Project Title Fort Henry East & West Branch Ditch Walls

Project Number 30023384

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 in the East and West Branch Ditches of Fort Henry.

.2 Description of Work

.1 The intent of the project is to complete repairs to the stone masonry in the walls of the East and West Branch Ditches, to the limits indicated on the drawings and, in conformance with good historic masonry restoration practice. Work includes but is not restricted to the following and, as detailed on the drawings and in these specifications.

.1 All work required for site access including restoration of paved, gravel and grassed areas.

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

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

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

.5 Completion of repairs to the masonry including: - repointing of masonry joints as directed, - Replacement of deteriorated stone, - Full Dutchman and partial Dutchman repairs to deteriorated stone, - Dismantling and Reconstruction of Deteriorated wall portions - Crack Repair/injection to stone units.

.6 Installation of special masonry joint finish sealant in skyward facing masonry as shown on the drawings.

.7 Installation of masonry vents.

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

.3 Note that repair works have already been completed to some of the wall areas in both Ditches and the

work of this contract is intended to complete all remaining required masonry repairs.

.4 The contractor shall start repair works only to the south wall of the West Branch Ditch and only commence works at the East Branch Ditch after June 14, 2015.

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.

.3 Note that no excavation is to be carried out as part of this work. Restoration of grassed and gravel surfaces shall generally consist of cleaning by raking, disposal and removal of debris, dead grass etc. off site and, in the case of grassed areas, the application of topsoil and seed while for gravel areas, apply crushed stone or granular 'A' to match existing grades and lines.

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.

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 Plans - the drawings listed in the "List of Drawings".

.2 Specification - the subject matter listed in the "Index to Specification", Addenda to the Specification and all relative written communications sent by the Departmental Representative to the Contractor in connection with the work.

.3 Department - Parks Canada, Agency, Georgian Bay and Ontario East Field Unit and Ontario Waterways Group.

.4 Departmental Representative - Parks Canada will appoint or designate a Departmental Representative for this Contract. The Contractor will be informed in writing of the designated individual or individuals. Should it be required to change the Departmental Representative, the Contractor will be informed in writing.

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 acceptable barricades of not less than 1.8 M in height to block off work areas from public access. Posts shall not be anchored by drilling into existing bedrock or other existing features or earth, 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.

1.9 Protection of the Work

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

1.10 Dust and Noise Control

.1 Due to group tours and tourists, dust generation and high noise activities will be restricted to 7:00 a.m. to 10:00 a.m., unless otherwise approved by the Departmental Representative.

1.11 Measurement for Payment

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

1.12 Basis of Payment

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

.1 Supply, installation and maintenance of all site barricades (fences).
.2 Provision and maintenance of temporary facilities.
.3 Layout of the work.
.4 Scheduling.
.5 Permits and taxes.
.6 Environmental measures.
.7 Rectification of existing surfaces, materials and access routes including raking down of debris and, installation of gravel, topsoil, finish grading, seeding and mulching.
.8 Site Clean-up and restoration.
.9 Any other "miscellaneous" items of work called for on the drawings and specifications and

not specifically covered by other payment items of the Contract.

1.13 Cannons Firing On-Site

.1 Cannons are fired at the site during the Fort operation season.

.2 The approximate times for firing are 12 Noon, 3:10 p.m. and 4:50 p.m.

PART 2 - MATERIALS

2.1 Acceptance of Materials

.1 Where materials and equipment are specified to CSA, CGSB, ASTM or similar standard, 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 providing 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 in areas which have been disturbed by the Contractor's operations under this Contract and which are not covered by other items of the Contract. Where the disturbance is to gravelled or asphalted areas, complete restoration with "like" materials and to satisfaction of the Departmental Representative.

.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 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.

.5 All work including site restoration must be completed no later than Labour Day. After Labour Day, Contractor will be responsible for all incremental costs related to Fort operations required within the work area.

3.3 Layout of the Work

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

3.4 Temporary Services

.2 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 will be allowed access to water supply at the Fort. Contractor is responsible for temporary connections, lines and haulage.

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 scheduled as indicated in the instructions to tenderer's.

Confirmation of attendance is to be made through the Parks Canada Project Manager. 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,

.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 or volatile materials, such as mineral spirits, oil or paint thinner on site.

.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.

.4 Do not dispose of any waste water in storm drains.

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 and approval 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 Departmental Representative.

1.2 Submission

.1 Co-ordinate, each submission, with requirements

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, Canadian Labour 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.

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 data sheets 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 National Building Code 2010 (NBC):
.1 Division B, Part 8 Safety Measures at Construction and Demolition Sites
.3 National Fire Code 2010 (NFC):
.1 NFC 2005, division B, Part 2 Emergency Planning, subsection 2.8.2 Fire Safety Plan.
.4 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.
.5 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 as 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.

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.

.3 Work at a site open to the Public.

.4 Work at heights.

.5 Work in areas with vehicle access.

.6 Work near utilities.

.7 Work with lime and water.

.8 Work with noise and loud noises (cannons).

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 Definitions

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2 Environmental Assessment

.1 Attached to this specification is the environmental assessment report including appendix D the Environmental Assessment Mitigation Monitoring Report Form which must be completed and updated throughout the project by the contractor as part of the work. The Significant information regarding species at risk and environmental requirements are listed in the report. The environmental protection measures outlined in this assessment report, as well as the measures called for elsewhere in these specifications, shall be adhered to as part of the work of this project.

1.3 Submittals

.1 In accordance with Section 01 33 00.

.2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction and the methods of

mitigation as well as how compliance will be measured.

.3 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.4 Environmental protection plan to include as applicable to this project:

.1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.

.2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.

.3 Names and qualifications of persons responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 Erosion and sediment control plan which identifies type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.6 Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.7 Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use of areas including methods for protection of features to be preserved within authorized work areas.

.9 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance as well as contents and location of spills kit.

.10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.11 Air pollution control plan detailing provisions to assure that dust, debris,

materials, and trash, do not become air borne and travel off project site.

.12 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and detailed provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials. The plan shall include addressing the runoff of water from rain, snow and weather.

.13 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

.14 Historical, archaeological, cultural resources biological resources and wetlands plans are not thought to be required for this project unless the ground surface is to be disturbed. If it becomes necessary the plans shall define procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

1.4 Fires

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

1.5 Disposal of Waste

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

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

1.6 Drainage

.1 Provide erosion and sediment control plan that identifies type and location of erosion and sediment controls to be provided. Plan: include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sedimentations control plan.

.3 Provide temporary drainage and pumping as

necessary to keep site free from water.

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

.5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local Provincial and Federal authority requirements.

1.7 Work Adjacent to Waterways

.1 Do not operate construction equipment in waterways.

.2 Do not use waterway beds for borrow material.

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

.4 Design and construct temporary crossings to minimize erosion to waterways.

.5 Do not skid logs or construction materials across waterways.

.6 Avoid indicated spawning beds when constructing temporary crossings of waterways.

1.8 Hazardous Waste Disposal

.1 Dispose of hazardous waste, generated by the work of this project, in accordance with applicable legislation.

1.9 Permit To Transport

.1 All waste described as subject to Ontario Regulation 347 as amended of the Environmental Protection Act must be transported with a valid "Certificate of Approval for a Waste Management System" to a site approved by the Ontario Ministry of the Environment to accept that waste.

.2 Obtain a TDGA permit for all lead waste prior to transporting the waste.

1.10 Noise Control

.1 Should the Contractor remove rivets as part of the work of removing the bridge, note that many methods of rivet removal create a significant amount of noise. Limit the timing of rivet removal and noise from the removal as much as possible. In all cases comply with local noise by-laws including the by-laws, related to noise and construction.

.2 Minimize the noise levels from construction activities by using proper muffling devices, in addition to appropriate timing and location of these activities to reduce or minimize the effect of noise on nearby residents, recreationists, and wildlife.

1.11 Spill Containment

.1 The Contractor shall have a spill containment kit on site and available at all times.

.2 During all operations, such as refueling and paint transfer, the operations shall be completed within a secondary containment system capable of preventing release of spills or leaks into the environment.

1.12 Pollution Control

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

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

.3 Prevent blasting media, lead paint removed and other extraneous materials from contaminating air and waterways beyond removal/application area, by providing temporary enclosures or other suitable methods acceptable to the Departmental Representative.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.

.5 Spills of deleterious substances:.1 Immediately contain, limit spread and clean up in accordance with provincial regulatory requirements..2 Report immediately to Ontario Spills Action Centre:1-800-268-6060. .3 Further information on dangerous goods emergency cleanup and precautions including a list of companies performing this work can be obtained from the Transport Canada 24-hour number (613) 996-6666collect.

1.13 Notification

.1 The Contractor shall monitor compliance with the Contractor's environmental plan logging compliance and non-compliance issues. The log shall be presented to the Departmental Representative for review.

.2 While the Contractor remains responsible for compliance review the Departmental Representative may notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.3 Contractor: after receipt of such notice shall inform the Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

.4 Departmental Representative may issue stop order of work until satisfactory corrective action has been taken.

.5 No time extensions will be granted or equitable adjustments allowed to Contractor for such suspensions.

.6 Contractor to co-operate with the authorities having jurisdiction and correct any non-compliance issues.

1.14 Measurement and Payment

.1 No measurement for payment will be made for the work of implementing the environmental protection measures indicated on the drawings or as required by applicable legislation. All costs for the implementation of environmental measures shall be included in the Contract lump sum price for the item “Sitework”.

.2 Prior to the first application for progress payment, the Contractor shall submit a breakdown of the Contract lump sum price for the various environmental measures called for. Once approved, this shall be used as the basis for progress payments.

PART 2 – MATERIALS

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 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 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.

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

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

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

1.2 Related Work

.1 Section 01 01 00 - General Requirements.

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

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

.4 Section 04 43 05 - Masonry Removals.

.5 Section 04 43 07 - Installation of Masonry.

.6 Section 04 43 19 - Cut Stone.

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 measures to protect existing features and to maintain them 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 lump sum item shall be considered to be broken down as follows:
.1 50% of the lump sum item 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% of the lump sum item 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 five 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.

.2 All work to be in accordance with the Occupational Health and Safety Act. Field measure to ensure proper fit of all works.

.3 Scaffolding shall be erected on wood sills which are placed on tarps to prevent discolouration or contamination of surfaces.

.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 men and materials can easily enter.

.5 Scaffolding shall be designed, drawn and inspected by a registered Professional Engineer experienced in this work, if deemed necessary by the "Ontario Health and Safety Act and Regulations for Construction Projects". Provide shop drawings for review. If required, all drawings shall be stamped and signed by a registered Professional Engineer. Make all changes required by Ministry of Labour officials. Prior to using the scaffolding for carrying out the work, the Design Engineer (when applicable)

for the scaffolding shall complete an inspection of the installation and shall provide the Departmental Representative with a letter stating that the installation conforms with his/her design and is suitable for the Contractors use. Make all changes required by Ministry of Labour officials. Provide for periodic inspections monthly as scaffolding and work progresses.

.6 Install, maintain and remove all plywood covers or other measures to protect existing 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. Provide hoarding and other measures to protect the Public.

PART 1 - GENERAL

1.1 Related Sections

.1 Section 03 20 00 - Concrete Reinforcing.

.2 Section 03 30 00 - Cast-in-Place Concrete.

1.2 Measurement Procedures

.1 No measurement will be made under this Section. Include costs of this work in associated cost items for concrete.

1.3 References

.1 Canadian Standards Association (CSA)
- .1 CAN/CSA-A23.1-09, Concrete Materials and Methods of Concrete Construction.
- .2 CAN/CSA-O86, Engineering Design in Wood (Limit States Design).
- .3 CSA O121-R1998, Douglas Fir Plywood.
- .4 CSA O151-R1998, Canadian Softwood Plywood.
- .5 CSA S269.1-R2003, Falsework for Construction Purposes.
- .6 CAN/CSA-S269.3-R20088, Concrete Formwork.

.2 Council of Forest Industries of British Columbia (COFI)
- .1 COFI Exterior Plywood for Concrete Formwork.

1.4 Shop Drawings

.1 Submit shop drawings for formwork and falsework in accordance with Section 01 33 00 - Submittal Procedures.

.2 Indicate method and schedule of construction, shoring, stripping, arrangement of joints, ties, liners, conduit trenches and chases and, locations of temporary embedded parts. Comply with CSA S269.1, for falsework drawings. Comply with CAN/CSA-S269.3 for formwork drawings.

PART 2 – MATERIALS

2.1 Materials

.1 Formwork materials:
.1 Use wood and wood product formwork materials to CSA-O121 and CAN/CSA-O86.

.2 Form ties:
.1 Use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm dia. in concrete surface. All holes shall be patched with appropriate materials approved by the Departmental Representative and arranged in a symmetrical pattern.

.3 Form liner:
.1 Plywood: high density overlay Douglas Fir to CSA O121.

.4 Form release agent: non-toxic, biodegradable, low VOC.

.5 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 15 to 24 mm ý /s at 40°C, flashpoint minimum 150°C, open cup.

.6 Falsework materials: to CSA-S269.1.

PART 3 - EXECUTION

3.1 Fabrication and Erection

.1 Verify lines, levels and centers before proceeding with formwork/falsework and ensure dimensions agree with drawings and field measurements.

.2 Fabricate and erect falsework in accordance with CSA S269.1 and COFI Exterior Plywood for Concrete Formwork.

.3 Do not place shores and mud sills on frozen ground.

.4 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.5 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.

.6 Align form joints and make watertight. Keep form joints to minimum.

.7 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.8 Clean formwork in accordance with CAN/CSA-A23.1, before placing concrete.

3.2 Removal and Reshoring

.1 Leave formwork in place for three days, unless otherwise indicated or approved by the Departmental Representative after placing concrete.

.2 Remove formwork no earlier than when concrete has reached 75% of its design strength or minimum period noted above, whichever comes later.

.3 Re-use of formwork and falsework shall be subject to requirements of CAN/CSA-A23.1.

3.3 Quality of Finish

.1 The finished surface of all concrete surfaces at minimum shall conform to the provisions of CSA A23.1, 7.7.3.6 Smooth-Form Finish.

.2 Grinding of the surfaces to achieve proper alignment and tolerance will generally not be accepted and the work must conform to the lines and be smooth when the forms are removed.

.3 An above average finish of concrete uniform in colour, straight in appearance or with uniform curves, where curves are required, is a condition of acceptance.

PART 1 - GENERAL

1.1 Related Section

.1 Section 03 30 00 - Cast-in-Place Concrete.

1.2 Measurement Procedures

.1 Work covered by this Section will not be paid for under a separate unit price. Payment shall be included in the related concrete item.

1.3 References

.1 American Concrete Institute (ACI)
- .1 ACI 315R-94, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

.2 American National Standards Institute/American Concrete Institute (ANSI/ACI)
- .1 ANSI/ACI 315-99, Details and Detailing of Concrete Reinforcement.

.3 American Society for Testing and Materials (ASTM)
- .1 ASTM A 775/A 775M- 07, Specification for Epoxy-Coated Reinforcing Steel Bars.

.4 Canadian Standards Association (CSA)
- .1 CAN/CSA-A23.1-09, Concrete Materials and Methods of Concrete Construction.
- .2 CAN3-A23.3-04, Design of Concrete Structures for Buildings.
- .3 CAN/CSA-G30.18-09 (R1998), Carbon Steel Bars for Concrete Reinforcement.
- .4 CAN/CSA-G40.21-13 (R1998), Structural Quality Steels.

.5 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.6 CSA W186-M1990 (R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.4 Shop Drawings

.1 Submit Shop Drawings including placing of reinforcement, in accordance with Section 01 33 00 - Submittal Procedures. All reinforcing dimensioning to be based on Contract Drawing information and as confirmed by field measurements.

.2 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings. Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada.

.3 Detail lap lengths and bar development lengths to CAN3-A23.3, unless otherwise indicated.

PART 2 - MATERIALS

2.1 Materials

.1 All reinforcing steel shall be uncoated.

.2 Substitute different size bars only if permitted in writing by Departmental

Representative.

.3 Reinforcing steel: carbon steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.

.4 Cold-drawn annealed steel wire ties: to CSA G30.3.

.5 Deformed steel wire for concrete reinforcement: to CSA G30.14.

.6 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.

.7 Mechanical splices: subject to approval of Departmental Representative.

.8 Plain round bars: to CAN/CSA-G40.21.

.9 Grouting of Dowels: Grout for dowels shall be a solvent free, moisture insensitive, high modulus, high strength structure epoxy paste adhesive. An acceptable product is Sikadur 31 Hi-Mod Gel produced by Sika.

2.2 Fabrication

.1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1, ANSI/ACI 315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.2 Obtain Departmental Representative's approval for locations of reinforcement splices other than those shown on placing drawings.

.3 No welding of reinforcing steel should be required.

.4 Ship bundles of bar reinforcement,

clearly identified in accordance with bar bending details and lists.

2.3 Source Quality Control

.1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to commencing reinforcing work.

.2 Upon request, inform Departmental Representative of proposed source of material to be supplied.

PART 3 - EXECUTION

3.1 Field Bending

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure and proper bending tools.

.3 Replace bars which develop cracks or splits.

3.2 Placing Reinforcement

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure and proper bending tools.

.3 Replace bars which develop cracks or splits.

3.3 Grouting of Dowels

.1 Drill holes for dowels at locations and to depths indicated on the drawings or as directed by the Departmental Representative.

.2 Hole size to be as recommended by grout manufacturer.

.3 Install dowel and grout in conformance with grout manufacturer recommendations.

PART 1 - GENERAL

1.1 Description

.1 The work of this section covers the requirements for the supply and placement of concrete as the re-facing to the existing concrete buttress at the base of the masonry retaining wall, at the southeast corner of the East Branch Ditch bridge.

.2 The removal of concrete on the existing buttress is also covered under this section.

.3 Comply with restrictions stipulated in this and other sections of these specifications.

1.2 Related Sections

.1 Section 03 10 00 – Concrete Formwork and Accessories.

.2 Section 03 20 00 – Concrete Reinforcing.

1.3 Measurement for Payment

.1 Work covered by this section will be paid for under the lump sum item:
.1 “Concrete in Buttress.”

.2 Concrete placed beyond approved removal lines will not be measured for payment.

.3 The tendered price for cast-in-place concrete items shall include all costs for labour, materials and equipment required for removal of deteriorated concrete on the buttress, supply and installation of formwork, reinforcing steel and dowels and, concrete, all in

accordance with the Contract Drawings and these Specifications.

.4 Heating and cooling of water and aggregates, and providing hot and cold weather protection will not be measured but are considered incidental to the work.

.5 All other work, necessary to the completion of the work of cast-in-place concrete and considered incidental to the work.

1.4 References

.1 All concrete supply and placement shall conform to CAN/CSA A23.1-09, Concrete Materials and Method of Concrete Construction.

.2 All formwork shall conform to CAN/CSA S269.3-M92, Concrete Formwork as supplemented by the Contract Specifications.

.3 All falsework shall conform to CSA S269.1-1975, S269.1-1975 (R2003). Falsework for Construction Purposes.

.4 Canadian Standards Association (CSA).
.1 CAN/CSA-A3001-08, Cementitious Materials for use in Concrete.
.2 CAN/CSA-A23.1-09, Concrete Materials and Methods of Concrete Construction.
.3 CAN/CSA-A23.2-09, Methods of Test for Concrete.

.5 Abrasive blast cleaning of concrete to general method and cleanliness of SSPC-SP6-89, Commercial Blast Cleaning.

1.5 Samples

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

.2 At least 2 weeks prior to commencing work, inform Departmental Representative of proposed source of aggregates and provide access for sampling.

1.6 Certificates

.1 Submit certificates for concrete in accordance with Section 01 33 00 - Submittal Procedures.

.2 A minimum of 2 weeks prior to starting concrete work, submit to Departmental Representative manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements.
.1 Portland Cement.
.2 Blended hydraulic cement.
.3 Supplementary cementing materials.
.4 Admixtures.
.5 Aggregates.
.6 Water.

.3 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.

.4 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1.

.5 In the case of pre-blended proprietary concrete and cement based products,

provide manufacturer's data sheets and ensure that all products are delivered in original manufacturer's labelled packaging. If any doubt exists regarding the source or quality of the material, provide shipping records or other suitable certification that the product was delivered to the site. Such certification must be provided from the manufacturer.

1.7 Quality Assurance

.1 A minimum of 2 weeks prior to starting concrete work, submit proposed quality control procedures for Departmental Representative's approval for following items:
.1 Falsework erection.
.2 Hot weather concrete.
.3 Cold weather concrete.
.4 Curing.
.5 Finishing.
.6 Formwork removal.
.7 Joints.

1.8 Waste Management and Disposal

.1 To Section 01 35 43 - Environmental Procedures, with the following additional requirements.
.1 Carefully coordinate the specified concrete work with weather conditions.
.2 Choose least harmful, appropriate cleaning method which will perform work adequately.

PART 2 - MATERIALS

2.1 Substitution

.1 Substitution of specified products may

be considered by the Departmental Representative provided that the Contractor requests the use of alternative products in writing and such request includes a certificate of compliance from an independent CSA certified testing laboratory that the proposed product meets or exceeds the specified products performance criteria tested in accordance with standards designated in the specified product manufacturer's technical data sheet.

.2 Substitute products shall be composed of constituent material similar to those comprising the specified product(s) and shall have similar performance characteristics. They must be fully compatible with other repair products specified or substituted.

.3 Submittals to Section 01 33 00 - Submittal Procedures.

2.2 Materials

.1 Portland Cement: to CAN/CSA-A3001.

.2 Supplementary cementing materials: to CAN/CSA- A3001.

.3 Cementitious hydraulic slag: to CAN/CSA-A363.

.4 Water: to CAN/CSA-A23.1.

.5 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density.

.6 Abrasive for blast cleaning shall be angular or sub-angular in shape and, not more than 1% shall pass the 300 sieve. Adjustments to the type and angularity of

the aggregate shall be made as necessary to produce the desired results.

.7 Air entraining admixture: to ASTM C 260.

.8 Chemical admixtures: to ASTM C 494. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

2.3 Mixes

.1 Proportion normal density concrete in accordance with CAN/CSA-A23.1, table 13, Alternative 1 to give following quality.

.1 Cement:

.1 Type 10 Portland Cement.

.2 Minimum compressive strength at 28 days: 35 MPa.

.3 Minimum cement content: 335 kg/m3 of concrete.

.4 Class of exposure: C-1.

.5 Nominal size of coarse aggregate: 20 mm except for sections of thin concrete where a maximum size of 9.5 mm may be used subject to the approval of the Departmental Representative.

.6 The water cement ratio shall be no greater than 0.40.

.7 Air content: 5% to 8% except for concrete with 10 mm aggregate which shall have air content 6% to 9%.

.8 Chemical admixtures: in accordance with ASTM C 494. Do not use calcium chloride or compounds or admixtures containing calcium chloride.

.9 Shrinkage Reducing Admixture shall be used - Equivalent to "Eclipse" by Grace Construction Products, 2% of cement by weight or, as recommended by admixture manufacturer.

.10 Plasticizing admixtures are to be used to increase the workability of the concrete and ensure that the concrete can

be placed.

.2 Ensure that aggregate sources conform to the requirements of Clause 5.5, "Deleterious Reaction" of CAN/CSA-A23.1 and that performance certification includes certification that the aggregate is non-reactive.

2.4 Equipment

.1 Air Compressors:

.1 The air compressor for air blasting shall have a minimum capacity of 3.5 m3/min. The compressed air shall be free from oil when testing in conformance with ASTM D4285.

.2 The air compressor for abrasive blast cleaning shall supply a minimum pressure, in the hose, of 620 kPa within 3 m of the nozzle. the air shall be free from oil when tested in conformance with ASTM D4285.

.2 Straight Edge:

.1 The straight edges for checking alignment shall be 1.5 m and 3 m long and commercially made of metal with little or no deviation from a straight line.

.3 Vibrators:

.1 Vibrators shall be used during the placing of concrete to ensure that voids are eliminated and the cavity is completely filled. The use of the vibrator shall be coordinated with the amount of admixtures to ensure that the concrete does not segregate.

PART 3 - EXECUTION

3.1 Housing and Heating (when required)

.1 Protection - General:

.1 The Contractor shall protect the concrete during cold weather conditions, if applicable.

.2 The protection system shall be designed for the worst conditions that can be reasonably anticipated from local weather records, forecasts, site conditions and past experience for the time period during which the protection is required. Due to the accelerated schedule for this project, it is critical that concrete placement occurs without delay due to weather. Therefore, concrete placement locations are to be housed, heated and protected from inclement weather conditions by constructing protective enclosures as required to complete concrete pouring and curing without delay.

.3 The Contractor shall monitor the conditions and modify the protection system as required.

.2 Protection - Minimum Requirements:

.1 The formwork and existing concrete shall be heated to a temperature of 5°C for a period of 36 hours prior to pouring concrete.

.2 During the 7 days following placing, the concrete temperature shall not fall below 10°C or exceed 70°C.

.3 For cold weather conditions, protection of concrete shall at least conform to Table 1. However the temperature of the concrete shall be checked to ensure that at least the minimum temperature specified above is maintained at all times.

TABLE 1 - MINIMUM COLD WEATHER PROTECTIVE MEASURES ALL CONCRETE

Anticipated Minimum Air Temperature °C)	Thickness >1.0m	1.0-0.5m	<0.5-0.25m	<0.25m
+5 to 0	pm1	pm1	pm1	pm2
-1 to -10	pm2	pm2	pm3	pm4
-11 to -20	pm3	pm3	pm4	pm5
less than-20	pm4	pm5	pm5	pm5

Maximum Allowable Drop in Concrete or Patching Temperature / 24h

>2.0m	-	10°C
1.0-0.99m	-	15°C
<1.0m	-	20°C

PROTECTIVE MEASURE

pm1 - Cover concrete with a moisture vapour barrier as specified for curing with moisture vapour barrier.

pm2 - Cover concrete as for pm1, then cover the moisture vapour barrier with insulation having an R-Value of 0.67**.

pm3 - Cover concrete as for pm1, then cover the moisture vapour barrier with insulation having an R-Value of 1.33**.

pm4 - Cover concrete as for pm1, then cover the moisture vapour barrier with insulation having an R-Value of 2.00**.

pm5 - House and heat as specified for housing and heating.

****NOTE**: All R values are metric. The conversion factor from metric to imperial is Metric "R" value x 5.678 = Imperial "R" value.

.3 Housing and Heating:

.1 The design of the protective housing shall take into account the effects of construction activities such as placing concrete, and grouting. Heating equipment of sufficient capacity to establish and maintain the specified curing conditions shall be used throughout the curing period and for such time thereafter as is necessary for the completion of the work. Heating equipment used within the housing shall be vented outside the housing. Heating equipment having an open flame will not be permitted.

.2 The ambient air temperature adjacent to the concrete or formwork within the housing shall not be permitted to vary, from location to location, by more than 8°C.

.4 Withdrawal of Protection

.1 The cold weather protection shall be gradually removed or reduced in such a manner that the maximum allowable drop of concrete temperature for each 24 h period as specified in Table 1 is not exceeded.

.2 The protection shall not be totally removed nor shall the concrete be fully exposed to the air until the average temperature of the concrete is within 10°C of the air temperature.

3.2 Preparation

.1 Obtain Departmental Representative's written approval before placing concrete. Provide 72 hours' notice prior to placing of concrete.

.2 Pumping of concrete is permitted only after approval of equipment and mix. The

mix supplier and mix designer must certify that the mix can be pumped using the proposed equipment and not affect the concrete properties.

.3 Ensure reinforcement and inserts are not disturbed during concrete placement.

.4 Before placing concrete, obtain Departmental Representative's written approval of proposed method for protection of concrete during placing and curing.

.5 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.6 Do not place load upon new concrete until authorized in writing by Departmental Representative.

3.3 Construction

.1 Do cast-in-place concrete work in accordance with CAN/CSA A23.1.

.2 Finishing:

.1 Finish concrete in accordance with CAN/CSA-A23.1.

.2 Use procedures acceptable to Departmental Representative or those noted in CAN/CSA A23.1 to remove excess bleed water. Ensure surface is not damaged.

.3 Provide screed float finish unless otherwise indicated.

.4 Chamfer and rub exposed sharp edges of concrete or patching with carborundum to produce 3 mm radius edges unless otherwise indicated.

3.4 Concrete Removals and Abrasive Blasting

.1 Remove deteriorated concrete, using pneumatic chippers, to the limits indicated on the drawings. Removals beyond that indicated will not be paid for, including additional concrete to fill the resultant void(s).

.2 Abrasive blast clean all existing concrete surfaces against which new concrete is to be placed.

.3 Abrasive cleaning must take place not more than 48 hours before the placement of any concrete. Special direction will be given when placement of reinforcing steel will require more time.

.4 Preparation and Abrasive Blasting.
.1 Remove all oil or grease on the surface, to which concrete is to be placed, by hand chipping. Expose and clean the coarse aggregate of the existing concrete by blasting with abrasive. Remove all dirt, laitance, loose material, paint, hardened concrete slurry, or any other contaminant(s) which would inhibit the bonding of the new concrete to the existing concrete. Adjust the blast medium and pressures to obtain the required level of cleanliness without damaging adjacent surfaces.
.2 Immediately after abrasive blasting, blast with compressed air all surfaces against which the concrete is to be placed. Compressed air must remove all remaining abrasive, sand, dust and debris. The surface will be checked by the Departmental Representative for fractured concrete, or loose aggregate. Remove this material using hand tools.

.5 Protection and Disposal of Debris.
.1 Install tarps, enclosures, etc. as

required to satisfactorily limit the amount of air borne dust.

.2 Provide worker protection measures to Site Specific Health and Safety Plan. See Section 01 35 29.6 - Health & Safety Requirements.

.3 Dispose of all concrete removals, blast media and debris resulting from the removal and blast cleaning operations off site in accordance with applicable legislation.

3.5 Placement and Curing

.1 Before placing concrete, thoroughly dampen the concrete surfaces to promote bond. Immediately before placing concrete, place bonding agent to ASTM C1059 or cement slurry bonding agent.

.2 Install wet burlap and white plastic over the newly placed concrete after it has initially set and so the placement of the burlap and plastic will not damage the surface. Install cold weather protection. Maintain moist curing on the concrete for a minimum of 7 days.

3.6 Site Torerance

.1 Unless otherwise noted, concrete application tolerance shall be in accordance with CAN/CSA-A23.1 straight edge method.

3.7 Field Quality Control

.1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Departmental Representative in accordance with CAN/CSA-A23.1.

.2 Departmental Representative will pay for costs of tests (to be reimbursed by Parks Canada). If retesting is required due to non-conformance, the contractor shall pay all costs associated with retesting.

.3 Departmental Representative will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

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 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 and columns/pilasters.

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 capstones or broken stones or, stones which are delaminated 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) 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 (Capstones)", 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

.1 Acceptable products for repair of

Patching

horizontal cracks or delaminations: 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 Patch material to be used for repairing/finishing tops of existing capstones to be a one-component, polymer modified repair and re-surfacing mortar. Sika MonoTop – 622 is an approved product for this application.

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 Patch horizontal crack/delamination areas and deteriorated tops of capstones with approved repair mortar according to the manufacturer's printed instructions, except as modified herein.

.2 At areas to receive patches, remove all loose mortar and masonry to a sound substrate.

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

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

.5 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) 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 panel 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 For patching application to the tops of capstones, apply in lifts (if

recommended by manufacturer) to final intended profile as directed by the Departmental Representative. Finish exposed surfaces (top and side towards ditch) with burlap sack to simulate a bush hammered finish. Cure patch as recommended by manufacturer.

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 and/or as directed by the Departmental Representative.

.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 Installation of special masonry joint finish sealant in capstone joints.

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.

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 a polymer modified mortar to repair/reinstate the tops of deteriorated capstones or, the use of DHL or “special” mortars to repair cracks in stone units.

.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 or his appointed 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 (mý) 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. A minimum of three repair mortar samples (for crack repair)shall be submitted for colour approval.

.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 24 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 Chip and Repoint Masonry Joints ....(m2).
.2 Mortar Fill....(m3).
.3 Remove and Reset Loose Masonry

Units ....(m3).
.4 Masonry Vents….(each).
.5 Seal Skyward Facing Masonry Joints....(m).

.2 Measurement for payment for the item, "Mortar Fill", shall be by the cubic metre (m3) of mortar acceptably placed as fill to voids (including deep joints). Measurement shall be facilitated by calculating the average volume of material in a selected container to be used for measurement. A record, together with a description of location used, shall be kept by the Contractor and the Departmental Representative. The record shall be signed off by the Contractor's Representative and the Departmental Representative each day that fill mortar is used. Should the Contractor fail to have this completed daily when mortar fill is being used (shall give the Departmental Representative at least 24 hours' notice), the volume shall be estimated by the Departmental Representative and compared to the Contractor's record. Should there by a difference, the Departmental Representative's estimate will be considered as final for payment purposes.

.3 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".

.5 Measurement of payment for the item "Seal Skyward Facing Masonry Joints", will be paid for by the linear metre. This includes removal of existing Perma Chink (where present), placing new backer rod and reinstalling Perma Chink to the satisfaction of the Departmental Representative.

1.14 Basis of Payment

.1 Payment at the unit 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 acceptable product, as 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 Masonry Vents

.1 Masonry vents shall be a screened aluminum louvre fabrication with an acceptable product being that by "Midget Louvre Co.".

2.7 Sealant for Special Masonry Joint Finish Sealant Joints

.1 Installation of special masonry joint finish sealant shall be completed using an acrylic latex sealant. An acceptable product is "Perma Chink" as used for filling joints in log homes.

.2 Bond Breaker: use closed cell polyethylene backer rod recommended by sealant manufacturer. Where depth of joint prohibits use of backer rod, use recommended adhesive backed 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 "AIREX-L", by Euclid Admixture Canada Inc.), shall be added. Dosage to be as recommended by the Manufacturer.

.2 The effectiveness of the air entraining is dependent on not only the quantity of the agent but the ratio of agent to water. The total quantity of agent used will be reported to the Departmental Representative and reviewed to ensure that ineffective overdosing is not occurring. Overdosing or even high ratio of agent can significantly reduce working time and may cause adverse effects to the mortars durability.

.3 Note that air entrainment in bedding mortars, for laying new stone units, may be reduced to facilitate the work.

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 For joint removal requirements, refer to miscellaneous detail drawing.

.2 If loose material is encountered during removal for joints fitting any of the above definitions, 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, 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 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.

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 depth of the joint required.

.3 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.

.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 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 building.

.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 (Phase III), mortar fill to 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.

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. Caulking to be an approved clear coloured 20 year silicon sealant. Contractor to submit samples and/or product information concerning proposed sealant and only install sealant when approved by the Departmental Representative.

3.7 Installation of Special Masonry Joint Finish Sealant (Capstones)

.1 For skyward facing joints and top head joint (top vertical), sealant shall be applied as the finish layer of pointing rather than mortar.

.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.

3.8 Remove / Reinstall Deteriorated Special Masonry Joint Finish on Capstones

.1 Remove existing Perma Chink and backer rod or, bond breaking tape, as directed by the Departmental Representative.

.2 Install Perma Chink 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 individual, full Dutchman and partial Dutchman stones for removal within the limits of the work. The drawings delineate stone units for replacement (full and Dutchman) and while these are generally indicative of the work to be done, specific stone replacement shall only be as delineated by the Departmental Representative once access is in place and joint removals have been completed. It should be noted that there may be more or less stone to be replaced from that shown and all stone replacement shall be copmpleted at the unit prices bid for the work.

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 stones and cap stones).....m3.

.2 Stone Masonry Removals - Full Dutchman.....m3.

For these items, the volume shall be equal to the size of the actual finished new stone to be ordered. An additional removal up to 50mm (2in.) as well as the joint width surrounding the stone being removed will be included with this item. Any additional removal depth beyond 50 mm (2in.), shall be paid for under the Removals item. Additional removals shall only be done by direction from the Departmental Representative if additional removals (beyond the 50 mm (2in.) are done without authorization, they will be at the expense of the Contractor and will not be compensated for in any way. If the Departmental Representative requires any additional removals beyond the 50mm (2 in), 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.

1.6 Basis of Payment

.1 Payment at the unit price 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 175 mm.

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 Repair

.1 Where faces of existing stones are to be removed (175 mm nominal depth) for a Dutchman 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 shall be removed from the site on a daily basis.

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 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 C568-99 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, the stone will be 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 Stone (full stones and cap stones) m3
.2 Supply New Stone (full Dutchman).....m3

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

1.7 Basis of Payment

.1 Payment at the unit price 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.
.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.

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 cap stones and, where applicable, full Dutchman).

.2 Included with the work of this section shall be the supply and installation of steel cramp anchors as directed by the Departmental Representative.

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.
.1 "Install Stone Masonry (full stones and cap stones)" .....m3.
.2 "Install Stone Masonry (full Dutchman)".....m3.
.3 “Supply and Install Stainless Steel Cramp Anchors” ".....each.

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

1.7 Basis of Payment – Stone Installation

.1 Payment at the unit price bid for the above stone installation 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 Pointing of joints around the stone units.

.3 Payment for installation 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.

1.8 Basis of Payment – Cramp Anchors

.1 Payment at the unit price for the cramp anchor item shall be full compensation for all labour, equipment and materials necessary to do the work of this item including the supply of the cramp anchor, drilling and installation of the anchor portion into the masonry back-up and, the installation of the cramp portion.

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 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).

2.3 Cramp Anchors

.1 Cramp anchors shall be fabricated from stainless steel conforming to ASTM A666, Grade 316. The anchor portion shall be secured in the back-up masonry with an approved non-moisture sensitive epoxy adhesive. Anchor hole size and application of adhesive to conform to adhesive manufacturer’s recommendations.

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 25 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 Where shown on the drawings or as directed by the Departmental Representative, install cramp anchors in accordance with the details on the drawings and as per manufacturer's recommendations for the grout.

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).

.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".

.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 of 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 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.

.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 Measurement and Payment Procedures

.1 There will be no measurement for payment for the work of Landscaping.

.2 Payment of landscaping shall be included in the Lump Sum Price for the item “Sitework”.

1.2 Description

.1 This section specifies the requirements for reinstating damaged landscaped areas within the work and staging areas, access route and areas disturbed by the work and consists of:

.1 Supplying, placing, and finish grading of a topsoil bed.

.2 Restoring lawn by seeding grass.

.3 Maintaining seeded areas until acceptance.

.2 All disturbed sodded areas, within the limits of construction zone, to be covered with topsoil, smoothed to the finish grade, and restored by seeding at Contractor's expense.

1.3 Related Sections

.1 Section 01 11 00 – General Instructions.

.2 Section 01 35 43 – Environmental Procedures.

1.4 Preliminary Inspection

.1 Establish the condition of sodded areas in conjunction with Departmental Representative before starting work.

1.5 Source Quality Control

.1 At least 2 weeks before starting final topsoil work, advise Departmental Representative of proposed sources of topsoil and grass seeds. Provide Departmental Representative with access to the sources for inspection, sampling and testing.

.2 When proposed sources are approved, use no other sources without written authorization from Departmental Representative.

1.6 Scheduling of Seeding Work

.1 Obtain Departmental Representative's approval of the schedule for seeding before proceeding.

PART 2 - PRODUCTS

2.1 Topsoil

.1 New topsoil to be a friable sandy-clayish loam of good humus content, suitable for supporting sod growth, free from:
.1 Debris and stones over 50 mm diameter.
.2 Coarse vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

.2 Approval of topsoil material subject to soil testing and analysis. Testing of topsoil will be carried out by testing laboratory designated by Departmental Representative. Departmental

Representative will pay for cost of tests.

2.2 Seeds

.1 Number 1 Kentucky Bluegrass/Fescue seeds to produce sod with minimum 40% Kentucky Bluegrass, 30% Creeping Red Fescue.

PART 3 - EXECUTION

3.1 Preparation of Topsoil Sub-grade

.1 Verify that grades are correct. If discrepancies occur, notify Departmental Representative and do not start other landscape work in that area until instructed to do so in writing by Departmental Representative.

.2 Grade soil, eliminating uneven areas and low spots, ensuring that new sodded surface will be faired-off to the existing sodded areas with no sharp transition.

.3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials. Remove debris which protrudes more than 75 mm above surface. Dispose of removed material off site.

.4 Coarse cultivate entire area which is to receive topsoil to depth of 100 mm. Coarse cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.2 Placing and Spreading of Topsoil

.1 Place topsoil after Departmental Representative has accepted sub-grade.

.2 Spread topsoil to 150 mm minimum depth after settlement and 80% compaction. Keep final elevation 15 mm below finished grade to allow room for sod.

.3 Manually spread topsoil around trees, shrubs and obstacles.

.4 Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.

.5 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative. Leave surfaces smooth, uniform and firm enough to resist deep footprints.

3.3 Acceptance of Topsoil Grading

.1 Departmental Representative will inspect topsoil in place and determine acceptance of depth of topsoil and finish grading.

3.4 Surplus Topsoil Material

.1 Dispose of materials not required off site.

3.5 Maintenance of Seeded Areas

.1 Maintain seeded areas until accepted by Departmental Representative.

.2 Apply water to ensure establishment and continuous growth of grass. Apply sufficient water to ensure moisture penetration of 200 mm into soil below sod.

.3 Cut grass when it reaches a height of 80 mms. Cut grass thereafter frequently enough to be kept at a height of 80 to 100 mm. Allow clippings to remain.

3.6 Acceptance of Seeded Areas

.1 Approval of material at its source does not prevent subsequent rejection on job site.

.2 Seeded lawn will be approved when:

.1 Growth of seeded areas has been properly established;

.2 Turf is free of bare and dead spots;

.3 No surface soil is visible when grass has been mowed to a height of 80 mms; and,

.4 Grass has been cut a minimum of 2 times.