

SPECIFICATION FOR MASONRY STABILIZATION

HALIFAX DEFENCE COMPLEX

HALIFAX, NOVA SCOTIA

PREPARED BY:

PARKS CANADA AGENCY

This document is the document referred to as Plans and Specifications and marked "A" in the Articles of Agreement.

MASONRY STABILIZATION

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1. Description of Work

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Work under this contract covers the stabilization of stone and brick masonry elements at the Halifax Defence Complex and other Parks Canada sites in Nova Scotia.

The Citadel and all other Parks Canada sites are historic place and as such must be protected from any damage due to construction activities on the site. Preservation of existing historic fabric shall be given the highest priority during construction related to the protection/ repair of the assets. Any damage which occurs to adjacent assets or surfaces shall be repaired at the Contractor's cost.

The Contractor shall be deemed to have visited the site and examined all assets and to have become fully familiar with all conditions relative to carrying out the work. There shall be no consideration given to claims resulting from the Contractor's failure to carry out sufficient site investigations prior to tendering of the work.

The scope of work for this project will include the following (but is not limited to) and will be carried out on an as requested basis:

- Scaffolding
- Repointing brick chimneys
- Reparing brick chimneys
- Supply and install replacement brick.
- Repointing stone walls.
- Grouting stone walls.
- Repair/replace sections of cobblestone swale.
- Onsite safety, barricades, construction safety fence as required.

The above scope is provided for general information only.

2. Documents Required

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Maintain at job site, one copy each of following:

- .1 Specifications.
- .2 Addenda.
- .3 Reviewed shop drawings.
- .4 Change orders.
- .5 Other modifications to Contract.
- .6 Field test reports.
- .7 Manufacturers' installation and application instructions.
- .8 Site Specific Safety Plan

3. Products

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Contractor's duties:

- .1 Order products specified from designated suppliers. Order in quantities and at times compatible with construction schedule and site storage capacity.
- .2 Transport, unload and handle at site.
- .3 Promptly inspect delivered products, and give written report to the Project Manager on condition of all items received.
- .4 Pay demurrage charges.
- .5 Install, connect and finish products as specified.

4. Work Schedule

- .1 The work will be carried out on an as and when requested basis for each year the contract is in place.
- .2 With each request for services an agreed schedule will be established between Parks Canada Agency and the Contractor and will be confirmed in writing.
- .3 The Contractor is to comply with the agreed schedule(s) at all times. If, for any reasons, the schedule is not followed, the Contractor is to immediately notify the Agency of the change and submit a revised Schedule for acceptance.
- .4 Interim reviews of work progress based on work Schedule will be conducted as decided by the Agency and Schedule updated by Contractor as requested by the Agency.
- .5 If required, the Contractor shall increase manpower and equipment and make whatever adjustments are appropriate to ensure that the project is completed on schedule.

5. Contractor's Use of Site

- .1 The site is located at the Halifax Citadel or other Parks Canada sites. Use of the site shall be limited to the areas adjacent to the work. Access to these areas at the Citadel will be by the existing perimeter road and ramp into the ditch. The contractor shall liaise with Parks regarding acceptable times and usage of the site, roads, etc. Material, equipment and vehicles shall be delivered to site before 0900 hours or after 1800 hours. It shall be the Contractor's responsibility to arrange for all required transportation of men, equipment and materials to the site.
- .2 Do not unreasonably encumber site with materials or equipment.
- .3 Move stored products or equipment which interfere with operations of Parks Canada.

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	.4	Obtain and pay for use of additional storage or work areas needed for operations.
	.5	Provide all barriers, signs, enclosures, etc. to ensure safety of the public or other parties on the site.
	.6	No smoking on site within 4 m of any doors or windows.
<u>5. Project Manager</u>	.1	The Project Manager for this work shall be name and contact information provided when a call up is requested.
<u>6. Budget</u>	.1	The actual amount of the contract will be based on the scope of work requested and may not expend the entire budget, at the sole discretion of the Agency.
<u>7. Measurement for Payment</u>	.1	<p>Much of the work of this contract is covered by unit rates and shall be measured and paid for as described in Section 01006. The quantities for the various items will only become known as the work proceeds. Unit rates provided will apply to greater or lesser quantities as the eventual scope of work dictates.</p> <p>Cost plus work items approved by Parks shall be recorded on daily work sheets which shall show all the hours for equipment and labour applicable to the cost plus items. These sheets shall also contain agreed quantities for materials for each day's work and shall be signed by the Contractor at the close of each day's activities and submitted <u>daily</u> to the Project Manager for review and approval.</p>
<u>8. Codes and Standards</u>	.1	Perform work in accordance with latest edition of National Building Code of Canada (NBCC) and any other code of provincial or local application provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.
	.2	Meet or exceed requirements of contract documents, specified standards, codes and referenced documents.
	.3	All work shall be carried out in accordance with the Nova Scotia Occupational Health and Safety Act and the Canada Labour Code Part II, and the Canada Occupational Safety and Health Regulations made under Part II of the Canada Labour Code.
<u>9. Project Meetings</u>	.1	Attend project meetings at times and locations approved by the Project Manager.

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| | .2 | Notify all parties concerned of meetings. |
| | .3 | Parks will record notes of meetings, and distribute to all parties. |
| <u>10. Setting Out of Work</u> | .1 | Assume full responsibility for and execute complete layout of work to locations, lines and elevations required. |
| | .2 | Provide devices needed to lay out and construct work. |
| | .3 | Supply such devices as straight edges and templates required to facilitate the Project Manager's inspection of work. |
| | .4 | Supply stakes and other survey markers required for laying out work. |
| | .5 | Do not use spray paint, chalk, etc. that will deface finished, exposed surfaces. |
| <u>11. Cutting, Fitting and Patching</u> | .1 | Execute cutting, fitting and patching required to make work fit properly. Maintain historic fabric at all times. Review items to be cut, fitted, patched, etc. with the Project Manager and obtain approval before proceeding with the work. |
| | .2 | Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work. |
| | .3 | Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly. |
| | .4 | Fit work airtight to pipes, sleeves, ducts and conduits. |
| | .5 | Halifax Citadel is an historic site and no historically significant aspects shall be altered. |
| <u>12. Protection</u> | .1 | Provide temporary dust screens, barriers, warning signs in locations where work is adjacent to areas used by public or government staff. |
| <u>13. National Parks Act</u> | .1 | Perform work in accordance with applicable sections of the National Parks Act. |
| <u>14. Protection of Materials</u> | .1 | Store and protect all materials and equipment required in connection with the work until they have been placed in the work and accepted by the Project Manager. Immediately remove rejected materials from the site. |

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| <u>15. Cleaning During
Construction</u> | .1 | Maintain work area free from accumulations of waste materials and rubbish. |
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PART 1 - GENERAL1.1 Description

- .1 This section covers the measurement of work done for payment purposes, and the scope of the work covered by the pay items.
- .2 It is the intention to provide for a finished piece of work, complete in all essentials and details, including all items reasonably inferable from the drawings and specifications.
- .3 The aggregate of all unit prices and lump sum payments shall constitute full compensation for the entire work of the Contract, as shown, specified and intended, regardless of any omission in the tender documents of any items which are necessary for the completion of the work including temporary facilities, safety, etc.
- .4 Should there be any discrepancy regarding measurement between the Measurement and Payment Section and any other section in the specifications, the Measurement and Payment Section shall overrule the other specification section.
- .5 Unless otherwise specified, all materials necessary to complete the items listed in the Unit Price Table and the finished work are to be supplied by the Contractor and the cost of such material is to be included in the Contractor's prices. There will be no measurement for work not authorized, or for work beyond authorized limits as determined by the Agency.
- .6 All unit prices and lump sums shall include all costs applicable to the items, including labour, materials, equipment, transportation, ancillaries and all other applicable and relevant costs as intended and as required to complete the work to the full satisfaction of the Engineer. The unit prices and lump sums indicated shall exclude HST.
- .7 Parks Canada Agency will make a final decision on the quantities in the field. The Contractor's unit prices shall apply to the actual quantity measured in the field and accepted by the Agency.
- .8 All work including shoring, protection measures, etc. required to prevent damage/disturbance to existing structures of any areas damaged as a result of work or access are considered incidental to the work.

- .9 Where disposal of excess material or debris is included in an item this shall include disposal off site in an environmentally approved disposal site.
- .10 The intent is to cover a range of required repair work as determined by the Agency on the site under established unit rates. Actual quantities may vary widely depending on the final scope of work and the condition of the various structures.

1.2 Measurement and Payment

.1 Scaffolding

Measurement for this item shall be by the square metre of wall face requiring access by scaffolding.

The price shall include all labour, equipment and materials necessary to supply, erect and maintain safe scaffolding access to designated work areas as required to carry out re-pointing, grouting or other stabilization work.

.2 Repointing

This item only applies to existing wall/chimney areas requiring repointing.

Measurement for repointing surface joints in walls, caps, etc. shall be by the square metre of surface acceptably repointed, as determined by the Agency.

The price shall include the mechanical removal of all material (i.e. raking out the joint to a minimum 25 mm depth or to sound mortar up to a maximum of 75 mm), flushing the cleaned-out joints with water, repointing joints with specified mortar, washing and rinsing surface, clean-up of surrounding areas, measures required to prevent damage to existing brick or stone units, and correcting any damage (if it occurs), and all other

work, including tools and PPE necessary to completely repair and protect the designated surfaces as intended.

.3 Parging

Measurement for reparging the surface of rampart chimeys shall be by the square meter of surface acceptably reparged as determined by the Agency.

The price shall include the removal of all loose or deteriorated parging within the designated area, cleaning remaining brick surfaces and all labour and material necessary to prepare and place the specified parging mortar, blend into existing edges, and all other work necessary to completely reparse the designated areas as intended.

.4 Grouting

Measurement for this item shall be by the number of bags of grout placed in the wall. The Contractor shall keep a record of the number of bags used. The theoretical volume shall be established on site prior to any grouting procedures taking place, based on the mix design and a site trial mix of grout (i.e. one bag will produce >x= cubic metres of grout). This shall be the standard for all grout measurements.

The price shall include submission of proposed grout mixes and methods, temporary support of stone or brick units as required, removing wet sand and deteriorated mortar deeper than 75 mm from the face with a high pressure water wash, injection and inspection ports on the outside face joints of the walls if applicable, removing veneer units as required, injection of the grout to fill the resulting voids, repair the pointing as required, washing and rinsing to provide a clean finished wall surface all to the full satisfaction of the Agency and all other work necessary to completely grout the wall. Pointing and/or finishing the joints within 75 mm of the surface is measured and paid for in Item No. 2.

.5 Cost Plus Work

Measurement for this item shall be by the approved hours for labour and equipment and by quantities approved by the Project Manager for materials.

Payment for **labour** shall be at the hourly rates bid for Item No. 5a in the Unit Price Table. The rates shall include a small tools allowance for shovels, hammers, wheel barrows, ladders, electric, pylons/delineator, grinders etc. Also included in the rates are **all required PPE (glasses, ear plugs, etc.)**. Only large equipment will be paid for separately. The rate shall apply to all hours during the Contractor's regular working day. Only hours on site will be measured (ie. travel time to and from off-site shops etc. will not be measured) There shall be no additional payment for overtime hours unless approval has been obtained in advance from the Agency. Work crew size and labour classes to be confirmed with the Agency prior to work commencing. Full time Supervisor rate shall only be applied when more than 3 workers are on site. Site Supervisor rate shall be used to perform hazards assessments/safe work plans, as required, to complete assigned work, and shall be limited to a maximum of 4 hours. Only labour designations identified on the Unit Price Table or subsequently approved by the Agency will be recognized for payment purposes.

Payment for **equipment** shall be at the hourly rates. The rates shall include the operator and all expenses associated with operating the equipment. Electric chipping hammer day rate shall include the cost of all bits or other items needed for its operation, and only be billed when used. Trucking hourly rate to be confirmed with the Agency prior to work starting and shall only be used to deliver large items such as materials, staging, fencing etc. to the work site at the start of the project and the end if required. Generator rate shall include all fuel and only be used when power is not available in the work area. Only equipment specifically identified or subsequently approved by the Agency shall be recognized for payment purposes. If it becomes necessary to use additional equipment the hourly rates shall be submitted for approval of the Agency in advance. Work to be scheduled to minimize the amount of time equipment is needed on site.

Payment for **materials** shall be at cost (excluding HST) plus 10% for overhead and profit. Materials to include bags of mortar, cement, sand, grinding disks etc.

At the end of each day the Contractor shall submit a detailed log of all hours and all labour, equipment and material which will be reviewed and signed by the Project Manager. Any corrections shall be made by the Contractor as directed. These sheets shall be submitted with back-up invoices for material, and equipment rentals with each progress claim.

Cost plus claims shall be broken down by activity (i.e. "repairing swale," etc.) and shall indicate the days being claimed to allow for cross referencing with the submitted logs.

Only work specifically approved by the Agency shall be carried out under this item.

.6 Testing Allowance

The Contractor will be required to arrange for a testing company to carry out all testing work for the project at the Agency's direction. Payment for the testing directed by the Agency will be at cost to the Contractor, excluding taxes. The Contractor shall submit invoices from the testing laboratory with each month's progress claim.

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1. Access

- .1 Use existing roads/paths for access to project site, storage areas or work areas, maintain such roads/paths for duration of contract and make good damage resulting from Contractor's use of roads/paths to Owner's satisfaction.
- .2 Contractor shall accommodate and permit authorized Park Canada Agency employees on the site.

2. Contractor usage

- 1. Contractor may have use of Casemate C11 if available at while at the Citadel.

3. Restraints

- .1 Access to the Citadel interior is limited by the size of the entrance tunnel.

4. Sanitary Facilities

- .1 The Contractor may use the existing public sanitary facilities for work force.
- .2 Keep area and premises in sanitary condition.

5. Water Supply

- .1 Water can be accessed in Casemate C48B and Cavalier Casemate CC10 at the Citadel. In remote work areas arrange, pay for and maintain temporary potable water supply in accordance with governing regulations and ordinances.

6. Power

- .1 Power can be accessed in the Citadel Casemates. Remote areas will require portable power generation using cost plus rates

7. Signs and Notices

- .1 Signs and notices for safety or instruction to be in English and French languages, or commonly understood graphic symbols.
- .2 Supply all labour, materials and equipment as required to install the furnished signs.

8. Scaffolding

- .1 Construct and maintain scaffolding in rigid, secure and safe manner.

1. References

- .1 CSA S269.1-(Latest), Falsework For Construction Purposes.
- .2 CSA S269.2-(Latest), Access Scaffolding for Construction Purposes.
- .3 FCC No. 301-(Latest) Standard for Construction Operations.
- .4 FCC No. 302-(Latest) Standard for Welding and Cutting.

2. Responsibility

- .1 Be responsible for safety of persons and property on work site and for protection of Parks employees and general public circulating adjacent to work operations and to the 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. General Protection

- .1 Carry out work placing maximum emphasis on safety, giving precedence to health and safety of public, Parks employees, site personnel and protection of the environment over cost and schedule considerations of work.
- .2 Provide temporary protection for safe handling of building occupants.
- .3 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.
- .4 Be vigilant and ensure that non-authorized persons are not allowed to circulate in designated construction areas of work site. Provide appropriate means by use of barricades, fences, warning signs and temporary lighting as required. Secure site at night time (or provide security guard) as deemed necessary to protect site against entry.

4. Regulatory Requirements

- .1 Comply with the Occupational Health and Safety Act for the Province of Nova Scotia and the Industrial Safety Regulations made pursuant to the Act.
- .2 Comply with Canada Labour Code Part II, and Canada Occupational Safety and Health Regulations.
- .3 Observe and enforce construction safety measures required by:
 - .1 National Building Code of Canada, Part 8;

- .2 Provincial Worker's Compensation Board;
- .3 Municipal statutes and ordinances.

- .4 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Agency will advise on the course of action to be followed.

- .5 A copy of the Canada Labour Code Part II may be obtained by contacting:
Canadian Government Publishing
Public Works & Government Services Canada
Ottawa, Ontario K1A 0S9
Tel: (819) 956-4800
(Publication No. L31-85/2000 E or F)

5. Filing of Notice

- .1 File all Notices with Provincial authorities prior to commencement of Work.

6. Work Permit

- .1 Obtain building permit related to project prior to commencement of Work.

7. Safety Assessment

- .1 Perform site specific safety hazard assessment related to project as specified in Health and Safety Plan.

8. Meetings

- .1 Attend health and safety pre-construction meeting as directed by the Project Manager.

9. Health and Safety Plan

- .1 Develop written site-specific Project Health and Safety Plan prior to commencement of Work. Submit plan to the Project Manager within 14 calendar days after award of Contract.
- .2 To prepare Health and Safety Plan, conduct a site specific hazard assessment based on review of all work of Contract Documents and of work site. Identify all known and potential health risks and safety hazards.
- .3 Based on hazard assessment, prepare Project Health and Safety Plan to include the following:
 - .1 Summary of health risks and safety hazards resulting from analysis of hazard assessment
 - .2 List critical site tasks and operations which must be performed as part of the Work.

- .3 List hazardous materials to be brought on site as required by Work.
- .4 Indicate engineering and control measures to be implemented at the site for managing identified risks and hazards.
- .5 Identify personal protective equipment to be used by workers as required to manage hazards that cannot be reasonably or practically managed by engineering and administrative controls.
- .6 State company's Safety Policy. Provide confirmation that General Contractor and subcontractors currently have in place Standard Operating Procedures (SOP) and Safe Work Practises (SWP), representative of the work type to be undertaken and meeting provincial safety regulations; that such procedures and practises will be stringently followed and enforced during work of this contract. Maintain a copy of all SOP and SWP on site at all times for own use and provide for inspection when requested by Project Manager.
- .7 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (ie. names/telephone numbers) of:
 - .1 Designated Personnel from own company;
 - .2 Local emergency resources;
 - .3 Regulatory Agencies applicable to work and as per legislated regulations.
- .4 All control measures, protective devices, work practises and procedures indicated in plan shall comply with applicable Federal, and Provincial Safety Regulations.
- .5 Develop plan in collaboration with all sub-contractors. Ensure that all work and activities of sub-contractors are included in the hazard assessment and are reflected in the Plan.
- .6 Implement, maintain and enforce compliance with requirements of the Health and Safety Plan until final completion of work and demobilization from site.
- .7 As the project progresses, continually review and evaluate work and construction site. Carry out additional hazard assessments, identifying new or potential health risks and safety hazards not previously known. Immediately revise and update Project Health and Safety Plan. Notwithstanding the

above, a hazard assessment shall be carried out and the Health and Safety Plan revised whenever:

- .1 New subtrade work, new subcontractor(s) or new workers arrive at the site to commence another portion of the work.
 - .2 The scope of work has been changed by Change Order
 - .3 Errors or Omissions are identified by any authorized safety representative.
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- .8 Post a legibly typed copy of the Health and Safety Plan in a common visible area at the work site. Ensure that all workers and other authorized persons allowed access to the construction area(s) are aware of and abide by the rules and regulations indicated in the Plan.
 - .9 Post all versions to the Plan and submit an updated copy to the Agency in all instances.
 - .10 Maintain copies of all hazard assessments on site for the entire duration of work. Make available upon request.
 - .11 Submission of the Health and Safety Plan, and any revised version, to the Agency is for information and reference purposes only. It shall not be construed to imply approval, be interpreted as a warranty of being complete, accurate and legislative compliant and shall not relieve Contractor of his legal obligations for the provision Health and Safety on the construction project.

10. Hazardous Products

- .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 - MSDS data sheets to the Project Manager on delivery of materials.
- .3 All Data Sheets must be posted on site, in a common area, visible to all workers (and in locations accessible to tenants employees when work of this contract includes construction activities adjacent to occupied areas).
- .4 Make all efforts to select and use materials (ie. adhesives, solvents, cleaners, etc.) for the type and nature of work to be carried out which are the least hazardous products available, of

low VOC content or low toxicity type products and emitting low noxious odours. Select products known to be friendly to the environment and to human health. Communicate this intent to sub-contractors, suppliers and manufacturers.

- .5 Where the use of hazardous and toxic products cannot be avoided:
- .1 Advise the Agency beforehand of the product(s) intended for use, submit WHMIS data sheets as per clause 10.2 above.

11. Fire Safety Requirements

- .1 Comply with Federal and Provincial fire safety regulations, including the requirements of the following standards as issued by the Fire Protective Services of Human Resources Development Canada:
 - .1 FCC 301 - Standard for Construction Operations.
 - .2 FCC 302 - Standard for Welding and Cutting.
 - .3 These standards may be viewed at the Regional Fire Protective Services= office (previously known as the Fire Commissioner of Canada) located at 99 Wyse Road, 8th floor, Dartmouth, NS; Tel: (902) 426-6053.

12. Powder Actuated Devices

- .1 Use of powder actuated fastening devices only after receipt of written permission from the Agency.

13. Overloading

- .1 Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.

14. Falsework

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

15. Scaffolding

- .1 Design, construct and maintain scaffolding in rigid, secure and safe manner in accordance with CAN/CSA - S269.2.
- .2 Erect scaffolding independent of walls. Remove promptly when no longer required.

16. Respiratory Protection

- .1 All personnel employed in an area of bird droppings, fumes, noxious gases, or dust, etc. or where there is a suspected oxygen deficiency are required to wear appropriate respiratory protection. The type of respiratory protection shall depend on the type and level of exposure.

- .2 Wet down bird droppings thoroughly with 3% formaldehyde solution in water before removal. Wet sufficiently to prevent airborne particles during removal.
- .3 Persons working in contaminated areas should wear masks capable of filtering out organisms. They also should wear protective clothing that can be removed at the site and placed in a plastic bag until washed in hot water and detergent. Boots should be hosed off before leaving the site to prevent the possible spread of histoplasma capsulation.
- .4 All work shall be carried out in accordance with applicable acts, regulations and guidelines. The Contractor shall liaise with authorities having jurisdiction and obtain all required permits related to handling and disposing of pigeon droppings.

17. Confined Spaces

- .1 All work in confined spaces shall be carried out in compliance with the Canada Labour Code, Part II, Section 11.
- .2 Contractor shall provide and maintain all equipment as required by any person to enter and/or perform work in a safe manner, in compliance with the Canada Occupational Safety and Health Regulations, Part XI. At the Engineer's request, the Contractor agrees to provide to PWGSC employees or its consultants, all necessary equipment as defined under Clause 7.2 above, to enter the confined space and the Contractor acknowledges that he/she is responsible for the safety and efficiency of this equipment.
- .3 Contractor shall provide and maintain training, as required by the Canada Labour Code, Part II, Section 11.
- .1 Contractor and/or his employees shall provide proof of training and qualifications when requested by the Agency.
- .4 Contractor shall provide the Agency with a copy of an "Entry Permit" for each and every entry into the confined space to ensure compliance with the Canada Labour Code, Part II, Section 11.
- .5 Contractor shall have a hazardous assessment of the confined space performed.
- .1 Contractor to provide the Agency with a copy of the hazardous assessment.
- .6 For the purposes of this contract, "confined space" means an enclosed or partially enclosed space that:

- .1 is not designed or intended for human occupancy except for the purpose of performing work,
- .2 has restricted means of access and egress, and
- .3 may become hazardous to an employee entering due to:
 - .1 its design, construction, location or atmosphere
 - .2 the materials or substances in it,
 - or
 - .3 any other conditions relating to it.

18. Elevated Work
Structures

- .1 Where required, erect and maintain scaffolding and/or ladders in a secure and safe manner in accordance with the Canada Labour Code Part II - Canada Occupational Safety and Health Regulations, Nova Scotia Occupational Safety and Health Regulations, Temporary Structures and Excavations Regulations and the Fall Protection and Scaffolding Regulations of the Province of Nova Scotia as well as any other applicable codes and standards.
- .2 Erect elevated work structures independent of walls. Remove promptly when no longer required.
- .3 Design/construct falsework in accordance with CSA S269.1-Latest.
- .4 Design/construct scaffolding in accordance with CSA S269.2-Latest.

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1. Fires

- .1 Fires and burning of rubbish on site shall not be permitted.

2. Disposal of Wastes

- .1 Do not bury rubbish and waste materials on site.
- .2 Do not dispose of waste or volatile materials, such as mineral spirits, oil, paint thinner or herbicides into waterways, storm or sanitary sewers or onto the ground.
- .3 The Contractor shall be fully responsible for safe disposal off the site in an environmentally acceptable manner and in accordance with all applicable regulations.

3. Pollution Control

- .1 Control emissions from equipment to local authorities emission requirements.
- .2 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
- .3 Clean up and remove all blown, excavated or imported material, material packaging, general equipment maintenance containers, general working debris, etc., to the designated dump site from the site daily.

1. General

- .1 Conduct cleaning and disposal operations to comply with local ordinances and antipollution laws.
- .2 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .3 Provide adequate ventilation during use of volatile or noxious substances.

2. Materials

- .1 Use only cleaning materials recommended by manufacturer for surface to be cleaned, and as recommended by cleaning material manufacturer.

3. Cleaning During Construction

- .1 Provide on site, dump containers or bags for collection of waste materials and debris. Cigarette butts to be disposed of and not to be thrown on ground.
- .2 Dispose of waste materials, and debris legally off site. No on site disposal is permitted.
- .3 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet surfaces nor contaminate building systems or be hazardous to the public visiting the site.

4. Final Cleaning

- .1 Broom clean stone, concrete, top of walls and other hard surfaces.
- .2 Rake clean other surfaces of the grounds, ramparts, etc.
- .3 Dispose of all debris, legally, off the site.

PART 1 – GENERAL**1.1 SUMMARY**

- .1 This Section describes the preparation and supply of mortar for all masonry work.

1.2 REFERENCES

- .1 CSA A179.M (Latest), Mortar and Grout for Unit Masonry.
- .2 CSA A82.56M (Latest), Aggregates for Masonry Mortar.
- .3 CAN/CSA-A5-M (Latest), Portland Cement
- .4 ASTM C207 (Latest), Hydrated Lime for Masonry Purposes.

1.3 DESIGN PERFORMANCE REQUIREMENTS

- .1 The following pre-construction testing is required to ensure mortar/grout meets the performance criteria:
 - .1 Mortar compressive strength: minimum 10 MPa, maximum 15 Mpa at 28 days;
 - .2 Grout compressive strength: minimum 6.0 Mpa, maximum 10 Mpa at 28 days.
 - .3 Air content of plastic mixes: not less than 10%, nor more than 15%.
 - .4 Vicat Cone penetration of mortar mix in plastic state: not less than 22mm, nor more than 28mm. for pointing mortar.
 - 5 Bulking analysis of proposed sand(s) used in mixes.
- .2 Mix designs & pre-construction testing to be at the contractor's cost.

1.4 TESTING STANDARDS

- .1 CSA A 179-94 Mortar and Grout for Unit Masonry. [for cube strength].
- .2 ASTM C780 Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry. [for Vicat Cone test].
- .3 Measurement of air content: use air meter made by Technical Innovations, Cleveland, Ohio, USA. Follow manufacturer's instructions.

1.5 TEST REPORTS FOLLOWING COMMENCEMENT OF WORK

- .1 Submit test reports on the following at the intervals indicated:
 - .1 Bulking analysis of sand following any new delivery of sand, following any change in environmental conditions, or when requested by the Project Manager;
 - .2 Air content of mortar mix at discretion of the Project Manager;
 - .3 Vicat cone penetration on every batch for the first three days and thereafter at the discretion of the Project Manager;
 - .4 Compressive strength of mortar for 7 and 28 day tests at the discretion of the Project Manager.

1.6 QUALITY ASSURANCE

- .1 The mixing of mortars shall only be done by mechanics having a minimum of 3 years experience in the preparation of cement-lime mortars.

PART 2 PRODUCTS**2.1 MATERIALS****.1 Water:**

- .1 Clean and free from contaminants.

.2 Aggregates:

- .1 Sand: to CSA A82.56M, [Aggregates for Masonry Mortar] sharp, screened and washed pit sand, free of any organic material. Grading and colour to approval of Engineer as follows:
- .2 Provide custom-blended sand conforming to the following sieve analysis for mortar parging and for mortar joints in excess of 10mm in width:

Sieve Size		Percentage by Weight P a s s i n g Each Sieve	Percentage by Weight Retained on Each Sieve
Imperial	Metric		
No. 4	4.75mm	100	0
No. 8	2.36 mm	90	10
No. 16	1.18 mm	70	20
No. 30	600 microns	50	20
No. 50	300 microns	30	20
No. 100	150 microns	15	15
No. 200	75 microns	15	15

- .3 Provide custom blended sand conforming to the following sieve analysis for joints less than 10mm in width.

Sieve Size		Percentage by Weight P a s s i n g Each Sieve	Percentage by Weight Retained on Each Sieve
Imperial	Metric		
No. 4	4.75 mm	100	0
No. 8	2.36 mm	100	0
No. 16	1.18 mm	80	20
No. 30	600 microns	55	25
No. 50	300 microns	30	25
No. 100	150 microns	15	15
No. 200	150 microns	0	15

- .4 Where a standard sand falls outside the above analysis, blend and screen to meet the above requirements.
- .5 Standard of acceptance for bedding and pointing mortars for brick and sandstone, subject to blending: Shubenacadie sand.
- .6 Aggregate for repointing limestone Coat of Arms to match colour of aggregates in existing limestone pointing mortar.

.3 Lime

- .1 Hydrated Lime, Type SA, to ASTM C207 -91. Type SA lime contains air entraining agent.
- .4 Cement
 - .1 Non-staining, white Portland cement to CAN3-A5.M93, normal (symbol 10) type.
- .5 Admixture for Colour
 - .1 Inorganic pigment, dry powder, mineral oxide type. Standard of acceptance, Elementis Pigments Inc, Toronto, ON.

2.2 SOURCES

- .1 Use same manufacturer brands and suppliers for sources of mortar materials for entire project.

2.3 EQUIPMENT

- .1 Mortars are to be prepared in a mechanical paddle mixer.

2.4 MORTAR MIXES

- .1 Mortar for pointing: by volume: one part white Portland cement: one parts hydrated lime and five parts aggregate. [1:1:5]. Use aggregate grading specified for mortar joint width.
- .2 Mortar for parging : all as above but using coarser aggregate.
- .3 Pointing and parging mortars may require the addition of pigment in order to match existing mortar on site. Pigment shall not exceed 2% of the binder content by volume.
- .4 Grout Mix: The ratio of grout materials shall be proposed by the Contractor to produce a flow of 10 to 15 seconds. Submit test results for three trial grout mixes. The Contractor should monitor the effectiveness of the grouting and make adjustments with the Project Manager's approval to the mix to achieve the maximum penetration and infilling of the voids in the wall. The grout used should be as permeable as possible to water vapour to match the original mortar as closely as possible.

King grout mix?

PART 3 – EXECUTION

3.1 PREPARATION OF MORTARS

- .1 Bulking of Sand and Aggregates
 - .1 Bulking is the increase in volume of dry sand when it becomes damp;
 - .2 Damp sand can occupy as much as one-third more volume than either dry or saturated sand;
 - .3 Damp sand may be used if its volume is adjusted for bulking. Obtain acceptance of Engineer of bulked sand volume. The Engineer reserves the right to reject sand if bulked volumes are excessive.
- .2 Test and Adjustment of Sand Quantities for Bulking:
 - .1 Test sand to be used in mortar for bulking at the start of the work, after each new delivery of sand and after any severe change in weather;
 - .2 Obtain a sample of sand which accurately reflects the average condition of the pile of damp sand, by the following methods:
 - i Take 4 shovelfuls of sand, each from a different level of the pile, and mix thoroughly;
 - ii Place this sand in a conical pile and divide into 4 quarters with a board. Remove 2 opposite quarters from the pile, and combine the 2 remaining quarters and mix thoroughly;
 - iii Repeat this quartering and mixing procedure until a sample of the size

required for testing remains.

- .3 Fill a 1-litre capacity jar, about two-thirds full with the damp sand to be tested. Drop the sand in loosely. Do not pack it in. Level off the surface, then measure the depth of the damp sand (D);
 - .4 Empty the sand into another container, being careful not to lose any, and half fill the first container with water;
 - .5 Pour back about half of the test sample of sand slowly into the water so that it is entirely saturated. Rod it thoroughly to remove any air;
 - .6 Add the rest of the sand, rodding again to remove, and level off the surface. Measure the depth of the saturated sand (S), which will be less than the depth of the damp sand;
 - .7 Calculate the percentage bulking, using formula: $[(D-S) \times 100\%]/S = \text{percentage bulking}$; where D = depth of damp sand, and S = depth of saturated sand;
 - .8 When batching the sand for use in mortar, increase the volume of the sand used by the percentage bulking shown in the test. For example, if the mortar mix is a standard 1:1:6 mix requiring 6 parts of sand and the percentage bulking is found to be 20%, the volume of sand used in the mortar should be: $(6 \times 120)/100 = 7.2$ parts. To adjust for bulking, the actual mortar mix will therefore be 1:1:7.2 when this same damp sand is being used.
- .3 Preparation of Cement-Lime-Sand Mixes
- .1 Prepare measuring boxes to ensure accurate proportioning of mortar ingredients;
 - .2 Introduce approximately 75% of the total volume of water into the mixer, followed by 50% of the sand and all of the dry hydrated lime and any pigment. Mix for approximately 3 minutes or until the materials are thoroughly blended and no particles of white lime are apparent in the mix;
 - .3 Let stand for 5 minutes;
 - .4 Add the full volume of Portland cement, the remainder of the sand and water. Mix for further 3-5 minutes until thoroughly blended and mortar has reached consistency determined by Vicat Cone penetration testing. For parging mortar, add fibre reinforcing at final mixing. Add at rate of 1 litre container of fibre reinforcing to 20 litres of mortar. Distribute evenly through mix;
 - .5 Add just sufficient water to obtain workable consistency for setting units. Avoid too wet a mix which stains the face of the work. Vicat Cone penetration may be slightly greater for bedding mixes, but should not exceed maximum value specified by more than 20%. Record water quantities and use for subsequent mixes to help ensure uniformity of all subsequent mixes;
 - .6 Use all mixes within two hours. Do not re-temper.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

- .1 This Section describes the requirements for any replacement brick units required.

1.2 References

- .1 Burned clay brick (solid masonry units made from clay or shale) for use as facing brick to chimneys to ASTM C 216-Latest.

1.3 Submittals

- .1 Brick:
 - .1 Submit a samples of each brick type for approval prior to ordering.
 - .2 Samples shall be full size and of full colour range and texture to be supplied for the entire project.
 - .3 Submit the following technical data with samples:
 - .1 Name, address and location of manufacturer of new brick.
 - .2 Full technical data on the characteristics of the brick to include: compressive strength, initial rate of absorption, 24 hour water absorption and saturation coefficient, in accordance with CAN3-A82.2-M78 (Methods of Sampling and Testing Brick) and/or ASTM C97 as applicable.

1.4 Delivery, Storage and Handling

- .1 Deliver clay products to site on pallets, packaged to avoid chipping, damage or soiling from any means.

Store clay products on site on pallets, clear of the ground, protected from precipitation, soiling and damage by non-staining tarpaulins.

Take delivery of, handle and store as described above, bricks supplied by Owner.

2 - PRODUCTS

2.1 Materials

The Contractor shall determine quantities of bricks that are required to replace deteriorated units for use as facing bricks for the reconstruction of chimney sections. Match existing brick dimensions as closely as possible. The Contractor must submit samples to Parks Canada for approval.