etc.) are to be painted on the interior as well.

1.2 Related Work Specified Elsewhere

.1 Section 08 62 10 - Wooden Windows and Doors.

1.3 Qualifications

.1 Provide for all work to be done by skilled and experienced tradesmen specializing in this type of work.

1.4 Job and Environmental Conditions

.1 Use sufficient drop cloths and protective coverings for the full protection of work not being painted. Protect hardware and all other components of the building, which do not require painting, from paint spoiling and other soiling during the painting process.

.2 Provide metal pans, or adequate tarpaulin, in areas assigned to the mixing of paints.

.3 Keep waste rags in metal drums containing water and remove at the end of every working shift.

.4 The painting Contractor shall remove from the Fort all excess material, leftovers and scrap, as well as his own equipment, at the end of the job.

.5 The owner will be provided with extra stock of each paint colour used, labelled as to its appropriate location of use.

.6 DO NOT paint in unclean areas.

.7 Application and drying of paints shall not proceed at temperatures below 10°C.

.8 Painting shall not proceed when the substrate surface is damp with morning dew.

.9 Painting shall not proceed during periods of rain and shall not resume until the wetted surface has dried.

.10 Moisture content of wood must not exceed 15% prior to applying paint.

1.5 Measurement for Payment

.1 No measurement for payment will be made for the work of painting windows and doors of this section. All costs for this work are to be included in the tendered prices for the related work items.

PART 2 - PRODUCTS

2.1 Exterior Paint (Windows and Doors)

.1 Windows and Doors Exterior Trim: Premium, acrylic latex gloss exterior finish with high pigment content. Manufacturer’s literature for proposed product to be submitted for approval.

2.2 Interior Paint

.1 Interior: Premium acrylic latex gloss finish with high pigment content. Manufacturer’s literature for proposed product to be submitted for approval.

2.3 Primer (Windows and Doors)

.1 Premium primer specified by manufacturer for approved finish paint systems.

2.4 General

.1 Water: potable

.2 Bleach: 10% sodium hypochlorate solution (e.g. Javex)

.3 Tri-sodium phosphate

.4 Mineral Spirits or Varsol

.5 Heat Gun

.6 Scrub brushes: natural bristle or soft plastic type only.

.7 Mechanical scrapers: round all edges

.8 Strippers: Citrus or other organically based non-toxic strippers. Methylene Chloride may only be used with special permission.

PART 3 - EXECUTION

3.1 Preparation (Windows and Doors)

.1 Apply all work in accordance with the manufacturer's printed directions unless modified by this Specification.

.2 Apply work with suitable, clean equipment in good condition.

.3 Apply work in dust free, suitable conditions and on surfaces free from machine, tool or sandpaper marks, insects, grease, oil, rust, salts and any other condition liable to impair finished work or prevent the production of good results.

.4 All work shall be even, uniform of sheen, colour and texture, free from marks, well brushed in and free of sags, crawls, runs, joint marks and other defects.

.5 Use paint unaltered; use same brand of paint for primer, intermediate and finish coats.

.6 Conform with the Departmental Representative's colour schedule and exactly match approved samples.

.7 Surfaces soiled by the spillage of paint, paint splattering, etc. shall be cleaned by this Trade. If such cleaning operations damage the surface, replacement or making good shall be at the expense of the Contractor.

.8 All paint shall be stripped from wood surfaces. All surface preparation must be done using hand tools, such as scrapers and brushes, supplemented by the heat gun. Hand tools must have rounded edges to prevent unnecessary damage such as gouging and scratching to the substrate.

.9 Surfaces must be hand-sanded as required.

.10 Use only approved paint strippers for paint stripping.

.11 Wash woodwork down with tri-sodium phosphate solution in hot water.

.12 All wood shall be primed immediately as it is installed and before exposure.

.13 Any open joints shall be sealed with caulking compound.

.14 Weathered wood shall be carefully treated by gently sanding the area by hand until it is relatively smooth and using filler to provide smooth surfaces.

.15 Finish edge of wood doors with varnish or paint as required to match the face of the door; seal hidden edges of wood doors with one coat of shellac and one coat of gloss varnish, two coats paint; repaint tops and edges of wood doors after fitting.

.16 Carefully sand smooth between coats including prime coat; apply one coat leafing aluminum type sealer or red shellac before applying first coat paint to knots or sap blemishes.

.17 Nail heads, with the capacity to rust, shall be sunk below the surface of the wood and the nail hole puttied with oil base putty and putty painted with one coat gum shellac cut in pure alcohol.

.18 After first coat, fill nail holes, splits and scratches, using putty coloured to match finish.

3.2 Application (Windows and Doors)

.1 Painting coats are intended to cover surfaces perfectly; if in the Painter's opinion the formulae specified are inadequate to provide a first-class finished surface, report to the Departmental Representative before commencing work; surfaces imperfectly covered shall receive additional coats at no additional cost.

.2 All paint is intended to be applied by hand brushing.

3.3 Exterior Woodwork Formulae (Windows and Doors)

.1 All exterior woodwork is to be treated in the following manner:
- .1 Disinfect
- .2 Prime Coat
- .3 Undercoat and filling
- .4 Apply two finish coats

.2 Wash down all stripped woodwork by scrubbing off any residue and mildew with a bristle brush and rinsing down with water; to be done with a solution of bleach, detergent and tri-sodium phosphate mixed in the following proportions:
- .1 Bleach - 1 litre
- .2 Detergent - 50 ml
- .3 Tri-sodium Phosphate - 200 ml
- .4 Water - 3 litres

.3 Apply a prime coat of Exterior Wood Paint, applied liberally until the surface stays wet, paint to be diluted - two (2) parts exterior wood paint : one (1) part mineral spirits or use primer as directed by manufacturer of finish coat.

.4 Apply undercoating of Exterior Paint in the same manner, paint diluted - four (4) parts paint: one (1) part mineral spirits or as directed by Manufacturer.

.5 Fill in all small cracks and fissures with putty tinted to match the finish coat colour.

.6 Brush on two coats of Exterior Paint, full strength, allowing each coat to dry between applications.

.7 Exterior wood doors are to be given an additional two coats of spar varnish over the paint system.